

APPENDIX 3

UPDATE ON THE SMARTTRACK WESTERN CORRIDOR FEASIBILITY REVIEW

1. INTRODUCTION

In February 2015, Council directed the City Manager to work with the TTC and Metrolinx to undertake a feasibility review of SmartTrack options on the Kitchener Corridor from Mount Dennis station to the Mississauga Airport Corporate Centre (MACC) in the vicinity of Eglinton Avenue West and Renforth Drive, to include:

- At least 3 stations at Jane/Scarlett, Kipling and the MACC;
- Integration with the Kitchener GO corridor/Regional Express Rail (RER) plan;
- Public consultation to inform the study; and
- Preparing the feasibility study as a background study for a possible Transit Project Assessment Process (TPAP), subject to further Council direction.

City Council requested the City Manager to include in the feasibility review a further option which would continue SmartTrack north from the Mount Dennis station to the airport area, including the existing Weston GO station, and two additional stations at Islington Avenue and in the vicinity of Woodbine Racetrack, and then connect to the MACC past Pearson Airport.

Following Council direction, City staff retained a consultant to assist in this initial work. The consultant was asked to focus on engineering feasibility, land use impacts and development potential. The initial work has progressed and is close to complete. The results of the demand forecasting modelling will need to be incorporated into the report in order to finalize the analysis. A final round of public consultation is planned in advance of a report to Council in Q1 2016.

2. PROJECT SCOPE

The consultant was asked to identify a number of potential corridors between Mount Dennis and the MACC: along Eglinton Avenue and running off the Kitchener corridor near Woodbine Racetrack. The feasibility of these corridor options is being assessed through five lenses: technical, regulatory, service concept, land use planning, and financial/costing.

The base reference case for the feasibility review is the EA-approved extension of the Eglinton LRT from Mount Dennis to the MACC and Pearson Airport area via Renforth Gateway. The Province has not made a commitment to fund this project.

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

The five aspects of the assessment cover several key questions:

Technical

The technical analysis is focused on identifying corridor options that are feasible given the design requirements of heavy rail. The analysis has considered issues of constructability and operations for heavy rail in each corridor, including considerations such as required turns and grades, any required tunnels, bridges and grade separations, station locations, equipment and infrastructure required for electrification, and other required elements for operating heavy rail in the study area. Considerations related to features such as waterways, floodplains, and major infrastructure are also factored into the technical analysis, as they may present constraints on the way in which a heavy rail corridor could be built. The technical analysis has also examined potential connections with existing and planned transit services in Toronto and Mississauga.

Regulatory

The review of regulatory and legislative requirements is focused on identifying general federal and provincial requirements to construct and operate heavy rail services in each corridor, including, but not limited to, the required rights-of-way and any safety barriers or buffers. The review also includes any requirements for environmental assessments under the Canadian Environmental Assessment Act and any restrictions on, or additional requirements for, rail operation on or near airport lands.

Service Concept

The service concept feasibility is examining the interaction of different services sharing the GO rail corridors, terminal station requirements and the integration of other transit services with SmartTrack. The Consultant has been asked to comment on:

- Any additional infrastructure that may be required in the Kitchener Corridor from Union Station to the point at which the SmartTrack corridor connects, to accommodate 15 minute SmartTrack service in addition to the other GO RER and UP Express services in the Kitchener Corridor; and
- The potential impacts to GO RER and UP Express services as a result of adding 15 minute SmartTrack service in the Kitchener Corridor without additional infrastructure.

Land Use Planning

Toronto's Official Plan establishes a number of city-building principles to guide planning in Toronto. These principles were further elaborated in "Feeling Congested?" (the transportation component of the Five Year Official Plan Review) and are guiding the land use analysis for the SmartTrack connection to the MACC. (For a full discussion on City Planning Division's approach to transit planning, see Appendix 6.)

