

# Kitchener GO Rail Service Expansion

Initial Business Case Update  
November 2019

### **Disclaimer**

This Initial Business Case is intended to evaluate the case for implementing two-way all-day service on the Kitchener corridor through co-production against the previously announced freight bypass corridor. The options presented are based on Metrolinx's initial view of an achievable service pattern on a shared rail corridor, the infrastructure requirements to enable the service increase, and the timeline to deliver the program. These assumptions have since been refined through further project development and negotiations with CN. Variations on the service pattern, infrastructure scope and schedule will be assessed through the Preliminary Design Business Case.

This business case uses the Kitchener corridor service as of September 2018 as the baseline for analysis. Since then, early works on the Kitchener corridor and preliminary discussions with CN have achieved service increases that exceed the assumed business-as-usual service levels. The text of this business case reflects these latest changes; however, the economic and financial analyses have not been updated. As this project advances through the business case lifecycle, future analyses will consider the effects of re-baselining the existing service levels.

All figures within this Initial Business Case represent preliminary results. Forecasted costs, revenues and ridership figures are at a high level and will be subject to refinement as analysis of the Kitchener Rail Extension proceeds to the Preliminary Design Business Case phase, and later analyses in the Business Case lifecycle.

# **Kitchener GO Rail Service Expansion**

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## Executive Summary

In November 2018, Metrolinx published the GO Expansion Full Business Case for the expansion of transit services on Metrolinx-owned corridors in the GO rail network. The Full Business Case did not consider service extensions to Kitchener, Niagara and Bowmanville, and noted that these would be investigated through separate business cases.

Kitchener-Waterloo and Toronto have been identified as major high tech hubs, with the number of tech jobs increasing by 66% and 32% respectively between 2011 and 2016<sup>1</sup>. Collectively, the Toronto-Waterloo Innovation Corridor has been identified as an emerging technology cluster. In 2018, the federal government announced funding to establish an Advanced Manufacturing Supercluster centred on Toronto, Kitchener-Waterloo and Hamilton.

The expansion of rail service between Kitchener and Toronto has been a key aspiration for communities on the corridor. All day service was identified as a catalyst to support the development of the corridor as a tech employment hub. The transit service would provide new mobility options, strengthen the connections between Waterloo Region and the Greater Toronto and Hamilton Area, and support economic development along the corridor. Despite the benefits, efforts to increase service have been limited since the portion of the Kitchener corridor between Bramalea and Georgetown GO stations is a key freight rail corridor owned by CN, and the available capacity must be shared between passenger and freight rail services. While the challenges continue to be explored and worked through in partnership with CN, the extension of two-way all-day service to Kitchener was not included in the initial commitments of the GO Expansion program.

The service expansion has been the subject of several Metrolinx studies, including:

- Kitchener GO Rail Service Initial Business Case, November 2015
- GTHA Rail Rationalization: Economic and Financial Assessment, October 2016
- New 407 Rail Corridor Feasibility Study, November 2016

These studies identified an option to deliver two-way all-day rail service to Kitchener by diverting freight traffic onto a new rail bypass corridor between Bramalea and Georgetown GO stations. The analysis results indicated that the option was technically feasible, although extremely challenging to deliver. Based on early cost estimates, the freight rail bypass would deliver a positive economic and financial return on investment.

Through subsequent development of the project scope, the expected costs and timelines for the freight rail bypass increased significantly. Metrolinx explored an alternative 'minimal infrastructure' option that could allow for incremental passenger service increases without the construction of a new rail corridor, while still sufficiently protecting for freight services. This would be achieved through greater collaboration with CN and incremental infrastructure improvements on a shared-use Halton Subdivision.

This business case was initiated to update the previous analysis and evaluate both program delivery options developed to date against the committed GO Expansion program. The business case evaluation would determine if the options will meet the strategic, affordability, economic and deliverability objectives of Metrolinx, without compromising the financial viability of GO operations.

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<sup>1</sup> CBRE, 2017 Scoring Canadian Tech Talent report

This update incorporates the latest developments in Metrolinx’s business case methodology, as well as changes in the scope of the GO Expansion program since 2016. Therefore, the results of this IBC are not directly comparable against the previous analyses. To allow for comparisons between this business case update and the results of the previous studies, this report includes an assessment of a freight bypass corridor option that is comparable to the concept studied in 2016.

The scope of each option and the results of the analysis are summarized in the following table.

|                                    | <b>Option 1: Freight Bypass Corridor and Guelph Subdivision Improvements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>Option 2: Halton Subdivision and Guelph Subdivision Improvements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Key Scope Items                    | <ul style="list-style-type: none"> <li>New 407 Subdivision, including: <ul style="list-style-type: none"> <li>18.6 mile long double-tracked and signalized rail corridor;</li> <li>new bridges, structures and level crossings; and</li> <li>Hydro tower and gas line modifications.</li> </ul> </li> <li>Guelph Subdivision Improvements, including: <ul style="list-style-type: none"> <li>second side platforms at Guelph Central and Acton GO stations;</li> <li>additional passing tracks;</li> <li>track and structure rehabilitation;</li> <li>drainage improvements; and</li> <li>level crossing upgrades, closures and grade separations.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Halton Subdivision Improvements, including: <ul style="list-style-type: none"> <li>track, signal and structure improvements to address capacity constraints on the corridor;</li> <li>station track and platform modifications; and</li> <li>level crossing upgrades, closures and grade separations</li> </ul> </li> <li>Guelph Subdivision Improvements, including: <ul style="list-style-type: none"> <li>second side platforms at Guelph Central and Acton GO stations;</li> <li>additional passing tracks;</li> <li>track and structure rehabilitation;</li> <li>drainage improvements; and</li> <li>level crossing upgrades, closures and grade separations.</li> </ul> </li> </ul> |
| Strategic Case                     | <ul style="list-style-type: none"> <li>Meets strategic objectives and supports the 2041 Regional Transportation Plan, as well as provincial and municipal plans and policies</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <ul style="list-style-type: none"> <li>Meets strategic objectives and supports the 2041 Regional Transportation Plan, as well as provincial and municipal plans and policies</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Economic Case                      | <ul style="list-style-type: none"> <li>Economic benefits do not offset the high capital, operating and maintenance costs</li> <li>Net present value of \$(1,531)M and benefits-cost ratio of 0.5</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>Provides similar economic benefits to Option 1 at a reduced cost; economic benefits outweigh the capital, operating and maintenance costs</li> <li>Net present value of \$(76)M and benefits-cost ratio of 1.0</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Financial Case                     | <ul style="list-style-type: none"> <li>Incremental revenues do not offset the increased operating and maintenance costs relative to the BAU scenario.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Incremental revenues do not offset the increased operating and maintenance costs relative to the BAU scenario.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Deliverability and Operations Case | <ul style="list-style-type: none"> <li>Greater challenges in deliverability due to a larger project scope and the construction of an entirely new rail corridor.</li> <li>Require negotiations with MTO and Hydro One to share the Parkway Belt corridor.</li> <li>Railway within a 500Kv Hydro corridor with significant operational risks.</li> <li>Separation of freight and passenger traffic will provide greater control, flexibility and reliability for Metrolinx operations</li> </ul>                                                                                                                                                                           | <ul style="list-style-type: none"> <li>Reduced the project complexity since all works are within or adjacent to existing rail corridors</li> <li>Requires negotiations with CN to allow greater access to the Halton Subdivision</li> <li>Passenger and freight services will continue to share the corridor, with the potential to be a source of delays.</li> </ul>                                                                                                                                                                                                                                                                                                                                                            |

# 1

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## Introduction



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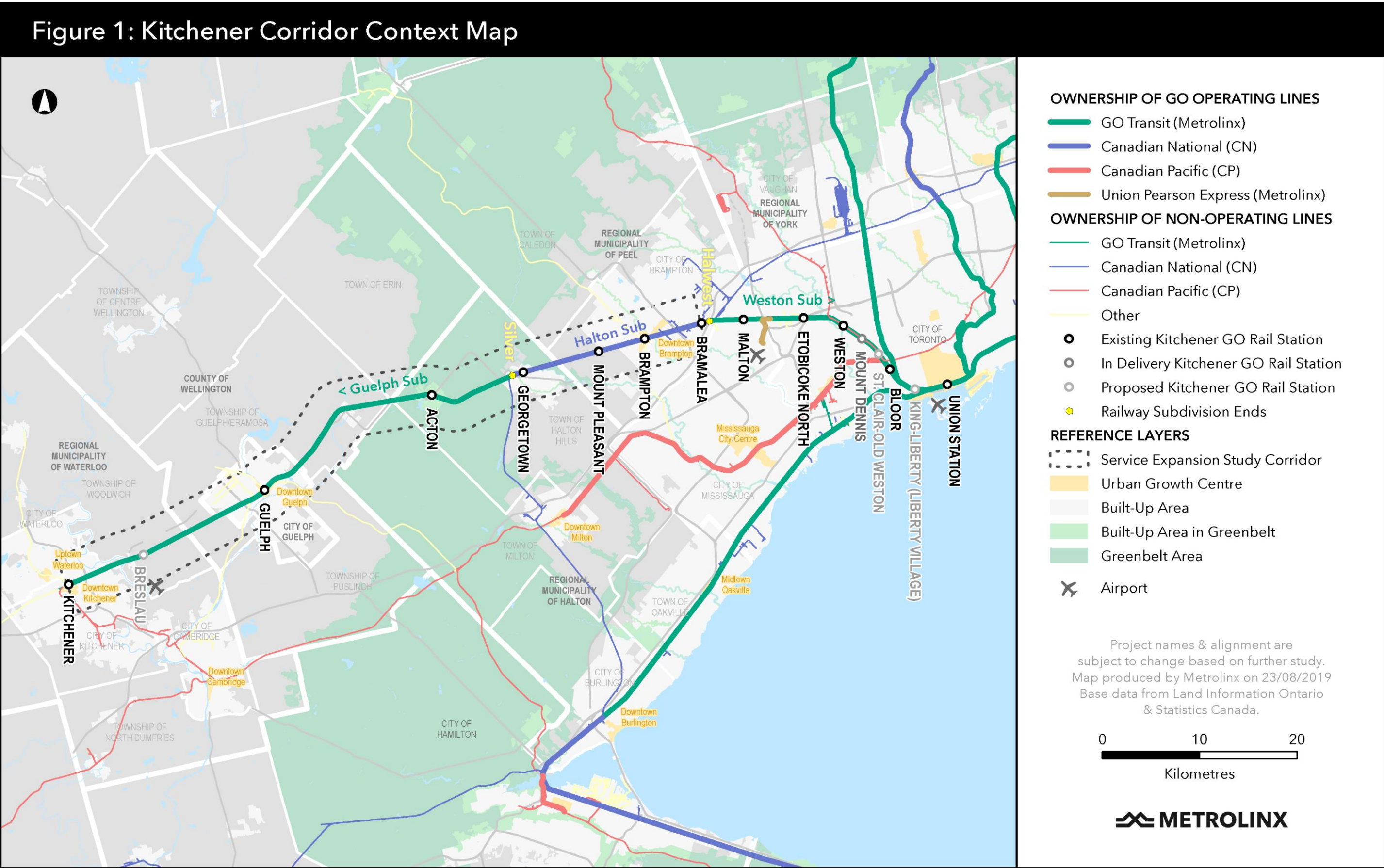
## Background

GO Transit, a division of Metrolinx, currently operates a commuter rail service on the Kitchener corridor between Union Station in the City of Toronto and Kitchener GO station in the City of Kitchener. The corridor includes 12 existing station stops in seven municipalities. One additional station is In Delivery and three more have been proposed along the corridor. Rail service is primarily provided for peak-period, peak-direction trips towards downtown Toronto in the morning, and returning in the evening. Regular bi-directional off-peak service is provided between Union Station and Mount Pleasant GO station in the City of Brampton, as well as limited bi-directional off-peak service between Union Station and Kitchener GO station.

The majority of the corridor is owned by Metrolinx, with the exception of a 13-mile segment of the Halton Subdivision between Bramalea and Georgetown GO stations. This segment is owned by CN, and is part of their main east-west freight rail corridor in Ontario. Metrolinx operates on the corridor through an access agreement with CN.

Figure 1 provides an overview of the stations and ownership for the Kitchener corridor.

Figure 1: Kitchener Corridor Context Map



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Through the current GO Expansion program, as defined in the GO Expansion Full Business Case (the “FBC”), Metrolinx will be constructing new track, signal and station infrastructure that will enhance the level of service on all of its rail corridors. On the Kitchener corridor, the program will deliver frequent two-way all-day service between Bramalea GO station and Union Station, and enhanced peak period service on the remainder of the corridor.

The municipalities of Brampton, Halton Hills, Guelph and Waterloo Region have advocated for a further extension of two-way, all-day service to Kitchener. The Kitchener GO Rail Service Initial Business Case (the “2015 IBC”) found that there is a feasible engineering and delivery concept for the service, and that the overall economic and financial return on investment associated with this service concept is positive. The 2015 IBC noted, however, that increases to passenger rail service west of Bramalea GO station are constrained by the capacity of the Halton Subdivision due to freight traffic. Current access agreements require negotiations with CN prior to any further increases in passenger rail services.

On June 14, 2016, the Province of Ontario announced that, through Metrolinx, an agreement-in-principle had been secured with CN to allow for the extension of two-way all-day service to Kitchener. Under the agreement, Metrolinx would construct a new rail corridor that would divert CN freight traffic off the Halton Subdivision, and free capacity for additional GO passenger rail service. Metrolinx began work on preliminary planning and feasibility analysis for the new rail corridor. In October 2016, Metrolinx completed the GTHA Rail Rationalization: Economic and Financial Assessment (the “2016 Economic and Financial Assessment”) to update the economic and financial analysis of the 2015 IBC based on the scope of the proposed freight bypass corridor. Concurrently, Metrolinx also completed the New 407 Rail Corridor Feasibility Study in November 2016 (the “2016 Feasibility Study”) to confirm the deliverability and technical feasibility of this option.

In the time since the June 2016 announcement, development of the project scope indicated a significant increase in the expected costs and timelines for the new rail bypass. Metrolinx explored an alternative ‘minimal infrastructure’ option that could allow for incremental passenger service increases without the construction of a new rail corridor, while still sufficiently protecting for freight services. This would be achieved through greater collaboration with CN and incremental infrastructure improvements on a shared-use Halton Subdivision. Metrolinx initiated this update to the 2015 IBC to evaluate this new option against the freight bypass option to identify the optimal investment decision.

## **Business Case Overview**

Business case analyses are mandated by Metrolinx for all projects that exceed \$50M in capital costs. As projects develop in scope and construction, business cases are completed to define the rationale and requirements for delivering said investment. As shown in Figure 2, the Initial Business Case is the first of four business cases completed in an investment’s lifecycle. It reviews variations of the preferred investment and selects a preferred option for further design and analysis.

Figure 2: Metrolinx Business Case Development Process



# 2



## The Case for Change



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## Introduction

This chapter defines the case for change, which is used to guide the evaluation of investment options considered within this business case.

## Existing Context

The Greater Toronto and Hamilton Area (GTHA) and wider Greater Golden Horseshoe (GGH) area are experiencing rapid growth and development. The population of the GGH is forecasted to increase to nearly 13.5 million by 2041. As the region develops, the economies of the constituent municipalities continue to integrate, necessitating improved intercity and interregional connections.

### *Corridor Context*

The Kitchener corridor primarily serves the GTHA municipalities of Toronto, Mississauga, Brampton and Halton Hills, as well as the municipalities of Guelph, Kitchener and Waterloo. By 2031, an estimated 2.3 million people and 1.4 million jobs will be located within 5 km of an existing Kitchener corridor station.

Both Kitchener-Waterloo and Toronto have been identified as major high tech hubs, with the number of tech jobs increasing by 66% and 32% respectively between 2011 and 2016<sup>2</sup>. Collectively, the Waterloo-Toronto Innovation Corridor has been identified as an emerging technology cluster. In 2018, the federal government announced funding to establish an Advanced Manufacturing Supercluster centred on Toronto, Kitchener-Waterloo and Hamilton. Part of this economic growth can be attributed to the concentration of post-secondary educational institutions along the corridor. Thirteen institutions have campuses located within 5 km of the Kitchener corridor, including:

- the main campuses of Wilfrid Laurier University and the University of Waterloo, as well as a satellite campus of McMaster University, near Kitchener GO station;
- the main campus of the University of Guelph, as well as a satellite campus of Conestoga College, near Guelph Central GO station;
- satellite campuses of Algoma University and Sheridan college, as well as a proposed satellite campus of Ryerson University, near Brampton GO station;
- the main campus of Humber College, near Etobicoke North GO station; and
- the main campus of OCAD University, Ryerson University, the University of Toronto, and George Brown College, as well as a satellite campus of Collège Boréal, near Union Station.

There are also two airports within 5 km of the Kitchener corridor which connect the region to the global economy and support the economic growth of the Greater Golden Horseshoe. These include:

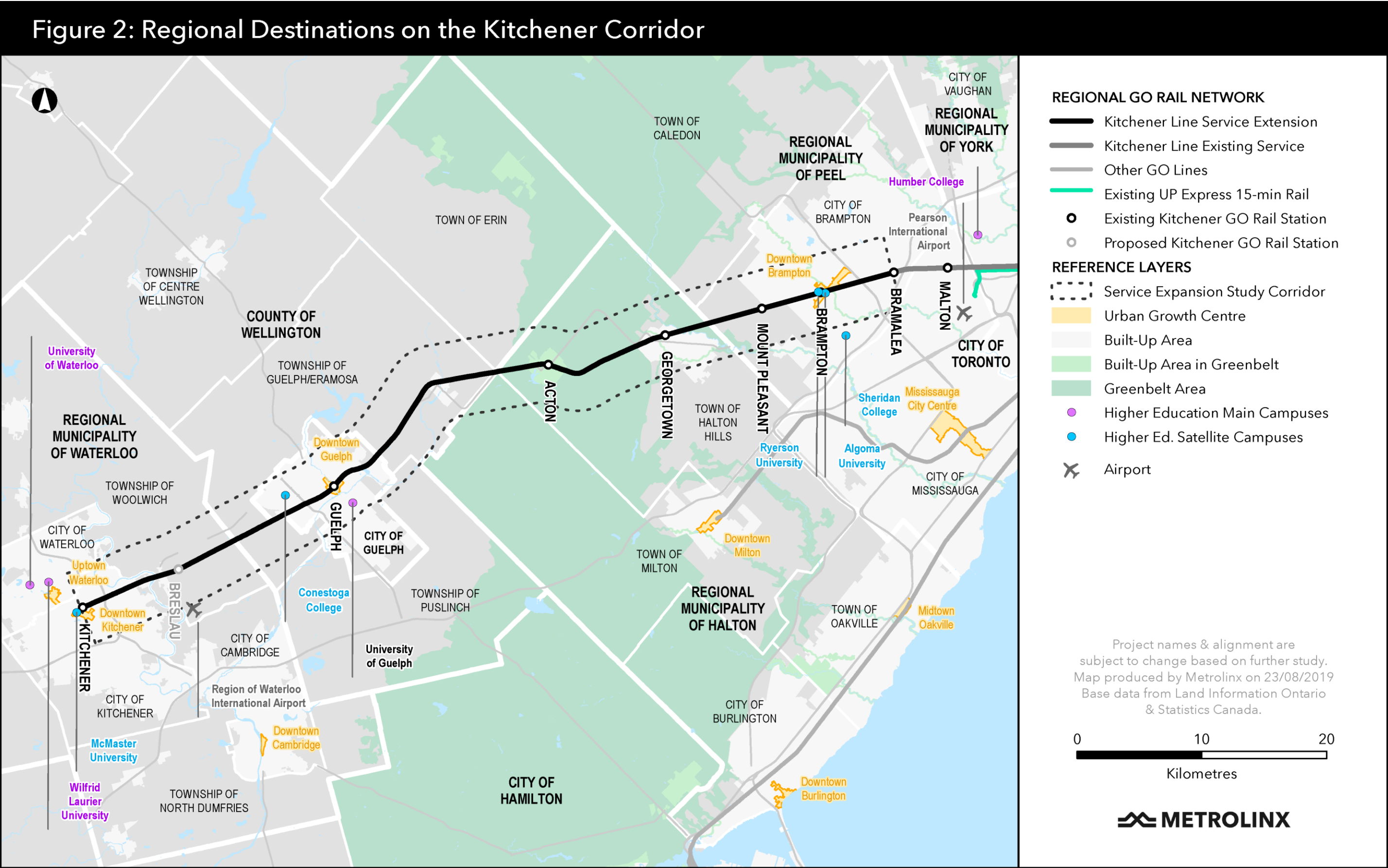
- Region of Waterloo International Airport near the proposed Breslau GO station;
- Toronto Pearson International Airport near Malton GO station (also directly connected via the UP Express at Weston GO station); and
- Billy Bishop Toronto City Airport near Union Station.

Figure 3 shows the regional destinations located within the study area of this business case update.

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<sup>2</sup> CBRE, 2017 *Scoring Canadian Tech Talent report*

Figure 3: Post-secondary educational institutions on the Kitchener Corridor



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Despite the advantages on the corridor and the recent economic development, industry groups, including chambers of commerce and start-up incubators, have cited deficiencies in transportation infrastructure and the resulting lack of access to labour as a major impediment to continued growth.

### *Existing Intercity Transit Services*

Intercity transit between municipalities on the Kitchener corridor is primarily provided by GO Transit rail and bus services. These include:

- Kitchener line rail service
  - Peak period, peak direction service between Union Station and Kitchener GO station
  - Regular off-peak two-way rail service between Union Station and Mount Pleasant GO station; and limited off-peak two-way rail service between Union Station and Kitchener GO station
  - Average travel time between Union Station and Kitchener GO station is 117 minutes
- Route 30 (Kitchener Train-Meet) bus service
  - Two-way all-day express bus service between Kitchener and Bramalea GO stations, with schedules timed to facilitate transfers to / from trains at Bramalea GO station.
  - Average travel time between Union Station and Kitchener GO station, including transfer time at Bramalea GO station, is 121 minutes. Travel times are less consistent than rail service, and can reach 155 minutes during peak periods due to highway congestion.
- Route 31 (Kitchener Train-Bus) bus service:
  - Off-peak and counter-peak bus service to supplement the train service.
  - Routing generally parallels the Kitchener rail corridor between Guelph Central GO station and Union Station, with stops at Acton, Georgetown, Mount Pleasant and Brampton GO stations.
  - Average travel time between Union Station and Guelph Central GO station is 133 minutes. Travel times are less consistent than rail service, and can reach 175 minutes during peak periods due to highway congestion.

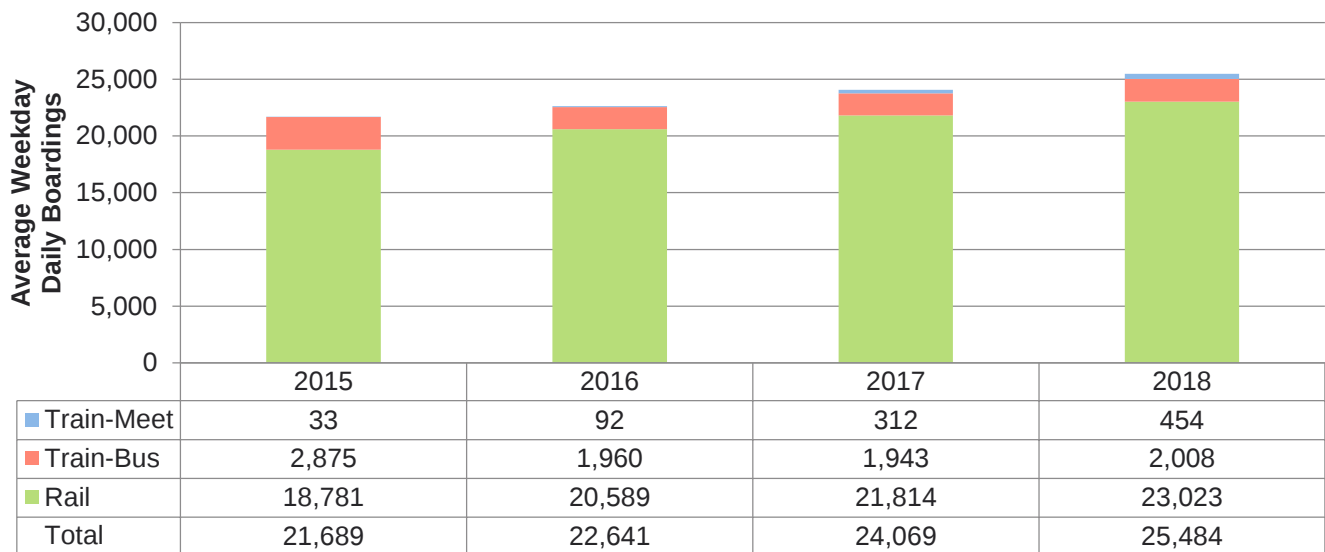
While Kitchener and Guelph are both served by GO bus for off-peak and counter-peak trips, there are currently no direct bus connections between the two cities. GO bus services route through Highway 401, and require a transfer at the Aberfoyle Park and Ride lot. The average travel time by bus varies between 75 to 120 minutes, depending on the transfer time.

In addition to GO Transit services, VIA Rail and private intercity bus operators, such as Greyhound and Coach Canada, also provide transit options for Kitchener, Waterloo, Guelph and Toronto.

### GO Transit Ridership

The Kitchener corridor has experienced significant ridership growth in recent years. As shown in Figure 4, average weekday daily rail boardings have grown by approximately 23% since 2015, while overall Kitchener corridor boardings (including supporting bus service) has grown by approximately 17%. In particular, since the introduction of two-way all-day bus service on Route 30 (Kitchener Train-Meet) in September 2016, ridership has grown from an average of 36 daily weekday riders to over 450 in 2018.

Figure 4: GO ridership (year-over-year comparison between January and December)



Stations that will be served by the Kitchener Expansion program represent approximately 57% of the total corridor rail ridership. Average daily ridership and the percentage of total corridor ridership is summarized in Table 1.

Table 1: Present Day Rail Ridership Breakdown by Station (Apr 2019)

| Station         | Average Daily Ridership | % of Total Corridor Ridership |
|-----------------|-------------------------|-------------------------------|
| Kitchener       | 282                     | 2%                            |
| Guelph Central  | 271                     | 2%                            |
| Acton           | 121                     | 1%                            |
| Georgetown      | 618                     | 5%                            |
| Mount Pleasant  | 3,500                   | 27%                           |
| Brampton        | 2,600                   | 20%                           |
| Bramalea        | 3,200                   | 24%                           |
| Malton          | 1,300                   | 10%                           |
| Etobicoke North | 771                     | 6%                            |
| Weston          | 147                     | 1%                            |
| Bloor           | 289                     | 2%                            |

Source: <https://metrolinx.files.wordpress.com/2019/06/click-here-to-view-the-map-in-detail.pdf>

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GO Transit also operates regional buses that connect Waterloo, Kitchener and Guelph to other transit hubs in the GTHA. The regional bus routes include:

- Route 25 (Waterloo / Mississauga) regional bus service:
  - Bus service between the University of Waterloo and the Square One Bus Terminal in the City of Mississauga, with a stop at the Kitchener Bus Terminal near Kitchener GO station. A branch of this route also serves Bramalea GO station and the Highway 407 Terminal.
- Route 29 (Guelph / Mississauga) regional bus service
  - Bus service between Guelph Central GO station and Square One Bus Terminal in the City of Mississauga.
- Route 33 (Guelph / York Mills)
  - Bus service between the University of Guelph and York Mills Bus Terminal in the City of Toronto, with stops at Guelph Central, Acton, Georgetown, Mount Pleasant and Brampton GO stations.
- Route 48 (Guelph / Highway 407)
  - Bus service between the University of Guelph and the Highway 407 Bus Terminal in the City of Vaughan, with stops at Meadowvale GO station on the Milton line and Bramalea GO station.

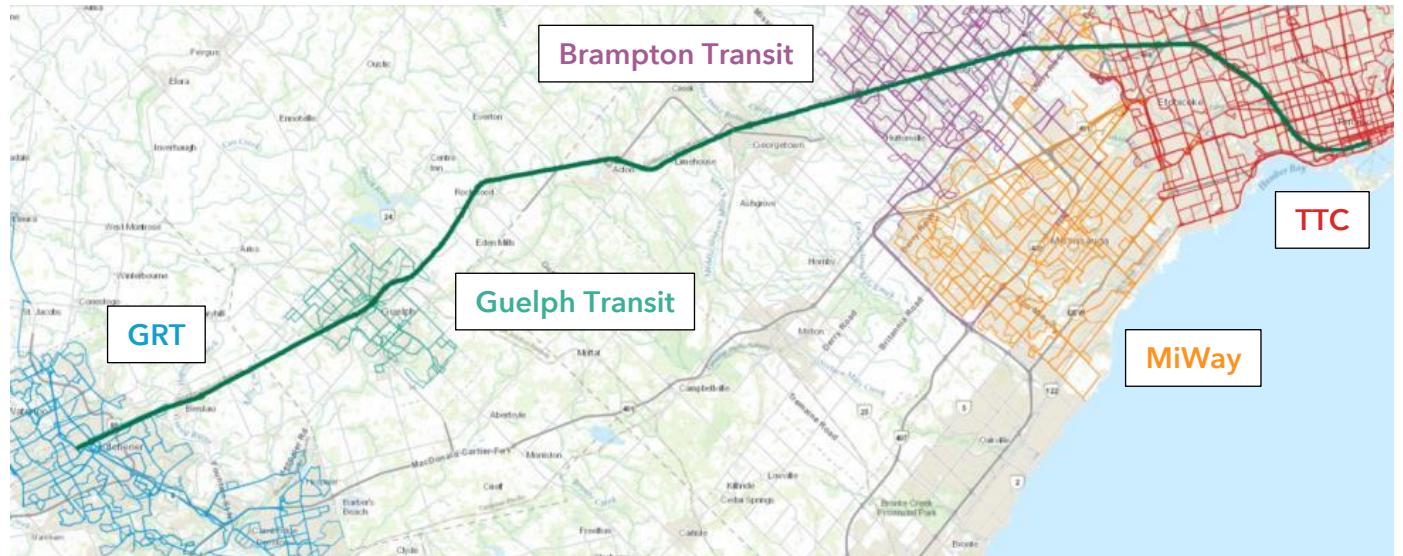
Ridership on these four regional bus routes has grown by 24% since 2015, from approximately 4,500 daily boardings in 2015 to over 5,500 daily boardings in 2018. While the trips made using these bus routes may not be fully served by an expansion of the Kitchener corridor rail service, the performance of these regional bus routes indicates a growing demand for intercity transit services between Waterloo Region, Guelph and the GTHA.

### Local Transit Connections

Local transit operators provide bus and rapid transit that connect the Kitchener line stations to local destinations. Figure 5 shows the networks of the local transit operators that provide connections to the Kitchener corridor. These operators include:

- Toronto Transit Commission (TTC)
  - local bus connections to all stations within the City of Toronto
  - Line 2 (Bloor-Danforth) subway connection at Bloor GO station
  - future Line 5 (Eglinton Crosstown) light rail transit connection at Mount Dennis GO station
- MiWay (Mississauga)
  - local and express bus connections to Malton GO station
  - potential connection to a future extension of the Hurontario LRT at Brampton GO station
- Brampton Transit
  - local bus and Züm bus connections to all stations within the City of Brampton, as well as Malton GO station
- Guelph Transit
  - local bus connections to Guelph Central GO station
- Grand River Transit (GRT; Waterloo Region)
  - local and express bus connections to Kitchener GO station
  - ION light rail transit connection at Kitchener GO station

Figure 5: Local Transit Networks Connecting to the Kitchener Corridor



In addition, passengers on the Kitchener line can connect directly to Pearson International Airport via the UP Express at Weston and Bloor GO stations.