The compatibility of surrounding land uses with the proposed infrastructure, including any vehicle maintenance and storage facilities that may be required in the corridor, is the focus of the

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

land use analysis. This analysis includes identifying potential impacts on sensitive features and land uses. It considers impacts arising from both the construction and operation of the line, compared to the base case LRT option, including the extent to which each proposal:

- Advances opportunities to improve the public realm;
- Requires property acquisitions;
- Improves development opportunities from a land use perspective;
- Reduces the area or desirability of existing developable land or opportunities;
- Is an obstacle to local trip making; and
- Negatively impacts stable residential neighbourhoods through increased noise, vibration, emissions, visual intrusion, or other negative impacts.

Financial Analysis/Costing

The City's broader financial analysis of SmartTrack will be supported by the Consultant who will provide high-level cost estimates for potential alignments, considering all elements of construction of the lines (e.g. design, engineering, required property acquisitions, track system requirements). This is only meant to cover any incremental infrastructure beyond what is required for the implementation of GO RER service. These costs do not include any additional infrastructure requirements on the Kitchener corridor beyond that required to connect the new corridor into the GO network.

3. CORRIDORS AND ALIGNMENTS

Seven initial corridor options were identified for the analysis. The base case is the Eglinton West LRT extension.¹ Four corridor options follow Eglinton Avenue while three follow the alignment from near the Woodbine Racetrack south to the MACC. The corridor options were presented to the public in a series of public meetings in June, along with information describing the proposed approach to the feasibility assessment (See Appendix 5 Public Consultation Summary).

Based on initial technical analysis, two of these corridor options were eliminated (2A and 3). Specific alignment options were developed for the remaining corridors for further assessment in this study. Several of these alignments were eliminated through secondary technical screening. One additional alignment (Eglinton Corridor 1D) was introduced after the public consultations and has not been through the same full assessment as the other alignments. The refined alignments of the remaining options will be presented to the public for review prior to a final report being submitted to Council.

¹ Metrolinx is currently undertaking work on optimizing the approved LRT extension. The results of this work will be completed in early 2016.

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Table 1: Corridors Evaluated and Screening Results