#### *Travel Demand*

Data from the 2016 Transportation Tomorrow Survey (TTS) was used to determine the overall travel trends along the Kitchener corridor. The following groups of municipalities were identified on the corridor:

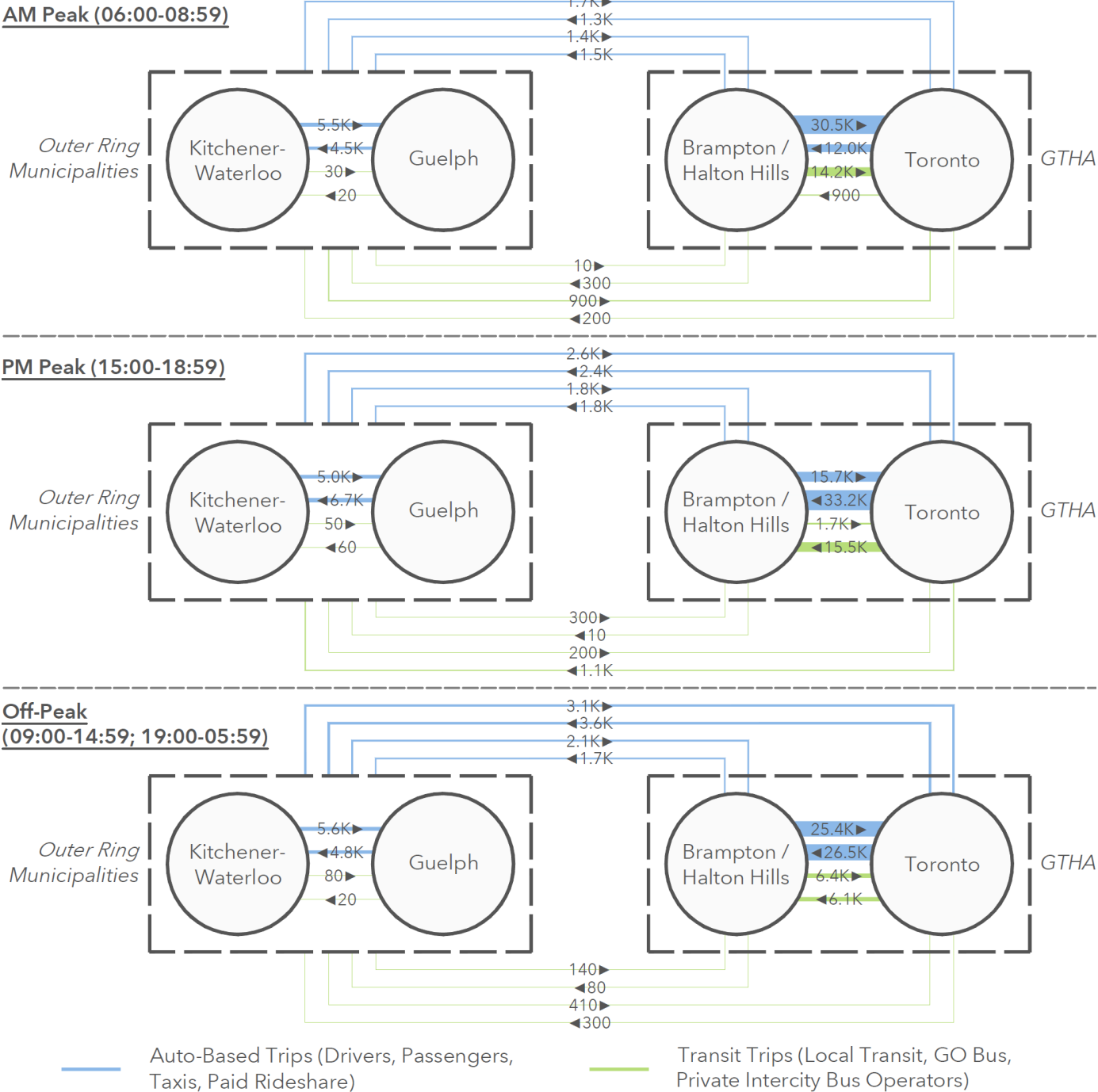
- Outer Ring municipalities, consisting of:
  - Kitchener / Waterloo; and
  - Guelph;
- Brampton / Halton Hills; and
- Toronto.

From these, four main travel markets were identified for further analysis:

- Trips between Brampton / Halton Hills and Toronto;
- Trips between Kitchener / Waterloo and Guelph;
- Trips between the Outer Ring municipalities and Brampton / Halton Hills; and
- Trips between the Outer Ring municipalities and Toronto.

The travel patterns within these markets are summarized in Figure 6.

Figure 6: Summary of Kitchener corridor travel patterns



Travel between Brampton / Halton Hills and Toronto

Trips between Brampton / Halton Hills and Toronto are the largest travel market on the Kitchener corridor, with an estimated 188,000 daily trips. Nearly half of the trips are peak period, peak direction trips made by commuters traveling to Toronto in the morning and returning in the afternoon.

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Transit is very competitive for peak period peak direction trips (32%) and somewhat competitive during off-peak periods (19%). Transit is least competitive for counter-peak trips, with only a 9% mode share.

#### Travel between Kitchener / Waterloo and Guelph

Travel between Kitchener / Waterloo and Guelph is the second largest market on the corridor. An estimated 32,000 trips are made each day between these cities. The direction of travel is relatively even during both peak periods, with an approximately 55%-45% directional split favouring eastbound travel in the morning and westbound travel in the afternoon.

Nearly all trips between Kitchener-Waterloo and Guelph are made by car, with transit representing less than 1% of the total mode share, due in part to the low level of transit service provided. The service areas of the local transit agencies do not intersect, and transfers are not possible. GO rail service has limited frequencies and is not offered at times that are conducive to a typical working day in Guelph (last a.m. train arrives at 07:34 and the first p.m. train departs at 18:13). There is also no counter-peak service for commutes from Guelph to Kitchener. GO bus service requires a circuitous route via Highway 401 that is not time competitive compared to driving between Guelph and Kitchener on Highway 7.

#### Travel between the Outer Ring Municipalities and Toronto

The third largest market is the long distance inter-regional trips between the outer ring municipalities (Kitchener, Waterloo and Guelph) and Toronto, totalling approximately 18,000 daily trips. Approximately 60% of peak period travel is towards Toronto during the morning peak, and returning west during the afternoon peak.

Similar to the Suburban GTHA-Toronto market, transit is competitive for peak period, peak direction trips, representing 33% of the mode share; however, the mode share for counter-peak (10%) and off-peak (10%) travel is low.

#### Travel between the Outer Ring Municipalities and Brampton / Halton Hills

The smallest of the travel markets analyzed is travel between the outer ring municipalities and the municipalities of Brampton and Halton Hills. Approximately 11,000 daily trips are made between these municipalities. The travel patterns are oriented towards a westward commute, with a 55%-45% directional split during the peak periods.

Transit represents a 15% mode share for peak period peak direction trips, 6% for off-peak trips, and only 1% for counter-peak trips.

### **Case for Change**

#### *Problem Statement*

The current Kitchener GO corridor provides rail service for peak period peak direction trips to downtown Toronto, but has limited options for off-peak and counter-peak travel, as well as non-Toronto trips. Waterloo Region is growing as a tech hub, and there has been a growth in the number of

“reverse commutes” towards the region. The Waterloo-Toronto corridor has also been designated as an innovation cluster and an important driver of Ontario’s economy. Employers in Waterloo Region have identified a need for improved transport connections to the labour and markets of the GGH to attract skilled workers and sustain economic growth in the region.

Through previous business case analyses, Metrolinx determined that two-way all-day service on the Kitchener corridor is the preferred solution to improving transportation options. This business case evaluates the optimal approach to deliver enhanced rail service.

### Key Drivers

Table 2 summarizes the key issues and considerations, both internal and external, for the current and future state of transportation in the Kitchener to Toronto corridor that shapes the opportunity and supports the case for investment in transit on the Kitchener corridor.

Table 2: Summary of Key Drivers

|          | Driver                                  | How does this Driver influence the problem/opportunity?                                                                                                                                                                                                                                                                                                                                                                                          | What is the impact of not addressing the problem/opportunity?                                                                                                                                                                                                                                                                                         |
|----------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Internal | Travel Behaviour                        | <ul style="list-style-type: none"> <li>2016 TTS data shows significant demand for travel between travel markets in the Kitchener corridor.</li> </ul>                                                                                                                                                                                                                                                                                            | <ul style="list-style-type: none"> <li>Trips will be made by auto-based modes, resulting in increased road congestion and emissions and reduced travel time reliability</li> </ul>                                                                                                                                                                    |
|          | Transport Service Provision             | <ul style="list-style-type: none"> <li>Peak period, peak direction travel is well served by transit, however, there are limited options for off-peak and counter-peak travel by transit in the corridor.</li> <li>There are limited transit options for travel between Kitchener / Waterloo and Guelph.</li> <li>Ridership is growing along the Kitchener corridor, especially for off-peak bus trips between Kitchener and the GTHA.</li> </ul> | <ul style="list-style-type: none"> <li>Reduced mobility choices for modes other than driving, especially for off-peak, counter-peak trips, as well as for trips outside of the GTHA.</li> <li>Growth in demand for off-peak transit travel between Kitchener and the GTHA may stagnate if buses become increasingly crowded or unreliable.</li> </ul> |
|          | Transport Infrastructure and Technology | <ul style="list-style-type: none"> <li>The Guelph Subdivision is mostly single-track, limiting capacity and ability to run trains in opposite directions.</li> <li>Existing infrastructure is in poor condition, with slow orders that restrict train speeds.</li> <li>Improved rail infrastructure could offer more capacity, faster speeds, and more reliable travel times.</li> </ul>                                                         | <ul style="list-style-type: none"> <li>Frequency and speed of rail service between Georgetown and Kitchener will remain low.</li> <li>Off-peak and counter-peak services between Kitchener and Mount Pleasant/Bramalea will continue to be provided by bus, which have less reliable travel times and limited capacity.</li> </ul>                    |

|          | Driver                         | How does this Driver influence the problem/opportunity?                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | What is the impact of not addressing the problem/opportunity?                                                                                                                                                                                                                                                                                                      |
|----------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| External | Government Policy and Planning | <ul style="list-style-type: none"> <li>Government of Ontario has announced plans to implement two-way all-day service to Kitchener, contingent on construction of a freight bypass corridor.</li> <li>Local and regional municipalities have identified two-way all-day service expansion as a priority and have incorporated it into official plans and transportation master plans.</li> <li>Provincial policy supports a shift towards more transit-supportive land use and a reduction in automobile travel.</li> </ul> | <ul style="list-style-type: none"> <li>Not implementing an announced service expansion may negatively impact organizational reputation unless there is a strong case to not proceed.</li> <li>Municipal plans for development and economic competitiveness will be compromised.</li> <li>Could hinder progress towards meeting Provincial policy goals.</li> </ul> |
|          | Demographics                   | <ul style="list-style-type: none"> <li>Projected increases in population and employment in all municipalities along the Kitchener corridor</li> </ul>                                                                                                                                                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>The Kitchener to Toronto corridor will be a less attractive place to live, work and do business - which will lower the overall quality of life and prosperity of the region.</li> </ul>                                                                                                                                     |
|          | Economic Activity              | <ul style="list-style-type: none"> <li>The Kitchener-Toronto corridor has been identified as part of Ontario's innovation supercluster.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>The region may not achieve the expected growth in employment, or provide the quality of mobility that fosters productivity and economic development and enables employers to attract skilled workers.</li> </ul>                                                                                                            |
|          | Land Use                       | <ul style="list-style-type: none"> <li>Four Urban Growth Centres on the corridor.</li> <li>Municipal official and secondary plans have adopted policies to encourage transit supportive development around GO stations.</li> <li>The Growth Plan requires municipalities to plan for intensification around Major Transit Station Areas.</li> </ul>                                                                                                                                                                         | <ul style="list-style-type: none"> <li>Identified intensification targets in Provincial and municipal planning will not be supported by levels of transit service required to achieve planned densities.</li> </ul>                                                                                                                                                |

## Strategic Outcomes and Objectives

The Metrolinx 2041 Regional Transportation Plan (2041 RTP) was adopted by the Metrolinx Board of Directors on March 8, 2018. The 2041 RTP presents a vision for the future of the GTHA:

*The GTHA will have a sustainable transportation system that is aligned with land use, and supports healthy and complete communities. The system will provide safe, convenient and reliable connections, and support a high quality of life, a prosperous and competitive economy, and a protected environment.*

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In pursuit of the Vision, the RTP outlined three goals:

- Strong connections – Connecting people to the places that make their lives better, such as homes, jobs, community services, parks and open spaces, recreation, and cultural activities.
- Complete travel experiences – Designing an easy, safe, accessible, affordable and comfortable door-to-door travel experience that meets the diverse needs of travellers.
- Sustainable and healthy communities – Investing in transportation for today and for future generations by supporting land use intensification, climate resiliency and a low-carbon footprint, while leveraging innovation.

The proposed investment recommended through this IBC would directly support the realization of the three goals in the 2041 RTP.

#### *Strong Connections*

The proposed investment would increase the level of transit service on the Kitchener corridor and better connect people to jobs, services, and recreation. The key strategic objectives of the investment under this goal include:

- Increasing the number of people and jobs that have access to frequent rapid transit; and
- Increasing access to regional destinations, such as airports and universities.

#### *Complete Travel Experiences*

The proposed investment would provide additional travel options for trips beyond the traditional work commute. The investment would also provide faster and more reliable travel times for transit users. The key strategic objectives under this goal include:

- Increasing travel options for off-peak and counter-peak trips, as well as travel to destinations other than downtown Toronto;
- Decreasing transit travel time; and
- Increasing the reliability of transit.

#### *Sustainable and Healthy Communities*

The proposed investment should support sustainable land use and transportation patterns. The key strategic objectives under this goal include:

- Supporting Provincial and municipal land use plans.

### **Alignment with Broader Policy**

Through their plans and policies, project stakeholders at the Provincial, regional and municipal levels are aiming to improve the quality of life and safety, guide economic growth and development and achieve environmental sustainability for their respective regions. Table 3 summarizes key items from plan and policy documents that align with the expansion of rail services to Kitchener.

Table 3: Summary of Alignment with Broader Policy and Plans

| Stakeholder                                                       | Organization strategy, policy or plan              | Link to Problem/Opportunity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Relationship Type(s)   |
|-------------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Government of Ontario – Ministry of Municipal Affairs and Housing | Provincial Policy Statement                        | The Provincial Policy Statement under the Planning Act supports transit expansion that optimizes existing infrastructure, crosses jurisdictional boundaries, supports land use density, minimizes the length and number of vehicle trips, and supports the use of transit and active transportation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Synergistic Approach   |
|                                                                   | Growth Plan for the Greater Golden Horseshoe, 2017 | The Growth Plan for the Greater Golden Horseshoe articulates support for an integrated, multi-modal, regional transit network as key to economic growth, reduced air pollution and improved public health. Specific areas identified for intensification to support transit include: <ul style="list-style-type: none"> <li>Major transit station areas on the Priority Transit Corridor between Union Station and Mount Pleasant GO station;</li> <li>Four Urban Growth Centres: Downtown Kitchener, Uptown Waterloo, Downtown Guelph and Downtown Brampton.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Synergistic Approach   |
| Government of Ontario – Ministry of Transportation                | Southwestern Ontario Transportation Plan           | The Province of Ontario is examining options for improved connections between London, Kitchener and Toronto to spur economic activity in the region by improving mobility and increasing travel reliability. This will include practical options for improvements to existing rail corridors in collaboration with private-sector partners to optimize passenger and freight rail. There is an opportunity for works on the Kitchener corridor to support the future transportation initiatives in southwestern Ontario.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Rationalistic Approach |
| Local and regional municipalities                                 | Official Plans and Secondary Plans                 | The Official Plans of local and regional municipalities along the Kitchener corridor generally support the increased use of existing rail corridors to enhance passenger rail service. Municipalities have implemented policies for the GO station areas to encourage intensification and improve multi-modal access. Specifically: <ul style="list-style-type: none"> <li>City of Kitchener: <i>Planning Around Rapid Transit Stations (PARTS) Central Plan</i> specifies a minimum density of 225 people and jobs per hectare in the Urban Growth Centre around Kitchener GO station.</li> <li>City of Guelph: <i>Downtown Guelph Secondary Plan</i> specifies a minimum density of 150 people and jobs per hectare in the Urban Growth Centre around Guelph Central GO station.</li> <li>Town of Halton Hills: <i>Georgetown GO Station Secondary Plan</i> includes policies for transit supportive development around the GO station.</li> <li>City of Brampton: The <i>Brampton 2040 Vision</i> plan identifies the area around Brampton GO station as a Major Growth Centre, while the areas around Bramalea and Mount Pleasant GO stations are identified as Town Centres.</li> </ul> | Synergistic Approach   |

# 3



## Investment Options



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## Introduction

This chapter describes two investment options for consideration and evaluation in the Strategic, Economic, Financial, and Deliverability and Operations Cases. The same service pattern is assumed in both cases; the differences lie in the infrastructure investment required. Both options would address the identified need for improved transit in the Kitchener – Toronto corridor.

## Option Development

The implementation of two-way all-day service between Union Station and Kitchener GO station was previously studied through the 2015 IBC, the 2016 Economic and Financial Assessment and the 2016 Feasibility Study. These studies recommended the construction of a freight bypass corridor that would divert CN freight traffic off the Halton Subdivision between Bramalea and Georgetown GO stations, and allow for an increase in passenger service frequencies.

Through ongoing project development work, Metrolinx identified a potential option to address rail capacity constraints on the Halton Subdivision through incremental infrastructure improvements, without the need to build a dedicated freight bypass. Metrolinx initiated this business case update to compare this new option against the previously approved freight bypass corridor.

## Option Scoping

### *Business as Usual*

The GO Expansion Full Business Case (FBC) was presented to, and endorsed by, the Metrolinx Board of Directors on December 6, 2018. To facilitate analysis in the FBC, Metrolinx developed a Reference Concept Design (RCD) which defined the service and infrastructure improvements that could be delivered through the program. The RCD represents one of many potential infrastructure and service investment programs that could be deployed. The exact specifications of the future GO Rail system will be determined through the GO Expansion procurement process, and may vary in design and delivery from the RCD.