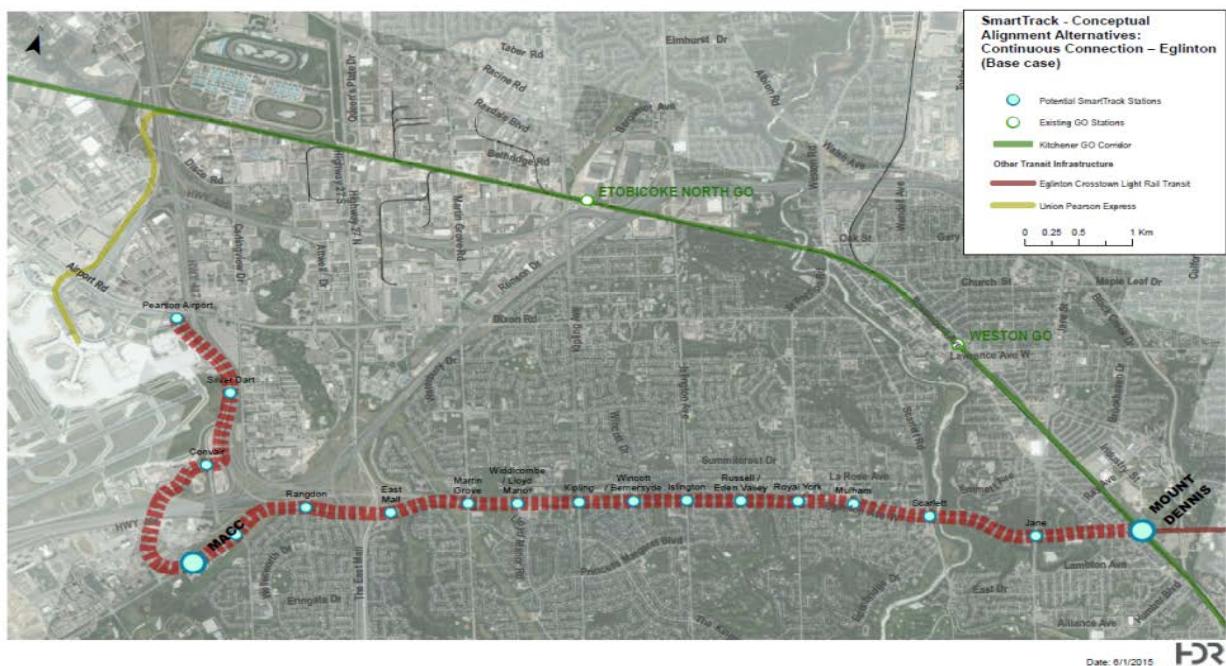
Corridor Option	Outcome of Preliminary Screening – Carried Forward?	Alignment Option Name	Outcome of Secondary Screening – Carried Forward?
Eglinton Avenue Corridor 1A	Yes	1A Elevated	Yes
		1Aa Below Grade	Yes
		1Ab Below Grade	No
Eglinton Avenue Corridor 1B	Yes	1Ba Below Grade (between GO and CP)	Yes
		1Bb Below Grade (west side of GO)	No
Eglinton Avenue Corridor 1C	Yes	1C Below Grade	Yes
Eglinton Avenue Corridor 1D	Introduced after primary screening	1D Below Grade (Alignment to be developed)	Yes
Northern Extension Corridor 2A	No	n/a	n/a
Northern Extension Corridor 2B	Yes	2B	Yes
Northern Extension Corridor 2C	Yes	2Ca Elevated	Yes
		2Cb Below Grade	Yes
Stand-alone Eglinton Corridor 3	No	n/a	n/a

The base reference case and each of the corridor options is discussed in more detail below.

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Base Reference Case – Eglinton Crosstown LRT Phase 2