The GO Expansion RCD, as well as improvements being delivered through other funded capital programs (e.g. the Eglinton Crosstown and ION LRT programs), are collectively considered to be the Business as Usual (BAU) scenario and forms the basis of the analysis in this business case. The BAU scenario is assumed to advance regardless of the decision to invest further through the Kitchener Expansion program. Infrastructure improvements within the BAU scenario include:

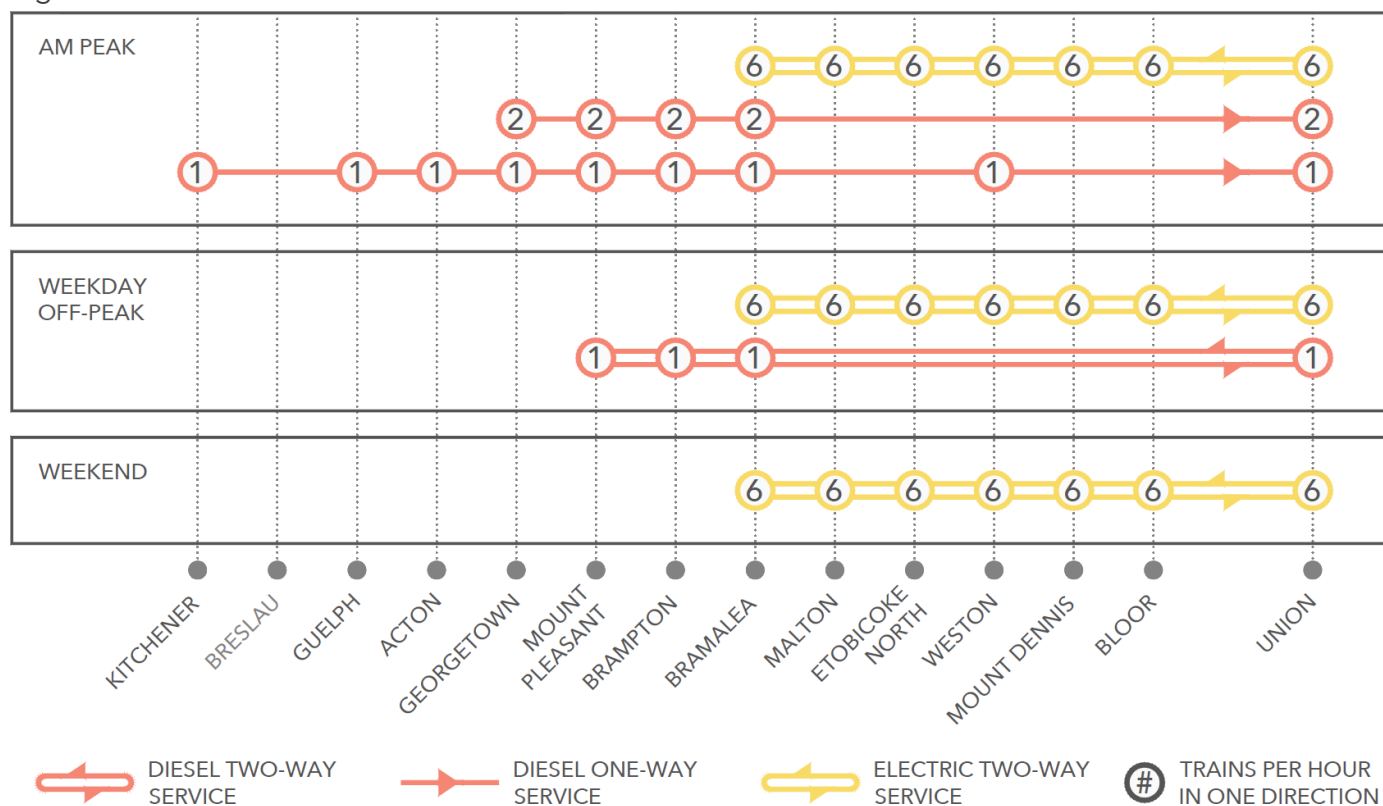
- improvements at Bramalea, Brampton, Georgetown, Bloor, Weston and Malton GO stations;
- new track, upgraded bridges and grade separations, and new train storage capacity on the Weston Subdivision;
- electrification from Union Station to Bramalea GO station;
- construction of a new station at Mount Dennis; and
- relocation of Kitchener GO station to the King-Victoria Transit Hub.

The BAU scenario assumes the implementation of the following service levels on the Kitchener corridor:

- **Peak Period:**
  - 10 minute frequency (6 trains per hour) two-way electric service, between Bramalea GO station and Union Station;
  - combined 20 minute frequency (3 trains per hour) peak direction diesel service between Georgetown GO station and Union Station; and
  - 60 minute frequency (1 train per hour) peak direction diesel service between Kitchener GO station and Union Station.
- **Weekday Off-Peak Period:**
  - 10 minute frequency (6 trains per hour) two-way electric service, between Bramalea GO station and Union Station; and
  - 60 minute frequency (1 train per hour) two-way diesel service between Mount Pleasant GO station and Union Station.
- **Weekends:**
  - 10 minute frequency (6 trains per hour) two-way electric service, between Bramalea GO station and Union Station.

The electric services will make all station stops between Union Station and Bramalea GO station, while diesel trains will operate express between Union Station and Bramalea GO station. Travel time on the Kitchener corridor for the diesel express service will be 119 minutes between Kitchener GO station and Union Station. Figure 7 illustrates the BAU scenario service pattern during the peak and off-peak periods.

Figure 7: BAU Service Pattern



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## *Infrastructure Investment Options*

### Freight Bypass Corridor (Option 1)

Option 1 proposes the construction of a new freight rail corridor from Torbram Road in the City of Brampton to James Snow Parkway in the Town of Milton (the “407 Subdivision”). The bypass would remove mainline freight rail traffic between Bramalea and Georgetown GO stations, freeing capacity for an increase in passenger rail service. This option is consistent with the freight bypass option which was evaluated in the 2016 Feasibility Study and 2016 Economic and Financial Assessment. Proposed works for the 407 Subdivision may include:

- 18.6 mile long double-tracked and signalized rail corridor;
- new bridges, structures and level crossings; and
- Hydro tower and gas line modifications.

### Halton Subdivision Improvements (Option 2)

Option 2 represents the ‘minimal infrastructure’ approach, whereby Metrolinx will continue to operate on a shared-use Halton Subdivision. Under this option, Metrolinx will negotiate for increased access to its infrastructure investments on the corridor. Improvements on the Halton Subdivision may include:

- track, signal and structure improvements to address capacity constraints on the corridor;
- station track and platform modifications;
- level crossing upgrades, closures and grade separations.

### Guelph Subdivision Improvements (Both Options)

Under both options, Metrolinx would also upgrade the Guelph Subdivision to support faster and more frequent service between Georgetown and Kitchener GO stations. Improvements on the Guelph Subdivision may include:

- second side platforms at Guelph Central and Acton GO stations;
- additional passing tracks;
- track and structure rehabilitation;
- drainage improvements; and
- level crossing upgrades, closures and grade separations.

The track improvements on the Guelph Subdivision will enable faster train speeds between Kitchener and Georgetown GO stations. These include the removal of a 30 mph slow order near Kitchener GO station and a 10 mph slow order near Guelph Central GO station.

### New Stations (Both Options)

The New Stations Preliminary Design Business Cases, published in March 2018, recommended the implementation of a new GO station at Breslau. The station is proposed to be delivered in partnership with a third party stakeholder through the Transit Oriented Development (TOD) Market Driven Strategy.

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This IBC analysis included the delivery of Breslau station in order to determine the full benefits of the Kitchener Expansion program. The planning and delivery of Breslau station will be advanced in parallel through the TOD program.

### *Representative Service Pattern*

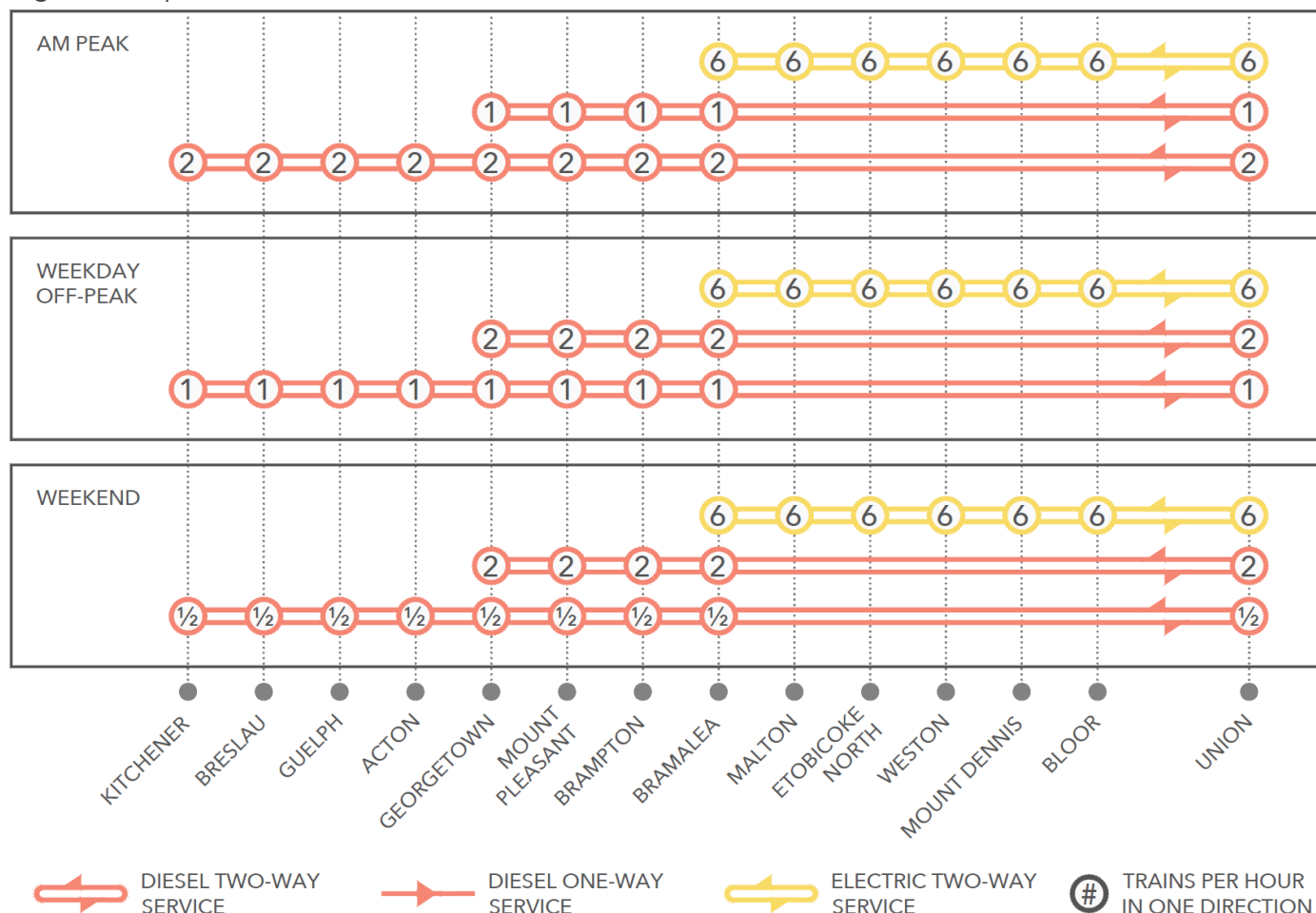
Metrolinx developed a representative service pattern to test the performance of the two infrastructure investment options. The representative service pattern is an achievable level of service that can be provided on the corridor under either option, and is comparable to those evaluated in previous studies (e.g. the 2015 IBC and the 2016 Financial and Economic Assessment).

The representative service pattern proposes to maintain the FBC's electric service between Union Station and Bramalea GO station, while significantly expanding the diesel service west of Bramalea GO station. The representative service pattern includes:

- Peak Period:
  - 10 minute frequency (6 trains per hour) two-way electric service, between Bramalea GO station and Union Station;
  - combined 20 minute frequency (3 trains per hour) two-way diesel service between Georgetown GO station and Union Station; and
  - 30 minute frequency (2 trains per hour) two-way diesel service between Kitchener GO station and Union Station.
- Weekday Off-Peak Period:
  - 10 minute frequency (6 trains per hour) two-way electric service, between Bramalea GO station and Union Station;
  - combined 20 minute frequency (3 trains per hour) two-way diesel service between Georgetown GO station and Union Station; and
  - 60 minute frequency (1 train per hour) two-way diesel service between Kitchener GO station and Union Station.
- Weekends:
  - 10 minute frequency (6 trains per hour) two-way electric service, between Bramalea GO station and Union Station;
  - combined 24 minute frequency (2.5 trains per hour) two-way diesel service between Georgetown GO station and Union Station; and
  - 120 minute frequency (0.5 trains per hour) two-way diesel service between Kitchener GO station and Union Station.

Similar to the BAU scenario service pattern, the diesel services in the representative service pattern will operate express between Union Station and Bramalea GO station. Both options benefit from track speed improvements on the Guelph Subdivision, which reduces end-to-end travel time on the Kitchener corridor by 20 minutes. Figure 8 illustrates the representative service pattern.

Figure 8: Representative Service Pattern



The representative service pattern will continue to evolve through stakeholder consultation, preliminary design, and the development of the final technical specifications for overall GO Expansion program. These include:

- Kitchener Expansion program preliminary design, which will provide more details on track speeds, passing track locations, layover capacity, and signal spacing;
- GO Expansion infrastructure plan, which will define the final configuration of the Weston Subdivision and the Union Station Rail Corridor, including any capacity constraints;
- GO Expansion service plan, which will define the rolling stock and operating characteristics of the GO rail network;
- ongoing reconfiguration at Union Station, which may result in temporary capacity constraints within the Union Station Rail Corridor; and
- results of ongoing negotiations with CN, which will determine the track capacity and time blocks available to Metrolinx for passenger train movements on the Halton Subdivision.

Metrolinx will continue to refine and optimize the service patterns through the design phases to satisfy corridor constraints, deliver greater benefits and/or reduce project costs. This could include changes in train frequencies, run times, fleet configurations, or stopping patterns.

# 4

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## Strategic Case



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## Introduction

The Strategic Case summarizes the performance of the options against the identified strategic objectives to indicate if the investment addresses the Problem Statement and the goals of the 2041 RTP.

## Strategic Evaluation

### *Alignment with the 2041 RTP Strategies*

The 2041 RTP outlines five key Strategies to achieving the plan's Vision, each accompanied by a number of Priority Actions. Improvement to rail service on the Kitchener corridor supports four of the five Strategies.

#### Strategy 1: Complete the delivery of current regional transit projects

Fifteen minute two-way all-day GO rail service to Mount Pleasant GO station and two-way all-day GO rail service to Kitchener GO station are both identified as "In Delivery" projects in the RTP. Implementation of these services is a necessary part of advancing the RTP.

#### Strategy 2: Connect more of the region with frequent rapid transit

The introduction of two-way all-day rail service along the full length of the Kitchener corridor would provide fast and frequent rapid transit between Waterloo Region, Guelph and the GTHA. In particular, the "Toronto-Waterloo Innovation Corridor" was specifically identified in this strategy, and would be served by improved Kitchener line rail service.

#### Strategy 3: Optimize the transportation system

The Kitchener corridor operates on a CN-owned freight corridor between Bramalea GO station and Georgetown GO station. Expansions on the corridor will provide an opportunity to evaluate the operations of this shared corridor and ensure that the capacity and operational requirements for both freight and passenger traffic are met.

#### Strategy 4: Integrate transportation and land use

Strategy 4 recommends aligning transportation plans with land use plans to improve transit access and reduce automobile dependence. The Kitchener corridor and its stations have been identified as areas for intensification under Provincial and municipal plans.

Under the Growth Plan for the Greater Golden Horseshoe, the Kitchener corridor (between Union Station and Mount Pleasant GO station) is identified as a Priority Transit Corridor, while the areas around Brampton, Guelph Central and Kitchener GO stations are identified as Urban Growth Centres. In addition, the Uptown Waterloo Urban Growth Centre is located within the broader catchment area of Kitchener GO station.

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Municipal plans have incorporated policies to encourage transit-supportive developments around the GO stations.

The provision of frequent, reliable transit service on this corridor is a necessary condition for realizing the full benefit of transit-oriented development as supported by Provincial and municipal plans and policies.

#### *Alignment with the 2041 RTP Goals*

Investment in improved rail service on the Kitchener corridor will also support the goals of the 2041 RTP.