Figure 1 Base Reference Case- Eglinton Crosstown LRT Phase 2



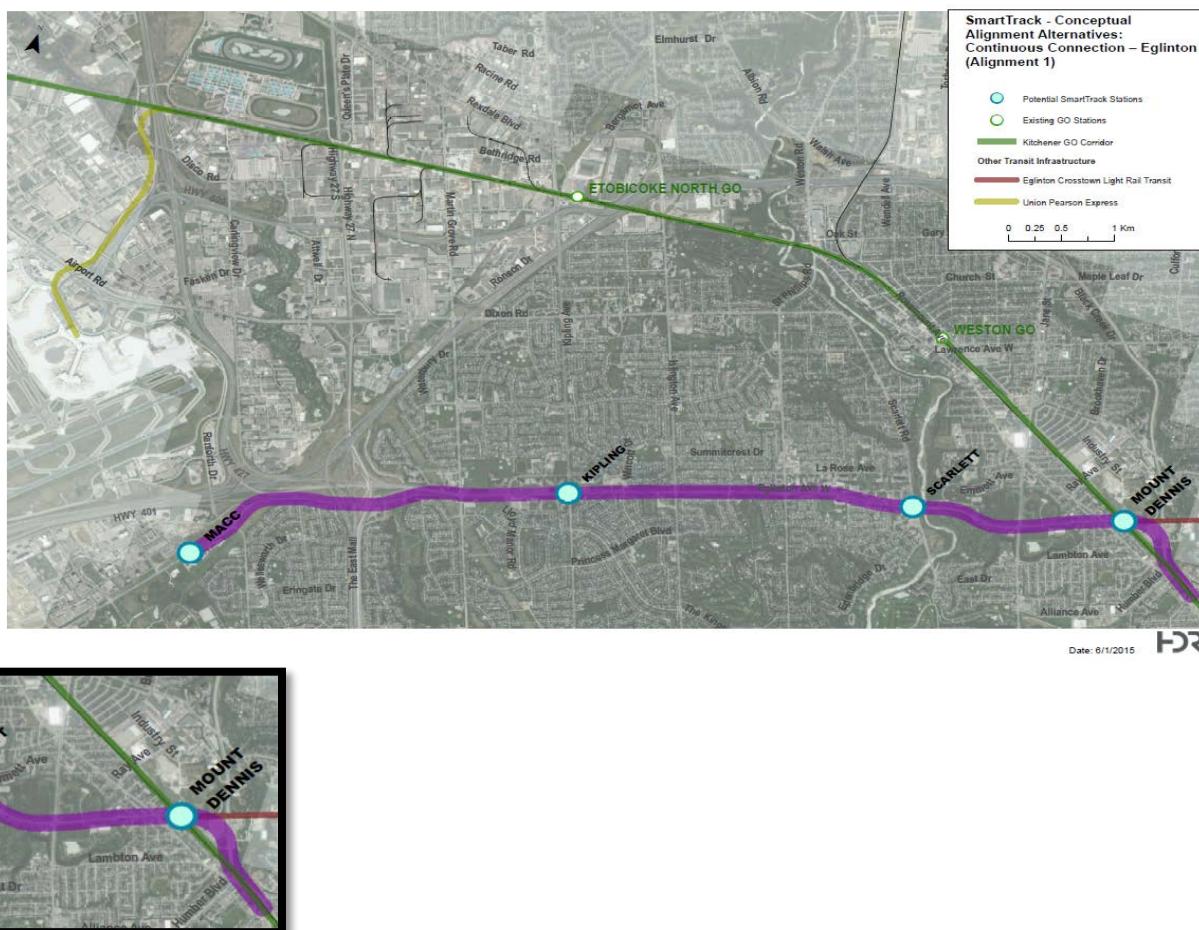
The approved LRT extension includes an at-grade connection to the MACC, and then extends northward toward Pearson Airport. As part of this Feasibility Review, heavy rail options are being assessed against the approved LRT extension. A specific connection into the airport was not included as part of the approved Environmental Assessment (<http://thecrosstown.ca/the-project/reports>), but the need to connect directly to the airport passenger terminals was identified as an important element to confirm. Further work was undertaken to assess options for connecting to the airport, but the Environmental Assessment has not been amended to include this connection.

Initial input from the Feasibility Review of SmartTrack corridors has pointed to opportunities to further develop and optimize the plan for the LRT extension. As an option, the City and Metrolinx may want to consider modifications to the number of stops or other aspects of the LRT project design to strengthen the service provided to the MACC and the airport area. As well, the final SmartTrack or LRT connection to Pearson Airport is being further investigated in partnership with the GTAA. Metrolinx is reviewing the approved LRT plan to consider alternative LRT concepts that would improve travel time compared to the approved LRT concept, address local concerns and at the same time improve strategic connections.