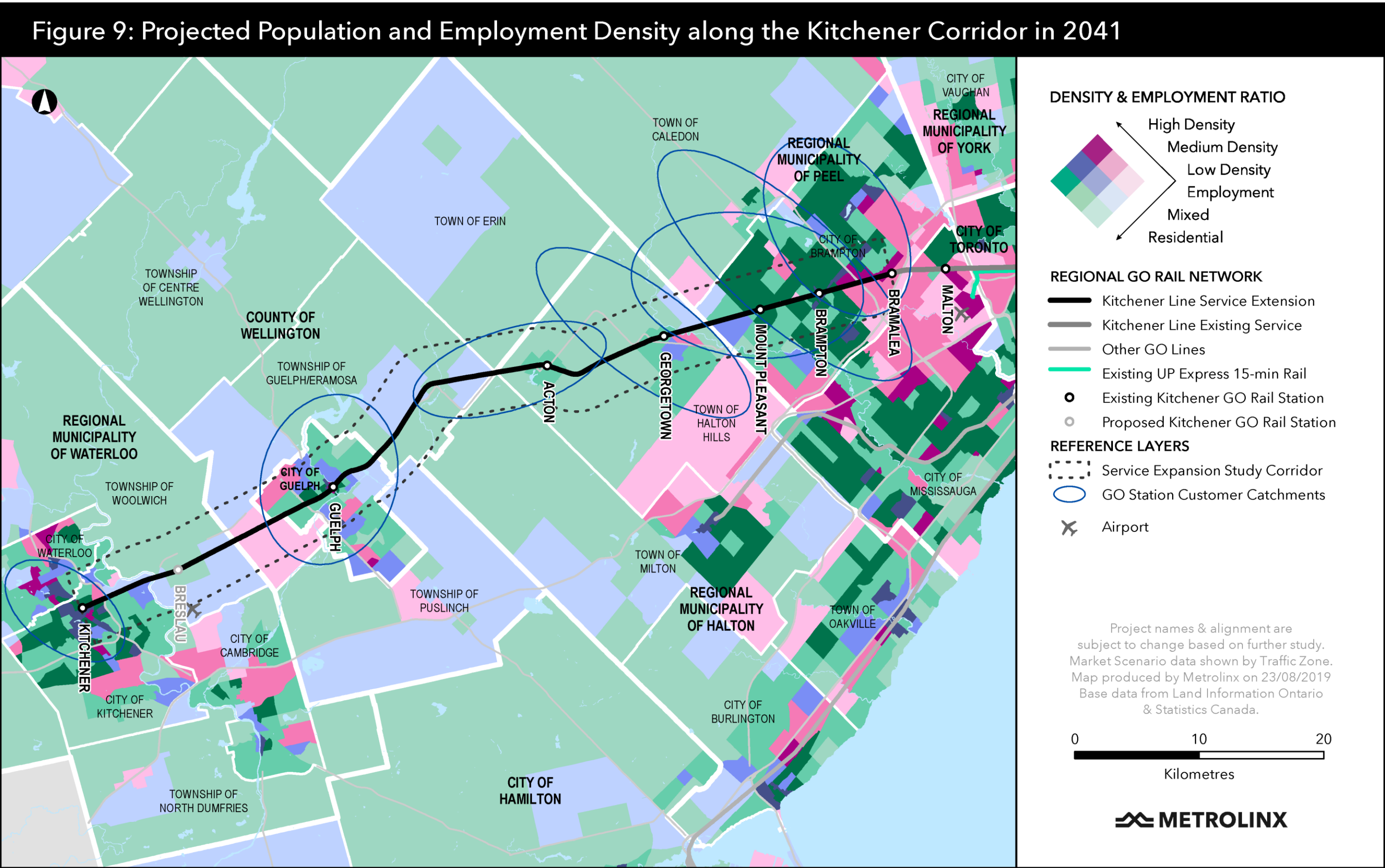
#### Strong Connections

The increase in rail service will improve intercity connections on the corridor. The service will improve access to jobs and other services by transit, and in particular, strengthen connections between people and jobs within the Toronto-Waterloo Innovation corridor. Improving the quality of, and access to, transit services is essential to support the continued economic development of the GGH.

The Kitchener Expansion program will extend two-way all-day rail service to seven Kitchener line stations west of Bramalea GO station. Approximately 38,000 people and 25,000 jobs are located within walking distance (800m) of these stations. Businesses on the corridor will have access to a larger labour market, while residents will have additional employment opportunities, and greater access to entertainment, services and regional destinations.

Figure 9 shows the concentrations of people and jobs that would be served by the Kitchener corridor improvements.

Figure 9: Projected Population and Employment Density along the Kitchener Corridor in 2041



The service expansion would generate an estimated 7,947 net new daily boardings on the Kitchener corridor compared to the BAU scenario, representing a 10% increase in projected ridership. Table 4 summarizes the incremental daily ridership generated as a result of the proposed investment.

Table 4: Incremental Daily Ridership (2031)

| Station                                                                                     | Incremental Ridership (2031) | % of Total Ridership Increase |
|---------------------------------------------------------------------------------------------|------------------------------|-------------------------------|
| Bloor to Bramalea                                                                           | -242*                        | N/A                           |
| Brampton                                                                                    | 1,529                        | 19%                           |
| Mount Pleasant                                                                              | 2,767                        | 34%                           |
| Georgetown                                                                                  | 643                          | 8%                            |
| Acton                                                                                       | 220                          | 3%                            |
| Guelph Central                                                                              | 304                          | 4%                            |
| Breslau                                                                                     | 2,480                        | 30%                           |
| Kitchener                                                                                   | 247                          | 3%                            |
| <b>Total</b>                                                                                | <b>7,947</b>                 |                               |
| * decrease due to an adjustment in the diesel service stopping pattern at Weston GO station |                              |                               |

The majority of the new ridership is attributed to Brampton, Mount Pleasant and Breslau GO stations; representing 19%, 34% and 30% of the increase respectively. Overall, stations on the Halton Subdivision comprise 63% of the projected increase, while the Guelph Subdivision stations account for 37% of the projected increase.

### Complete Travel Experiences

The expansion of rail service on the Kitchener corridor will improve the speed, frequency and reliability of transit service on the corridor. Combined, these will enhance the overall travel experience for GO customers and make transit a more attractive travel mode.

The track speed improvements on the corridor will provide a 20 minute end-to-end travel time reduction for Kitchener line service. Customers will get to where they're going faster, and allow more time for their professional, social and recreational activities.

The majority of the frequency improvements will be additional counter-peak and off-peak trips that will allow people to use transit for reverse commutes and non-work trips. This will provide increased flexibility for customers travelling on the Kitchener corridor, regardless of when they're travelling and which direction they're going.

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The service expansion will replace the existing GO bus service with rail service that will operate within a separate right-of-way from road vehicles. Transit service will not be impacted by highway congestion and will offer more consistent travel times for customers. Option 1 provides further reliability benefits by diverting CN freight traffic off the Halton Subdivision, removing another potential source of delays. Both options will allow customers to plan their trips with greater certainty that they'll get to their destination on time.

#### Sustainable and Healthy Communities

Extension of two-way all-day service to Kitchener will support the development of sustainable communities and travel patterns along the Kitchener corridor. Specifically, both options support the provincial Growth Plan for the Greater Golden Horseshoe by increasing service within a Priority Transit Corridor, which is intended to support intensification of Urban Growth Centres and Major Transit Station Areas. The service increase also supports municipal plans and policies to intensify land use around their existing GO stations. High-quality transit is an essential part of creating environmentally sustainable, dense, walkable, and healthy communities, contributing to improved overall quality of life.

#### **Strategic Case Summary**

Both options evaluated in this business case address the Problem Statement, as well as the three strategic outcomes established in Chapter 2. Table 5 provides a summary of the performance of each option against the strategic outcomes and objectives.

Table 5: Strategic Case Summary

| 2041 RTP Goal               | Strategic Outcome                                         | BAU                                                                                                                                                                                                                                                       | Option 1: Freight Bypass                                                                                                                                                                                            | Option 2: Minimal Infrastructure                                                                                                                                                                                    |
|-----------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strong Connections          | Population and jobs with access to frequent rapid transit | 46K people and 23K jobs within 800m of a Kitchener line station (excluding Union Station) with two-way all-day service                                                                                                                                    | 84K people and 48K jobs within 800m of a Kitchener line station (excluding Union Station) with two-way all-day service                                                                                              | 84K people and 48K jobs within 800m of a Kitchener line station (excluding Union Station) with two-way all-day service                                                                                              |
|                             | Connections to regional destinations                      | Peak-only access for GTHA residents to post-secondary institutions in Waterloo Region and Guelph; and for Guelph and Waterloo Region residents to Pearson Airport and post-secondary institutions in Toronto.                                             | Two-way all-day access for GTHA residents to post-secondary institutions in Waterloo Region and Guelph; and for Guelph and Waterloo Region residents to post-secondary institutions in Toronto and Pearson Airport. | Two-way all-day access for GTHA residents to post-secondary institutions in Waterloo Region and Guelph; and for Guelph and Waterloo Region residents to post-secondary institutions in Toronto and Pearson Airport. |
|                             | Improve Transit Travel Time                               | Average travel time of 119 minutes by rail between Kitchener GO station and Union Station, running express between Bramalea GO station and Union Station.                                                                                                 | Travel time reduction of 20 minutes between Kitchener GO station and Georgetown GO station.                                                                                                                         | Travel time reduction of 20 minutes between Kitchener GO station and Georgetown GO station.                                                                                                                         |
| Complete Travel Experiences | Improved off-peak and counter-peak services               | Two-way all-day service is only available up to Bramalea GO station. Off-peak two-way service is available up to Mount Pleasant GO station.                                                                                                               | Two-way all-day service is provided for all stations along the Kitchener corridor                                                                                                                                   | Two-way all-day service is provided for all stations along the Kitchener corridor                                                                                                                                   |
|                             | Improve Transit Reliability                               | Bus travel times are affected by highway congestion. Trips between Kitchener GO station and Union station can reach 175 minutes during the peak periods. Passenger rail service will share the corridor with freight traffic, which may result in delays. | Transit service will operate on a dedicated passenger rail corridor without interference from road vehicles or freight rail operations.                                                                             | Transit service will operate on a rail corridor without interference from road vehicles, but will share the corridor with freight rail traffic, which may result in delays.                                         |
| Sustainable Communities     | Support for Growth Plan                                   | Two-way, all-day service will be provided for a portion of the Transit Priority corridor, and serve only one Urban Growth Centre.                                                                                                                         | Two-way, all-day service will be provided on the full length of the Transit Priority corridor, and serve four Urban Growth Centres                                                                                  | Two-way, all-day service will be provided on the full length of the Transit Priority corridor, and serve four Urban Growth Centres                                                                                  |

# 5

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## Economic Case



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## Introduction

The Economic Case is one of two chapters focused on the rationale for pursuing an investment (the other being the Strategic Case). While the Strategic Case evaluates options based on a project specific policy/plan oriented evaluation framework, the Economic Case determines if the expected benefits of this investment exceed the costs required to deliver it, and articulates the overall benefit to society of pursuing each investment option.

The Economic Case compares costs and benefits to determine the overall economic viability of an investment. This analysis considers the magnitude of costs and benefits for a 60-year lifecycle (the evaluation period) as well as:

- Benefit Cost Ratio (BCR) – the net benefits divided by the net costs, which is used to indicate benefits that are realized per dollar spent
- Net Present Value (NPV) – the net benefits minus net costs, which is used to indicate total net benefits to the region

## Assumptions

The impacts of the proposed investment were estimated using the GO Expansion Full Business Case model. The model utilizes the generalized time of the travel modes available to a user for each trip made in the transportation network to calculate ridership for the entire 60-year lifecycle. The benefits of the increased ridership are compared against the costs required to deliver the investment to determine the overall economic impacts.

Ridership estimates are derived through a change in the generalized travel time. The model applies station-specific growth factor on existing ridership figures (informed by the Greater Golden Horseshoe four-stage Travel Demand Model), which is then modified through changes in the travel cost due to the proposed investment. It should be noted that the ridership model has been developed to estimate the ridership for trips originating from and destined to Union Station. Trips between other station pairs (e.g. Kitchener to Guelph, or Guelph to Brampton) are not explicitly forecasted through the model. Ridership for stations that do not exist today (e.g., Breslau) was estimated using the Greater Golden Horseshoe Model with 2031 as the forecast year. Daily ridership for bi-directional service is annualized using a factor of 250 for weekday trips and 57.5 for weekend trips.

The model makes use of assumptions and parameters throughout the social cost benefit analysis, as noted in Table 6. The assumptions and parameters used within this Business Case are consistent with Metrolinx's new Tier 2 Business Case Guidance, as of April 2018.

Table 6: Economic Case Assumptions

| Input                                              | Impact Type                                                                                                                                                                                                                |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Analysis Approach                                  | All benefits/costs are expressed in real terms in 2017\$.<br><br>Appraisal begins in 2018. It assumes 5 years of construction (2019-2024), with a hypothetical opening year of 2025, and 60 years of operation (2025-2084) |
| Evaluation Period                                  | 60 years                                                                                                                                                                                                                   |
| Ridership and Benefits Growth Cap                  | 30 years from base year of evaluation                                                                                                                                                                                      |
| Economic discount rate                             | 3.5%                                                                                                                                                                                                                       |
| Inflation Rate                                     | 2.0%                                                                                                                                                                                                                       |
| Real Inflation                                     | 0%                                                                                                                                                                                                                         |
| Value of Time (VoT) (2017\$)                       | \$17.36/hour                                                                                                                                                                                                               |
| VoT Growth Rate                                    | 0%                                                                                                                                                                                                                         |
| Auto occupancy                                     | 1.077                                                                                                                                                                                                                      |
| Auto operating cost savings (2017\$)               | Total operating cost: \$0.66/km<br>Marginal operating cost: \$0.09/km                                                                                                                                                      |
| Decongestion benefit (2017\$)                      | 0.01 hours/km (peak)<br>0.0013 hours/km (off-peak)                                                                                                                                                                         |
| Safety improvements (accident mitigation) (2017\$) | \$0.10/km                                                                                                                                                                                                                  |
| GHG value                                          | \$0.011/km                                                                                                                                                                                                                 |

All analysis completed in this section uses real values and a social discount rate, as opposed to nominal values and a financial discount rate. Real values do not include the impact of general inflation, but must consider real growth. A social discount rate reflects society's time value preference for consumption – a benefit or cost incurred tomorrow may be less 'valuable' than the same benefit or cost incurred today.

The model analyzed both options for the proposed investment relative to the BAU scenario. The results from each scenario were then compared to determine the incremental benefits that can be realized and incremental costs required to provide expanded rail service on the Kitchener corridor.

### Limitations

The FBC model is a direct-demand, elasticity-based model which relies on current ridership levels as a base for predicting future growth in demand in response to service changes. The current Kitchener

service levels and ridership are very low in the off-peak, which limits the ability of the model to estimate the potential demand uplift from significant service increases. In the peak period, the FBC model is limited in its ability to estimate demand uplift due to significant improvements in travel time, and due to introducing significant new counter-peak service. A regional travel demand model would be able to more accurately estimate the potential ridership growth from introducing large travel time or service improvements to corridors with limited existing service and ridership.

## Costs

The costs or 'required investment' to deliver the Kitchener Expansion program are divided into two categories:

- Capital Costs - fixed one-time costs incurred during the implementation of the investment. The capital costs include the labour and materials required for construction; as well as contingency. Property acquisition costs are excluded from the economic analysis.
- Operating and Maintenance Costs - ongoing costs required to operate the service, provide day to day maintenance, and complete major rehabilitations throughout the lifecycle of the project.

The capital and operating and maintenance costs for the entire lifecycle of the Kitchener Expansion program are listed below. These costs are incremental to the BAU scenario and have been discounted based on the approach defined earlier in this chapter.

Table 7: Economic Costs Summary (2017\$)

| Economic Costs (\$M, Present Value) | Option 1:<br>Freight Bypass | Option 2:<br>Minimal Infrastructure |
|-------------------------------------|-----------------------------|-------------------------------------|
| Capital Costs                       | \$2,010                     | \$602                               |
| Operating and Maintenance Costs     | \$1,058                     | \$965                               |
| Terminal Value                      | \$(68)                      | \$(22)                              |
| Total Present Value of Costs        | \$3,000                     | \$1,545                             |

The scope is currently being refined and confirmed through negotiations with CN and other stakeholders. There are opportunities to optimize infrastructure scope and deliver stations through the market driven strategy to reduce the capital cost of the program without significant impacts to the benefits. In particular, preliminary analysis identified opportunities to optimize the scope of the program and reduce costs from the initial estimate of \$3,944M for Option 1 and \$1,248 for Option 2. These opportunities will continue to be investigated through subsequent phases of project development.

## User Impacts

User Impacts are a key area of analysis for transport investments. They capture how the investment will improve the welfare of transport network users or travellers. This includes both travellers who will and

will not make use of the Kitchener rail service since both groups benefit from travellers switching to GO rail from other modes.

The Kitchener Expansion program will change the cost of travel to three main groups:

- Existing GO Bus/Rail Passengers – The Kitchener Expansion program will reduce the generalized cost of travel below the current cost of travel for GO users by increasing frequency and reducing the travel time on the corridor. This investment will provide a direct benefit to existing users.
- New GO Rail Passengers – The Kitchener Expansion program will reduce the generalized cost of travel on GO. This will attract new users to GO that used to travel via other modes. These new users will receive a benefit equal to the difference in what they were willing to pay and the new generalized cost of travel on GO.
- Auto Users – The Kitchener Expansion program will attract some auto users off of local roads. This leads to decongestion of said roads which in turn reduces the travel time and operating cost for travellers who remain on the auto network.

All user impacts included in this analysis are ‘net impacts’ across the investment; a sum of benefits and disbenefits.

Table 8: User Impacts (\$2017 NPV, millions)

| Category   | Impact Measure           | Option 1:<br>Freight Bypass | Option 2:<br>Minimal Infrastructure |
|------------|--------------------------|-----------------------------|-------------------------------------|
| Transit    | Travel Time Benefits     | \$538                       | \$538                               |
| Automobile | Congestion Reduction     | \$113                       | \$113                               |
|            | Operating Cost Reduction | \$110                       | \$110                               |

## External Impacts

Every auto trip taken can contribute negative impacts to society through emissions that pollute the air or injuries that can occur from collisions. These impacts are called external impacts, or the ‘social cost of transport’. Transportation investments are an opportunity to reduce these social costs by improving the economic efficiency of the transportation system, meaning less impact for the same amount of travel (measured in impacts per passenger kilometre).

For instance, motorists switching to GO Rail decreases the number of trips on the GTHA’s road network. This will lead to fewer collisions and emissions, making the GTHA’s transportation network safer and healthier and contributing to the province’s greenhouse gas emissions reduction targets.

External impacts are estimated through the mode changes generated by the proposed investment. If travellers move from a less efficient mode to GO Rail then there is an impact equivalent to the externalities per trip on GO Rail, minus the externalities on their previously used mode. These benefits are calculated based on the change in automobile vehicle kilometres travelled (VKT).

Table 9: External Impacts (\$2017 NPV, millions)

| Category                             | Impact Measure<br>(\$M, \$2017 NPV)      | Option 1:<br>Freight Bypass | Option 2:<br>Minimal Infrastructure |
|--------------------------------------|------------------------------------------|-----------------------------|-------------------------------------|
| Safety and<br>Environmental Benefits | Collision and GHG<br>Emissions Reduction | \$45                        | \$45                                |

## Other Unquantified Impacts

The Kitchener Expansion program is expected to generate additional impacts that have not been quantified through the business case analysis. These benefits are discussed qualitatively in the following subsections.

### *Non-Toronto Trips*

The economic and financial model utilized in this business case was designed to estimate ridership to and from Union Station. With the introduction of two-way all-day service on the Kitchener corridor, there is a potential to increase transit use between other urban centres on the corridor.

In particular, travel between Kitchener to Guelph generates approximately 23,000 daily trips; however, transit currently represents only 0.6% of the mode share (approximately 150 daily trips) due, in part, to the lack of viable transit alternatives. A review of the 2016 TTS data for trips across local transit agency service boundaries, excluding Toronto (e.g. between Milton and Mississauga, or York Region and Brampton), found that approximately 3.4% of these trips are made by transit. A comparable mode share applied to Kitchener-Guelph trips could generate an additional 650 daily trips between these stations.

### *Wider Economic Impacts*

The Kitchener Expansion program is expected to also generate wider economic impacts as a result of the increase in mobility along the Kitchener corridor. These include the impacts of reduced cost of travel on economic activity, land use and spatial development, labour markets and economic competition, such as:

- Improved economic productivity due to improved choice of inputs in production; greater exchange of information between workers and firms, and faster learning from increased face-to-face contact;
- Improved competition by connecting new markets or reducing the cost of travel within existing markets leading to increased accessibility and choice for consumers; and
- Expansion of the labour market by increasing the 'commuter shed', which is the number of employees that can reach a destination in a given time frame.

Specifically within the Waterloo-Toronto corridor, the improved transportation links will facilitate collaboration and knowledge sharing between firms, improve access to specialized labour and expertise, as well as consolidate the employment and labour markets in the two regions. This is particularly important for the technology sector that resides within the innovation corridor.

### *Benefits to CN*

The previous 2016 Economic and Financial Assessment (precursor to this study) identified benefits to CN from the construction of the 407 Subdivision. These are primarily due to lower train operation and track maintenance costs as a result of the shorter length of the 407 Subdivision relative to the Halton Subdivision. These benefits have not been quantified as part of the analysis.

### **Economic Case Summary**

The economic evaluation indicates that the Kitchener Expansion program would generate travel time savings for existing and new GO riders, and reduce automobile usage along the corridor.

These benefits do not balance out the capital, operating and maintenance costs associated with Option 1, resulting in a negative net present value and benefit-cost ratio that is positive but less than 1.0. This indicates that there is an economic benefit associated with the implementation of the service expansion, but the benefits do not outweigh the cost.

Option 2 achieves equivalent benefits to Option 1, but incurs lower capital costs relative to Option 1. This results in a benefit-cost ratio of 1.0, indicating that the economic benefit of the program is approximately equal to the costs.

Overall, Option 2 outperforms Option 1 from an economic perspective.

Table 10: Economic Case Summary

| Impact Type (\$2017 M, Present Value)                             | Option 1:<br>Freight Bypass | Option 2:<br>Minimal Infrastructure |
|-------------------------------------------------------------------|-----------------------------|-------------------------------------|
| Total Costs                                                       | \$3,000                     | \$1,545                             |
| Capital Costs (economic cost, exclusive of property acquisitions) | \$2,010                     | \$602                               |
| Operating and Maintenance Costs                                   | \$1,058                     | \$965                               |
| Terminal Value                                                    | \$(68)                      | \$(22)                              |
| Total Impacts                                                     | \$1,469                     | \$1,469                             |
| User Impacts                                                      | \$805                       | \$805                               |
| External Impacts                                                  | \$45                        | \$45                                |
| Incremental Fare Revenue Adjustment                               | \$619                       | \$619                               |
| Net Present Value                                                 | \$(1,531)                   | \$(76)                              |
| Benefit-Cost Ratio                                                | 0.5                         | 1.0                                 |

# 6

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## Financial Case



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## Introduction

The Financial Case assesses the overall financial impact of proposed investment options. While the Strategic Case and Economic Case outline how an investment achieves organizational goals and social value, the Financial Case is one of two cases (the other being the Deliverability and Operations Case) that focuses on the requirements to successfully deliver an investment. This includes a review of total revenue (fares) gained and expenditures (capital, operating and maintenance) required over the lifecycle of the investment incremental to the base case scenario.

## Capital Costs

The capital cost of building and delivering the proposed investment options forms the largest component of overall project costs. Estimates of probable capital costs are provided in year of expenditure dollars (YOES). They include a contingency allowance based on the conceptual level of engineering utilized for this assignment, as well as a professional services allowance to account for the completion of designs, procurement activities, and support activities during construction.

Table 11: Capital Cost in Financial Terms (Total Spend, YOES)

| Item                       | Option 1:<br>Freight Bypass | Option 2:<br>Minimal Infrastructure |
|----------------------------|-----------------------------|-------------------------------------|
| Capital Cost Elements      | \$2,738                     | \$747                               |
| Property Acquisition       | \$490                       | \$34                                |
| Professional Services      | \$461                       | \$146                               |
| <b>Total Capital Costs</b> | <b>\$3,689</b>              | <b>\$927</b>                        |

Pursuing Option 1 would result in a significantly higher capital expenditure. The main cost drivers are associated with the construction of the new freight corridor, which will require new track, signals and grade separations.

Option 2, which involves incremental upgrades to existing infrastructure on the Halton Subdivision, would incur significantly lower costs compared to the construction of the 407 Subdivision. The costs of the works on the Guelph Subdivision would be the same as Option 1.

The scope is currently being refined and confirmed through negotiations with CN and other stakeholders. There are opportunities to optimize infrastructure scope and deliver stations through the market driven strategy to reduce the capital cost of the program without significant impacts to the benefits. In particular, preliminary analysis identified opportunities to optimize the scope of the program and reduce costs from the initial estimate of \$3,944M for Option 1 and \$1,248 for Option 2. These opportunities will continue to be investigated through subsequent phases of project development.

## Operating and Maintenance Costs

The operation and maintenance of additional GO rail service will bring additional project costs. Operating and maintenance costs cover all aspects of the Kitchener Expansion program, including staffing, fuel, vehicle and track maintenance and other state of good repair costs.

The operating and maintenance costs for Option 2 also includes the fees that Metrolinx pays to CN for access to the Halton Subdivision. These fees would not be paid under Option 1 due to the transfer of the Halton Subdivision ownership. VIA also pays access fees to CN to operate their Toronto-Kitchener-London service. While these fees may become payable to Metrolinx under Option 1, they have not been included in this business case analysis.

The annual incremental operating and maintenance costs are estimated at \$56M for Option 1, and \$66M for Option 2 in year 2031. The annual operating costs for Option 1 are lower than Option 2 due to the elimination of access fees paid to CN. Costs over the 60-year lifecycle, including major rehabilitation of the infrastructure, is projected to be \$1,137M for Option 1 and \$970M for Option 2.

## Revenue Impacts

Preliminary estimates project that 800,000 net new riders will utilize the new Kitchener corridor service. Average fares based on the home stations of the new riders were applied to the annual ridership estimate to derive the incremental change in fare revenues. Overall, both options for the Kitchener Expansion program are estimated to generate \$38M in (incremental) fare revenues annually, or \$621M over the 60-year lifecycle.

## Financial Case Summary

For both options, the overall net present value (NPV) of the investment is negative over the 60-year time horizon, indicating that the project is not profitable on a strictly financial basis. Option 2 outperforms Option 1 due to the significantly higher capital costs associated with the 407 Subdivision.

Table 12: Financial Case Summary

| Financial Case Metric (\$2017 M, Present Value, Incremental to BAU) | Option 1:<br>Freight Bypass | Option 2:<br>Minimal Infrastructure |
|---------------------------------------------------------------------|-----------------------------|-------------------------------------|
| Total Revenue Impacts                                               | \$621                       | 621                                 |
| Total Capital Costs (Total Expenditure, YOES)                       | \$3,689                     | 927                                 |
| Total Capital Costs (NPV, discounted)                               | \$2,468                     | 620                                 |
| Total Operating and Maintenance Costs                               | \$1,137                     | 970                                 |
| Net Operating Cash Flow                                             | \$(516)                     | \$(306)                             |
| Net Present Value (NPV)                                             | \$(2,984)                   | \$(969)                             |

# 7

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## Deliverability and Operations Case



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## Introduction

The Deliverability and Operations Case is an analysis of investment delivery, operations and maintenance, service plans and any other issues that may prevent the realization of an option. This includes delivering the project from original concept through to planning, design, environmental assessment, stakeholder engagement, procurement, construction and operations. The Deliverability and Operations Case is one of two cases (the other being the Financial Case) focused on requirements for delivering the investment.

## Project Delivery

### *Project Sponsor and Governance Arrangements*

Metrolinx is the overall project sponsor, while CN will be a key technical stakeholder. Ownership of the infrastructure will be divided between CN and Metrolinx based on the investment option pursued.

Under Option 1, CN will own the new 407 Subdivision, as well as the Halton Subdivision east of Bramalea and west of Georgetown. Metrolinx will retain the right to construct and operate on additional tracks on the 407 Subdivision. Ownership of the Halton Subdivision between Bramalea and Georgetown would transfer to Metrolinx. CN would continue to retain running rights to service local freight customers. Metrolinx will also continue to own the Weston and Guelph Subdivisions.

Under Option 2, CN will continue to own the Halton Subdivision. Metrolinx will enter into an agreement with CN that would provide Metrolinx with access to its investments in infrastructure on the Halton Subdivision. Metrolinx will continue to own the Weston and Guelph Subdivisions.

### *Major Project Components and Constructability Review*

The proposed infrastructure works will be undertaken on three distinct corridor segments: the 407 Subdivision, the Halton Subdivision and the Guelph Subdivision. Potential constructability and deliverability challenges for rail corridor infrastructure projects include:

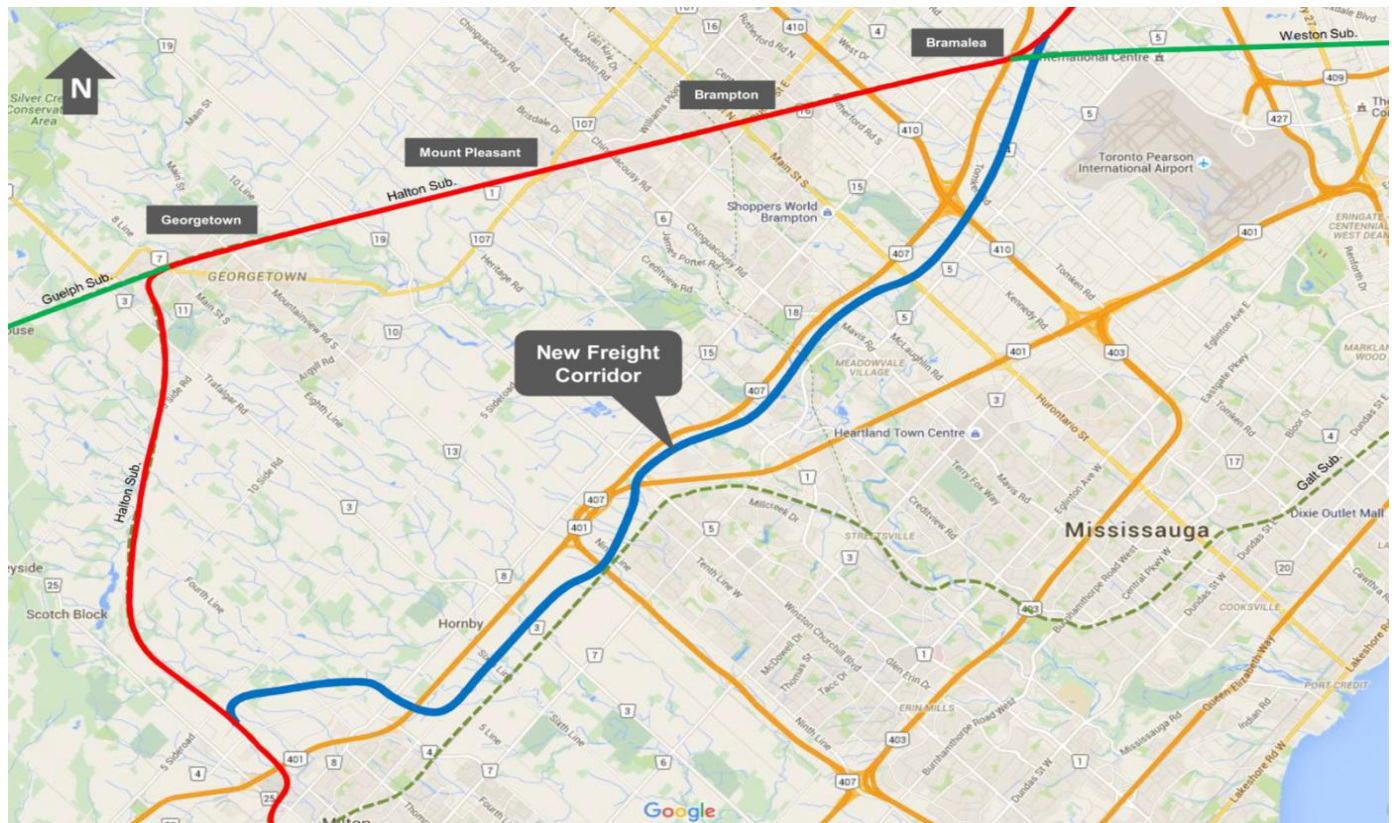
- Nuisance concerns during construction (air quality, noise and vibration, night work);
- Potential for soil contamination on the corridor;
- Stormwater/groundwater management for corridor drainage and culverts;
- Potential for discovery of archaeological artifacts during design and construction;
- Cultural heritage requirements for properties with direct impacts (e.g., stations, bridges, culverts, adjacent structures);
- Engagement with Indigenous communities;
- Stakeholder relations (e.g., community groups, affected residents, agencies); and,
- Construction in sensitive environmental areas (e.g., Niagara Escarpment, Greenbelt, Conservation Authority regulated areas, Areas of Natural and Scientific Interest, Provincially Significant Wetlands).

A high-level review of site specific challenges was also completed for each of the three identified corridor segments, and is discussed in the following subsections.

### 407 Subdivision (Option 1)

The 407 Subdivision will be a new rail corridor constructed along the Highway 407 and Hydro One corridors, with connections to the Halton Subdivision at Halwest (near Torbram Road in Brampton) in the east and Mansewood (near James Snow Parkway in Milton) in the west. Figure 10 shows a potential route for the 407 Subdivision.

Figure 10: Nominated Route for the New 407 Subdivision



The 2016 Feasibility Study identified two Environmentally Significant Areas (ESAs) and one Provincially Significant Wetland (PSW) within the study area, as well as several unevaluated wetlands. There are no Areas of Natural and Scientific Interest (ANSI) along the proposed corridor. Preliminary reviews suggest that the new corridor will not impact the ESAs, but will have impacts on the PSW. Further study and consultation with the Ministry of Natural Resources and Forestry (MNRF) and Credit Valley Conservation (CVC) will be required to understand the potential impacts and required mitigations and compensations. There are also nine waterbodies that will require further assessment and consultation with the Fisheries and Oceans Canada (DFO), MNRF and CVC to determine specific regulatory and permitting requirements.

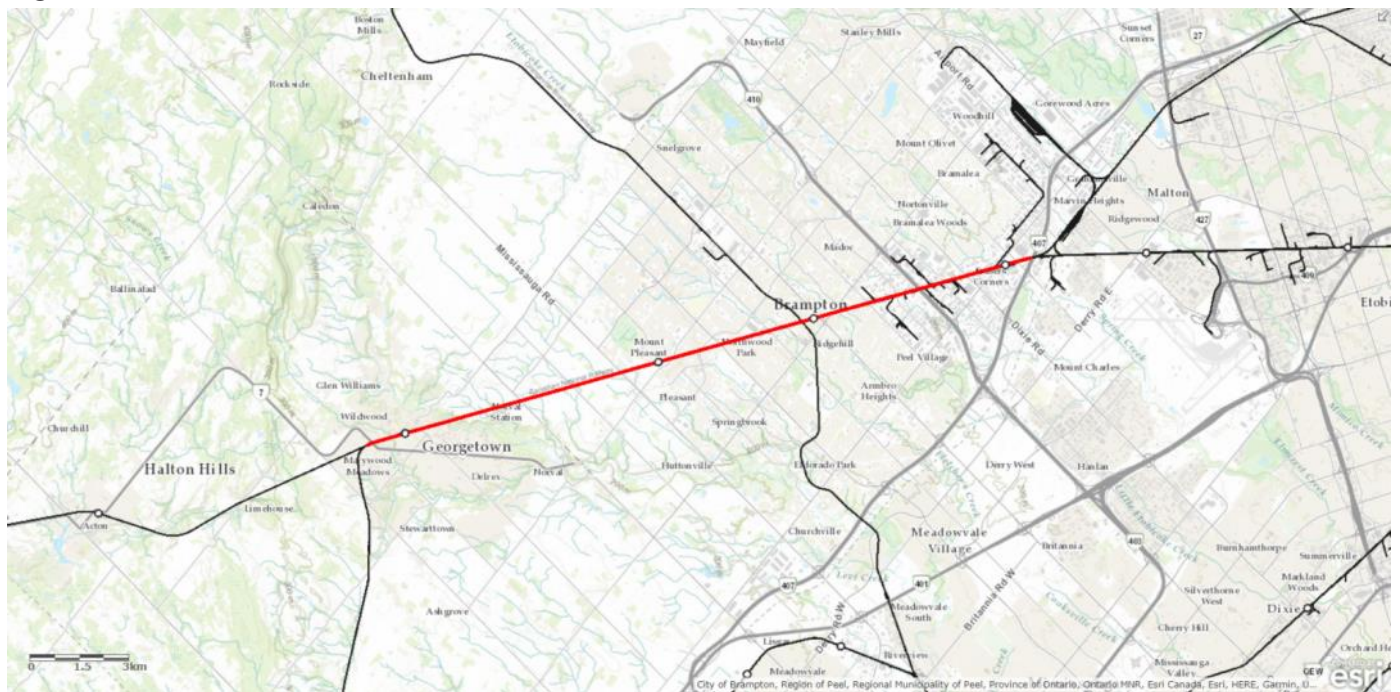
Major utilities along the corridor include two Enbridge gas pipelines and the Hydro One high voltage power corridor. Both utilities will need to be protected or relocated to accommodate the new rail corridor. In particular, the Hydro One power line also has the potential to impact the proposed signaling and radio systems through electromagnetic induction.

The majority of the new corridor will be located on public lands within the Parkway Belt (transportation and utility corridor along the south side of Highways 401 and 407) to reduce the required property acquisition costs. The lands include easements or other devices which allocate usage rights for Hydro One, Enbridge and the proposed 407 Transitway. The feasibility study did not explore the impact of these easements on the proposed rail corridor. Allocation of the Parkway Belt lands for a rail corridor as shown in the 2016 Feasibility Study may preclude the expansion of the Hydro One transmission lines and construction of the 407 Transitway. In addition to the public lands within the Parkway Belt, the corridor will also require the acquisition of 446 acres of private land, primarily near the west end connection to the Halton Subdivision.

### Halton Subdivision (Option 2)

Under Option 2, improvements will be made to expand the existing capacity of the Halton Subdivision between Halwest (east of Bramalea GO station) and Silver (west of Georgetown GO station). Figure 11 shows the segment of the Halton Subdivision under consideration.

Figure 11: Halton Subdivision between Halwest and Silver



The majority of the works will be undertaken between Bramalea and Mount Pleasant GO stations. This segment of the corridor is located within an urbanized area, and there are no ESAs or PSWs near the proposed work areas. The work may impact Etobicoke Creek, which will involve consultations with the MNR and Toronto and Region Conservation Authority (TRCA). TRCA and the City of Brampton are currently working on an Environmental Assessment (EA) for Downtown Brampton flood protection and have requested discussion with Metrolinx and CN with regards to bridge widening. Metrolinx will continue to consult with TRCA and the City of Brampton.

The corridor is also adjacent to several municipal, provincial and federal designated heritage resources, primarily within the historic urban centres of Brampton and Georgetown. In particular, the station buildings at Brampton and Georgetown GO stations are federally designated through the Heritage Railway Stations Protection Act. Any alterations to the station buildings would need to be coordinated with the Government of Canada through Parks Canada.

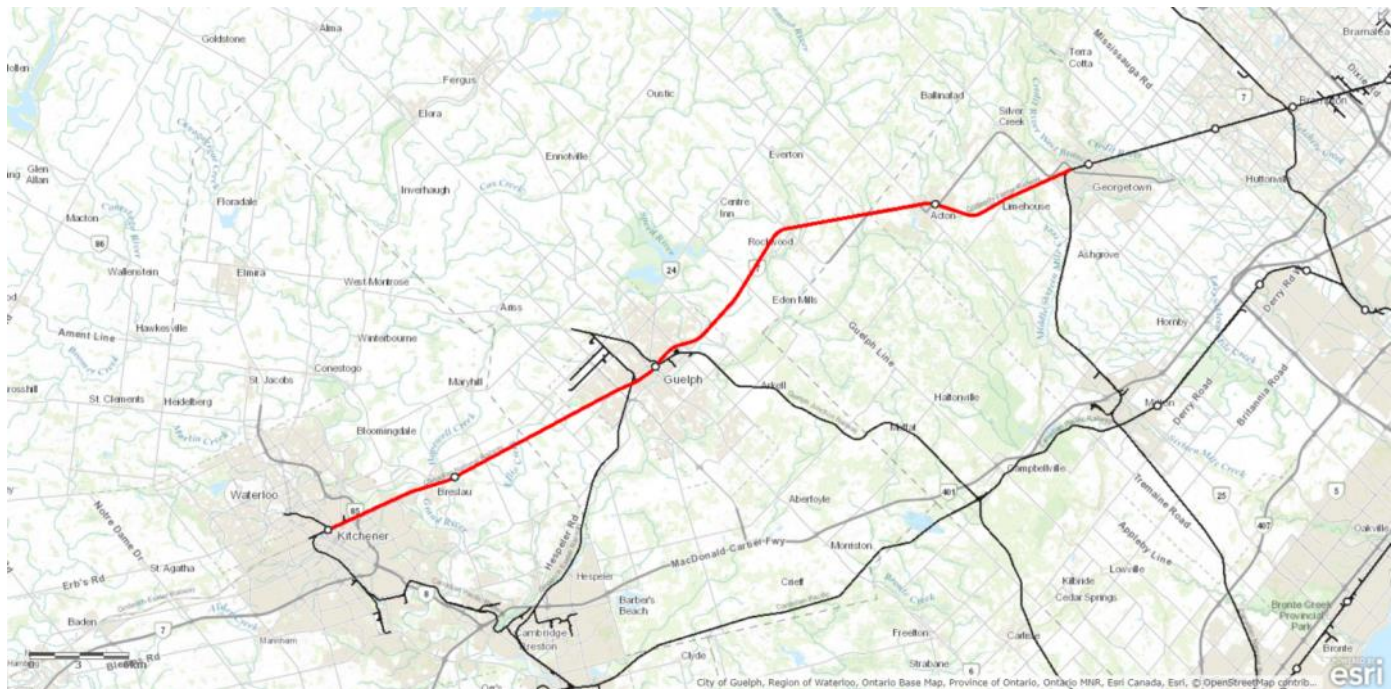
Construction within urban areas, especially for the residential area between Brampton and Mount Pleasant GO stations, will require further consultations with adjacent stakeholders. Works will be subject to additional requirements on air quality, noise and vibration. Prior to seeking EA approval, mitigation as a condition of approval will be negotiated with CN. Metrolinx will also negotiate with CN throughout the work to identify situations where certain approvals are required under other federal/provincial legislation (e.g. species at risk, DFO, cultural heritage, etc.).

The works will generally be contained within the limits of the Halton Subdivision right-of-way (ROW), with potential property acquisitions to widen the ROW, as required, to accommodate the new infrastructure. Work will be undertaken in line with the Master Construction Agreement (MCA) between Metrolinx and CN.

### Guelph Subdivision (Both Options)

Both options will require infrastructure improvements on the Guelph Subdivision to support improved rail service between Georgetown and Kitchener GO stations. The extent of the Guelph Subdivision used for GO Transit service is shown in Figure 12.

Figure 12: Guelph Subdivision



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The corridor traverses several ANSIs, PSWs, and ESAs, especially in the rural areas between the urban centres of Georgetown, Acton, Guelph and Kitchener. The corridor also traverses the Niagara Escarpment and Greenbelt planning areas between Georgetown and Rockwood. Works in these areas will require consultation with the appropriate regulatory agencies including MNRF, CVC and the Grand River Conservation Area (GRCA).

Similar to the Halton Subdivision, the Guelph Subdivision passes through areas of cultural heritage, especially within the urban centres of Acton, Guelph, and Kitchener. The train station buildings in these areas are also federally designated heritage resources under the Heritage Railway Stations Protection Act. Works at these stations will require coordination with the Government of Canada through Parks Canada. Metrolinx also has an agreement with the City of Guelph to provide two years notice prior to relocating Locomotive 6167, a former CN steam locomotive, which is currently located on the south side of the station site.

The scope of work will also include infrastructure improvements within the urban area of Acton, Guelph and Kitchener, which will require further consultation with adjacent stakeholders and impose restrictions on air quality, noise and vibration impacts during construction.

The works will generally be contained within the limits of the existing Guelph Subdivision ROW, with potential property acquisitions to widen the ROW, as required, to accommodate the new infrastructure.

#### *Environmental Assessment Requirements*

The Georgetown to Kitchener Expansion Class Environmental Assessment (EA) was completed in 2009 for the proposed service extension to Kitchener. The EA included infrastructure works on the segment of the corridor between Mount Pleasant GO station and Baden, Ontario, located west of Kitchener.

The EA covers a portion of the works required for Options 1 and 2. Metrolinx will undertake additional technical studies to update the 2009 EA, including:

- Spot checks for natural heritage (e.g. vegetation, trees, species-at-risk, etc.);
- Stage 1 archaeological assessment at specific locations, and if required, Stage 2 archaeological assessment;
- Cultural heritage studies; and
- Stormwater management and drainage studies.

Any works that are not covered in the 2009 EA would be subject to additional EA requirements.

#### 407 Subdivision (Option 1)

The 407 Subdivision has not been investigated through an EA. Due to the size and scope of the project; this may require an assessment through the Individual Environmental Assessment (IEA) process, rather than the expedited Transit Project Assessment Process (TPAP). This will be subject to further discussions with the Ministry of Environment, Conservation and Parks (MECP).

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### Halton Subdivision (Option 2)

The 2009 EA only included consideration of a third track between Mount Pleasant and Georgetown GO stations. Any works required on the Halton Subdivision between Bramalea and Mount Pleasant GO stations will need to be assessed through the TPAP.

### Guelph Subdivision (Both Options)

The majority of works proposed on the Guelph Subdivision, including the new station at Breslau, were assessed through the 2009 EA, and would only require technical studies and consultation to confirm the previous findings. Assessment through the TPAP will be required for any new proposed works, such as the mitigation of level crossings along the corridor or culvert extensions.

### *Project Dependencies*

#### GO Expansion Program

The infrastructure and service plan for the Kitchener Expansion program will need to be coordinated with the wider GO Expansion program.

The RCD is one of many potential infrastructure and service investment programs that could be deployed to meet the objectives of the GO Expansion program. The specifications of the future GO rail system will be developed in collaboration with private sector partners as part of the procurement process. This could include changes to:

- the frequency, stopping patterns, and other operating characteristics of future GO services;
- the rolling stock, including passenger capacity and electrification technology;
- the infrastructure and track capacity between Bramalea GO station and Union Station; and
- the construction staging plan, which could result in temporary capacity constraints on parts of the network.

### CN Negotiations

Service expansions beyond Bramalea GO station are dependent on successful negotiation with CN for increased passenger service on the Halton Subdivision. This would include establishing the allowable passenger train frequencies, available time blocks for train movements, and interfaces between passenger and freight rail services where crossover movements between tracks are required.

Option 1 would require a formal agreement between Metrolinx and CN on the ownership of the 407 Subdivision and Halton Subdivision, and the associated operating rights on the corridors for both parties.

Option 2 would require continued collaborative negotiations and capacity workshops with CN to increase passenger service on the shared-use Halton Subdivision. Any construction within CN's ROW will be subject to the terms of the MCA between Metrolinx and CN.

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### Other Stakeholder Negotiations

Option 1 will also require negotiations with Hydro One and MTO to utilize the lands within the Parkway Belt for a rail corridor. Lands have been reserved for the future 407 Transitway and expansion of Hydro One's power line capacity. Use of these lands for a rail freight corridor would need to be approved against the terms of the Transitway and coordinated with the future plans of these stakeholders.

### *Operations during Construction*

The infrastructure improvements to support the Kitchener Expansion program will involve work on, over or under rail corridors, provincial highways and municipal roads. Construction of the infrastructure would need to be planned to maintain operations and connectivity while works are completed.

### 407 Subdivision (Option 1)

The 407 Subdivision will be located within a new rail corridor, allowing the majority of the works to be undertaken without interfering with existing rail operations. Coordination with CN and GO operations will be required when establishing the connections to the existing main tracks at Halwest and Mansewood.

The project also involves two new grade separations at Highway 401, one new grade separation at Highway 410, as well as a reconstruction of an existing grade separation at Highway 407. These works will need to be coordinated with the Ministry of Transportation (MTO) to limit the impacts to motorists. The remaining grade crossing and grade separation work on regional and local roads will require coordination with the respective municipalities.

Hydro One has also indicated a requirement to have ground level access to their towers for maintenance at all times. Work zones will need to consider the required clearance from Hydro One towers to allow unimpeded access for maintenance staff and equipment.

### Halton Subdivision (Option 2)

Works on the Halton Subdivision will need to be coordinated with passenger and freight rail traffic. Metrolinx operates regular service during both the peak and off-peak periods, while CN operates freight service as and when required. Any track closures, diversions or speed restrictions will require agreement from both CN and Metrolinx. If pursued, the design phase will require a detailed staging plan to be developed and approved by both Metrolinx and CN.

Any works on the existing grade crossings will require coordination with local and regional municipalities to mitigate the impacts to road operations.

### Guelph Subdivision (Both Options)

On the Guelph Subdivision, there is regular GO rail service during the peak period, as well as limited off-peak GO, VIA and freight rail traffic. The lower frequency of rail movements provides additional flexibility in scheduling construction works. All track closures, diversions or speed restrictions would be subject to approval by Metrolinx.

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In addition, any works on the existing grade crossings will require coordination with local and regional municipalities to mitigate the impacts to road operations.

### *Project Schedule and Phasing*

This business case assumes that increased rail service will begin in 2025 as a basis for completing the economic and financial analysis. Actual delivery time of the program will depend on funding decisions, and required time to complete environmental assessments, design and construction. This will be further refined and developed through the preliminary design phase.

The schedule will be a significant challenge for Option 1. Service increases can't be realized until the 407 Subdivision is completed and CN traffic is diverted off the Halton Subdivision. The estimated timeline to complete the 407 Subdivision is approximately 8.5 years from approval to proceed. The delivery time may further vary based on the procurement model, permitting regime and requirements, and lead time for construction.

Under Option 2, the infrastructure is proposed to be completed through smaller construction packages. The works are anticipated to require five years to complete, once approval to proceed is secured. Since this option focuses on expanding capacity on existing corridors, the service can be incrementally increased as portions of the work is completed in advance of the full completion date.

For both options, the phasing of service increases will need to be coordinated with the overall GO Expansion program. In particular, the current layout of the Union Station platforms and rail corridor limits the number of inbound trains from the Kitchener corridor. The GO Expansion program will reconfigure the station tracks and platforms to increase capacity; however, service increases across the network will need to be coordinated in the short term while the capacity constraint is in place.

## **Operations and Maintenance**

### *Roles and Responsibilities*

For both options, Metrolinx and CN will be responsible for timetable planning, train control, dispatch and infrastructure maintenance on their respective corridors. The maintenance costs will be determined by the Master Operating Agreement (MOA) between Metrolinx and CN.

### *Operational Impacts and Future Expansion*

Through the implementation of Option 1, Metrolinx will assume ownership of the Halton Subdivision between Bramalea and Georgetown GO stations, providing greater control over the train movements in the corridor. The separation of passenger and freight traffic will reduce conflicts and delays for both operators. Option 1 also provides flexibility for Metrolinx to implement further infrastructure improvements, such as new stations, electrification or additional track capacity; as well as passenger rail service enhancements, such as improved VIA Rail service, alternate express train service patterns, or enhanced passenger rail service to southwestern Ontario. As part of the transfer of the 407 Subdivision to CN, Metrolinx also reserves the right to construct new tracks to divert CP freight traffic to allow for a

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service increase on the Milton corridor, or to implement a new passenger rail service on the 407 Subdivision.

Under Option 2, CN will continue to own and operate the Halton Subdivision. Existing potential for delays will remain, due to train crossover movements, freight servicing of local customers and may increase due to the overall higher rail volume on the corridor. In addition, opportunities for future expansion of the Halton Subdivision will be constrained, especially within the urban areas of the City of Brampton. CN has also expressed concerns regarding electrification of a shared rail corridor.

#### *Fleet Requirements*

The Kitchener Expansion program will require additional locomotives and coaches to operate the proposed train trips. As parts of the GO rail network are electrified through the GO Expansion program, diesel locomotives may become available. The additional fleet requirements will be confirmed through further schedule planning, and considered in light of the overall fleet requirements for the GO Expansion program.

#### *Depot/Stabling Arrangements*

Both options will include the expansion of layover capacity at Shirley Yard in Kitchener. The required layover capacity will be investigated in greater detail as the service schedules are developed, and potential alternatives for train storage solutions will be assessed.

#### *Trade-offs between Capital and O&M Phases*

The investment in the 407 Subdivision proposed under Option 1 would allow Metrolinx to assume ownership of the Halton Subdivision. This eliminates the requirement for Metrolinx to pay access fees to CN to operate on the corridor, and is reflected in the lower O&M costs for this option.

### **Procurement**

The procurement option that provides the best value for money is under review. Delivery of improvements on the Halton Subdivision will be carried out as per the terms of the MCA between Metrolinx and CN; while delivery of infrastructure improvements on the Guelph Subdivision could be part of the GO Expansion procurement, or a standalone project. For all options, procurement and operations will need to be coordinated with the overall GO Expansion procurement.

### **Conclusion**

Both options analyzed through this business case are technically feasible, but have challenges in the deliverability and operations of the service. In both cases, deliverability of the option will be dependent on agreement with third party stakeholders to share an existing corridor. Generally, Option 2 performs better on the deliverability considerations, while Option 1 performs better operationally. Table 13 summarizes the key findings of the Deliverability and Operations case.

Table 13: Deliverability and Operations Case Summary

| Deliverability and Operations Consideration | Option 1: Freight Bypass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Option 2: Minimal Infrastructure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Constructability and Environmental Impacts  | <ul style="list-style-type: none"> <li>• Construction impacts in sensitive environmental areas (e.g., Niagara Escarpment, Greenbelt, Conservation Authority regulated areas, ANSI, PSW)</li> <li>• Cultural heritage requirements for properties with direct impacts (e.g., stations, bridges, culverts, adjacent structures)</li> <li>• Stakeholder relations/social impacts within the urban areas of Kitchener, Guelph and Brampton</li> <li>• Stormwater/groundwater management for corridor drainage and culverts</li> <li>• Potential for soil contamination on the corridor</li> <li>• Nuisance concerns during construction (e.g., air quality, noise and vibration, night work)</li> <li>• Potential for discovery of archaeological artifacts during design and construction</li> <li>• Potential operational impacts on Hydro One and 400-series highways</li> </ul> | <ul style="list-style-type: none"> <li>• Construction impacts in sensitive environmental areas (e.g., Niagara Escarpment, Greenbelt, Conservation Authority regulated areas, ANSI, PSW)</li> <li>• Cultural heritage requirements for properties with direct impacts (e.g., stations, bridges, culverts, adjacent structures)</li> <li>• Stakeholder relations/social impacts within the urban areas of Kitchener, Guelph and Brampton</li> <li>• Potential operational impacts on existing CN and GO traffic on the Halton Subdivision</li> <li>• Stormwater/groundwater management for corridor drainage and culverts</li> <li>• Potential for soil contamination on the corridor</li> <li>• Nuisance concerns during construction (e.g., air quality, noise and vibration, night work)</li> <li>• Potential for discovery of archaeological artifacts during design and construction</li> </ul> |
| Approvals and Permits Required              | <ul style="list-style-type: none"> <li>• IEA approval, in addition to standard permits / approvals for works on rail transit corridors</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>• TPAP approval and standard permits / approvals for works on rail transit corridors</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Implementation Schedule                     | <ul style="list-style-type: none"> <li>• Large scope and long lead time for approvals and construction</li> <li>• Service increases will need to be coordinated with the overall GO Expansion Program</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>• Smaller scale projects could allow for incremental increases in capacity and service</li> <li>• Service increases will need to be coordinated with the overall GO Expansion Program</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Third Party Agreements                      | <ul style="list-style-type: none"> <li>• Requires an agreement with CN on the ownership and operations of the 407 and Halton Subdivisions</li> <li>• Requires negotiations with Hydro One and MTO to share the Parkway Belt corridor</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>• Requires continued collaboration with CN to optimize passenger and freight co-production.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Operating Impacts                           | <ul style="list-style-type: none"> <li>• Additional fleet and storage capacity may be required to operate the service</li> <li>• Full separation of freight and passenger traffic, reducing a source of operational delays</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>• Additional fleet and storage capacity may be required to operate the service</li> <li>• Shared use of corridors, leading to potential delays and loss of operational flexibility</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Future Expansion                            | <ul style="list-style-type: none"> <li>• Flexibility to adapt corridor infrastructure to meet changing transportation demands and operational needs</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>• Will require future agreements with CN for further corridor expansion</li> <li>• Constrained ROW on the Halton Subdivision physically limits potential for expansion.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

# 8

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## Business Case Summary



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## Introduction

This chapter summarizes the findings of the four-case evaluation, provides a recommendation on the option(s) to be advanced for preliminary design, and highlights additional work or investigations that are required to confirm the findings of this business case.

## Investment Review

### *Strategic Case*

Both options reviewed in this business case perform well in the Strategic Case. The service increases delivered through both options address the problem statement, as well as the strategic outcomes of creating strong connections, providing complete travel experiences, and supporting sustainable and healthy communities. Option 1 slightly outperforms Option 2 due to the increased reliability of a dedicated passenger rail corridor.

### *Economic Case*

Both options provide significant economic benefits that are largely driven by the transit user benefits. Due to the significant capital cost to implement Option 1, the overall BCR for this scenario is 0.5, indicating that the benefits do not outweigh the costs. Option 2 delivers equivalent benefits at a substantially lower capital cost. This option achieves a BCR of 1.0, indicating that the benefits accrued are equivalent to the economic cost of the investment.

### *Financial Case*

Both options perform poorly in the financial case. The incremental revenues generated by the new service will not offset the additional operating costs incurred over the BAU case. Coupled with the cost of implementation, the net present value of both options are negative for Metrolinx.

### *Deliverability and Operations Case*

Both options are technically feasible, but have distinct challenges in their deliverability and operations. Option 2 is simpler to deliver due to the smaller project scope, however, Option 1 performs better operationally in the long run due to the additional control and flexibility that Metrolinx would have on the operations of the Halton Subdivision.

The key dependencies for both options are the final GO rail system specifications that will be developed through the procurement process for the GO Expansion program, and the agreements to share corridors with third party stakeholders.

## Recommendations and Next Steps

Option 2 performs well in the strategic case, moderately in the economic and deliverability and operations cases and poorly in the financial case. This option could allow for the implementation of

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improved service on the Kitchener corridor at a lower cost and shorter timescale compared to the previously approved freight bypass option.

Option 1 remains a viable alternative to deliver two-way all-day service on the Kitchener corridor, albeit at a significantly higher cost. This option also provides additional operational benefits, as well as flexibility for other passenger rail programs which are outside the scope of this business case.

Based on the results of the business case analysis, Metrolinx recommends advancing the Kitchener Expansion program using the infrastructure program outlined in Option 2. Once an option is agreed to for development by Metrolinx, the Province and impacted stakeholders, a Preliminary Design Business Case following Metrolinx's stage-gate process will begin assessing the preferred option at a more detailed level of analysis further refining project scope, benefits and costs.

Through the Preliminary Design Business Case, Metrolinx will further refine the infrastructure that will be delivered, the interactions between the Kitchener Expansion program and the wider GO Expansion program, and the requirements of the agreement with CN on the shared-use corridor. The service pattern for the Kitchener Expansion program will be revised to address operational constraints and optimize the economic and financial case for the project. This work will also involve more detailed ridership modelling using a regional travel demand model to more accurately capture the potential ridership of an expanded Kitchener corridor service.

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## Appendix – Sensitivity Analysis

Several tests were conducted on key input assumptions and parameters to determine the range of benefits and disbenefits possible for each investment option. Tests were conducted on the following items:

- Purchase of new rolling stock to operate extension services (no rolling stock purchase assumed in reported results)
- Track User Fees
- Value of Time growth rate of 0.75 per cent (zero per cent growth rate utilized in reported results)
- Economic Discount Rate of 2.5% (3.5% growth rate utilized in reported results)

Note that in some cases, the effects of the sensitivity analysis are only to the second decimal place and are, thus, not visibly different to the main IBC results.

### Rolling Stock Purchase

The IBC assumes that no new rolling stock is required to purchase in order to operate the Kitchener extension services. As parts of the GO Rail network are electrified through the GO Expansion program, diesel locomotives may become available in the mid to late 2020s. However, in the case that excess rolling stock is not available for operations to/from Kitchener, tests were run to see BCR impacts when five new 12-car diesel bi-level trains are purchased for Options 1 and 2.

Table 14: Rolling Stock Sensitivity Test Benefit Cost Ratios

| Rolling Stock Purchased | Option 1: Freight Bypass | Option 2: Minimal Infrastructure |
|-------------------------|--------------------------|----------------------------------|
| 5 Trains                | 0.5                      | 0.9                              |

With additional rolling stock costs BCRs decrease for all options. This decrease is expected as costs for these options increase while benefits remain stationary.

### Track User Fees

Metrolinx incurs track user fees from CN for each kilometer operated on their rail corridor. These fees do not pay for maintenance and operating costs to our freight partners, but rather are fees incurred for the opportunity to use the company's corridor. As this cost is not entirely a resource cost/opportunity cost of using the track, but rather a transfer payment, it can be argued that this cost should only be accounted for in the financial case analysis and not the economic case.

Removing these costs from the economic case will impact option benefit cost ratios. A sensitivities test was considered on this cost. The test assumes no user fee, on the premise that no additional resource costs are utilized when accessing a freight operator's track.

Table 15: Track User Fees Sensitivity Test Benefit Cost Ratios

| Track User Fees | Option 1: Freight Bypass | Option 2: Minimal Infrastructure |
|-----------------|--------------------------|----------------------------------|
| With CN Fee     | 0.5                      | 1.0                              |
| No Fee          | 0.5                      | 1.0                              |

With user fees removed, the BCR increases for Option 2 as expected, because CN continues to be the owner of the track, but decreases slightly for Option 1 because in the original results there are operating cost savings associated with building CN a freight bypass and owning the existing corridor when compared to a BAU scenario. When these track access fees are removed, so are these savings.

#### Value of Time Growth Rate

Sensitivity tests were conducted on reported BCRs with the Value of Time annual growth rate set to 0.75 per cent, whereas it is recommended that it be set to zero per cent as done in the IBC reported results.

Table 16: VoT Growth Rate Sensitivity Test Benefit Cost Ratio

| VoT Growth Rate                       | Option 1: Freight Bypass | Option 2: Minimal Infrastructure |
|---------------------------------------|--------------------------|----------------------------------|
| 0% VoT Growth Rate (Main IBC results) | 0.5                      | 1.0                              |
| 0.75% VoT Growth Rate                 | 0.5                      | 1.1                              |

#### Economic Discount Rate

Sensitivity tests were conducted on reported BCRs with the Economic Discount Rate set to 2.5%, to compare results to those in the IBC reported results using an Economic Discount Rate of 3.5%.

Table 17: Economic Discount Rate

| Economic Discount Rate                         | Option 1: Freight Bypass | Option 2: Minimal Infrastructure |
|------------------------------------------------|--------------------------|----------------------------------|
| 3.5% Economic Discount Rate (Main IBC results) | 0.5                      | 1.0                              |
| 2.5% Economic Discount Rate                    | 0.6                      | 1.1                              |

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## Glossary

| Term                                     | Definition                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FBC                                      | GO Expansion Full Business Case (November 2018)                                                                                                                                                                                                                                                                                                                                   |
| 2015 IBC                                 | Kitchener GO Rail Service Initial Business Case (November 2015)                                                                                                                                                                                                                                                                                                                   |
| 2016 Economic and Financial Assessment   | GTHA Rail Rationalization: Economic and Financial Assessment (October 2016)                                                                                                                                                                                                                                                                                                       |
| 2016 Feasibility Study                   | New 407 Rail Corridor Feasibility Study (November 2016)                                                                                                                                                                                                                                                                                                                           |
| Initial Business Case (IBC)              | The first Business Case prepared for a project in line with part two of Metrolinx's stage gate process (Feasibility and Options Analysis). This Business Case compares potential investments to identify if there is merit in further design and development.                                                                                                                     |
| GO Expansion Program                     | Capital program to implement electrified two-way all-day service across the GO rail network. Specifically on the Kitchener corridor, the program will implement frequent (15-minute or better) two-way all-day electrified service between Union Station and Bramalea GO station.                                                                                                 |
| Greater Toronto and Hamilton Area (GTHA) | The combined area of the Cities of Hamilton, and Toronto; and the Regions of Durham, Halton, Peel, and York.                                                                                                                                                                                                                                                                      |
| Greater Golden Horseshoe (GGH)           | The combined area of the GTHA, as well as the Cities of Barrie, Brantford, Guelph, Kawartha Lakes, Orillia, Peterborough; the Counties of Brant, Dufferin, Haldimand, Northumberland, Peterborough, Simcoe, and Wellington; and the Regions of Niagara and Waterloo.                                                                                                              |
| Preliminary Design Business Case (PDBC)  | This Business Case is aligned with step three of Metrolinx's stage gate process (Preliminary Design) and develops a more detailed design for one or more investment options discussed in an Initial Business Case. It is used to secure funding for a potential investment.                                                                                                       |
| Business As Usual (BAU)                  | A scenario used in Business Case analysis that reflects the future state of the region (including population, employment, and the transportation network) without the investment that is appraised in the Business Case. In this document, Business as Usual refers to the future state of the region and GO Rail with GO Expansion, but without the Kitchener Expansion program. |

| Term                           | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reference Concept Design (RCD) | <p>In this document, refers to the Reference Concept Design for the GO Expansion program, which illustrates how an investment is delivered. This reference concept design is used to:</p> <ul style="list-style-type: none"> <li>• Demonstrate that a working approach to deliver GO Expansion is possible.</li> <li>• Determine a budget and construction schedule to be approved by Treasury Board.</li> </ul>                                                                                   |
| Net Present Value              | The total economic value of a project. Determined by subtracting project costs from its total benefits. A positive Net Present Value indicates that the project's benefits exceed its costs                                                                                                                                                                                                                                                                                                        |
| Mode Share                     | The percentage of person-trips made by one mode of travel relative to the total number of trips made by all modes.                                                                                                                                                                                                                                                                                                                                                                                 |
| Urban Growth Centres           | Existing or emerging downtown areas shown in Schedule 4 in the Growth Plan for the Greater Golden Horseshoe, 2017, and as further identified by the Minister (of Municipal Affairs) on April 2, 2008. They represent twenty-five downtown areas that are intended to be mixed-use, high-density, and transit-supportive focal points for residential and employment growth and intensification in a municipality.                                                                                  |
| Vehicle-Kilometres Travelled   | A measure of roadway use, commonly used in estimating congestion, that reflects the distance that an individual drives, or, more typically, the cumulative distance driven by all vehicles in an urban region during a specified period of time. Vehicle kilometres travelled can reflect the link between land use and transportation. Land uses that are further away from each other result in longer trip lengths, more traffic on roadways and more vehicle kilometres travelled, for example |
| Wider Economic Impacts         | Benefits from investing in transportation that lead to a more productive region. Typically these benefits include agglomeration (enabling increased innovation, collaboration, and productivity) and labour supply benefits (increased job access for employee and a larger labour pool for employers).                                                                                                                                                                                            |
| Benefit Cost Ratio (BCR)       | An economic indicator that reflects the relationship between benefits and costs of an investment. A BCR greater than 1 indicates the projects benefits exceed costs.                                                                                                                                                                                                                                                                                                                               |