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Corridor 1A

Figure 2 Corridor Option 1A

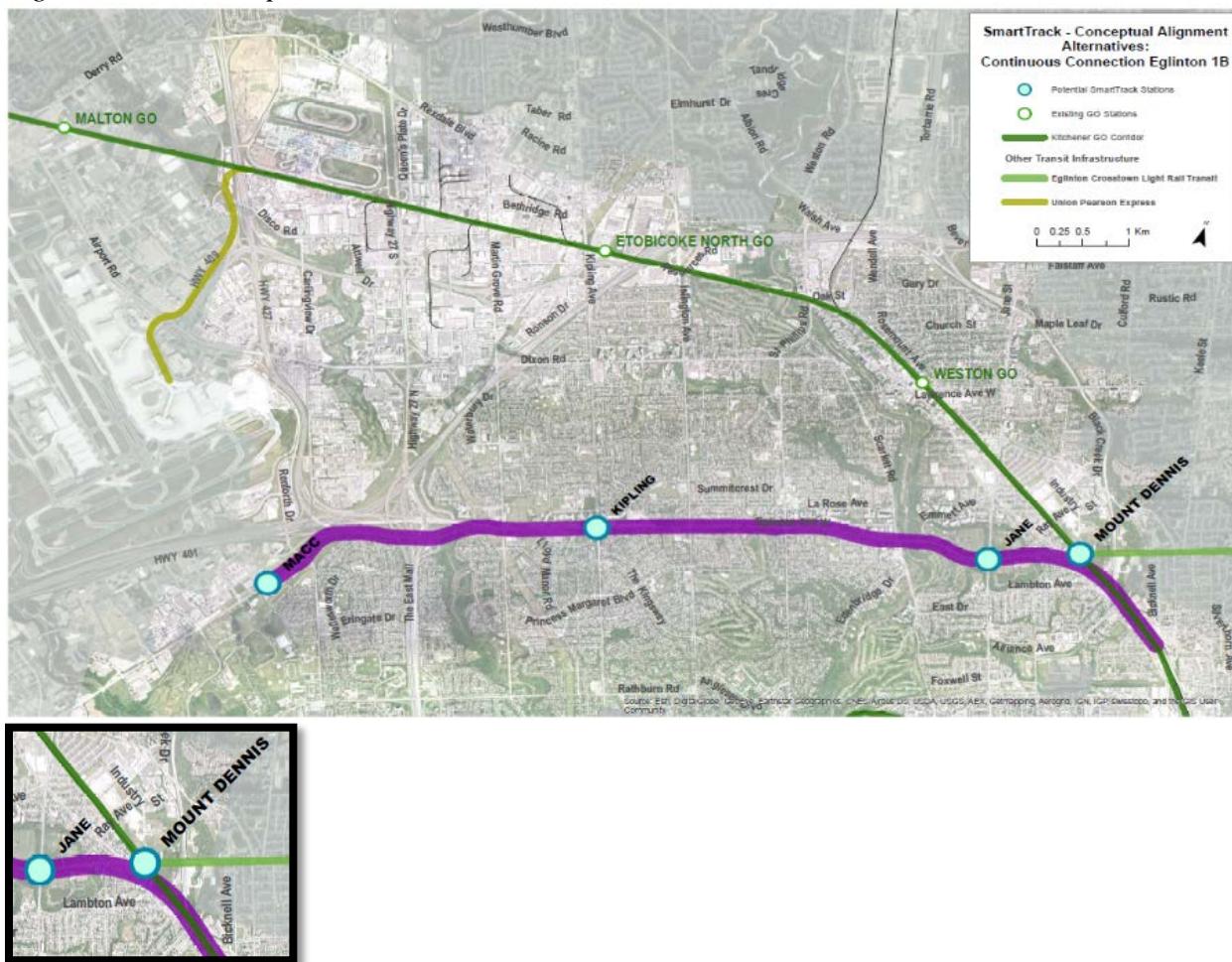


Corridor 1A loops to the east in order to then turn west into the Eglinton Avenue right-of-way and connect through Mount Dennis station. Two new tracks would need to be added to the corridor in the vicinity of St. Clair Avenue, requiring the widening of the corridor to the east. This would have a significant impact between St. Clair and Eglinton, and in particular, in neighbourhoods in the vicinity of Mount Dennis station. The tracks would either be tunneled or elevated to cross the CP Rail tracks and Black Creek, and then elevated across the Eglinton Flats parkland. Requirements for crossing Black Creek would need to be confirmed. Impacts on the Eglinton Flats parkland could be minimized by following the Eglinton Avenue alignment, although the road right of way would likely need to be widened through the park. From Scarlett Road through to the MACC, the corridor would be tunneled (see discussion that follows in Section 4 Alignment Characteristics).

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Corridor 1B

Figure 3 Corridor Option 1B

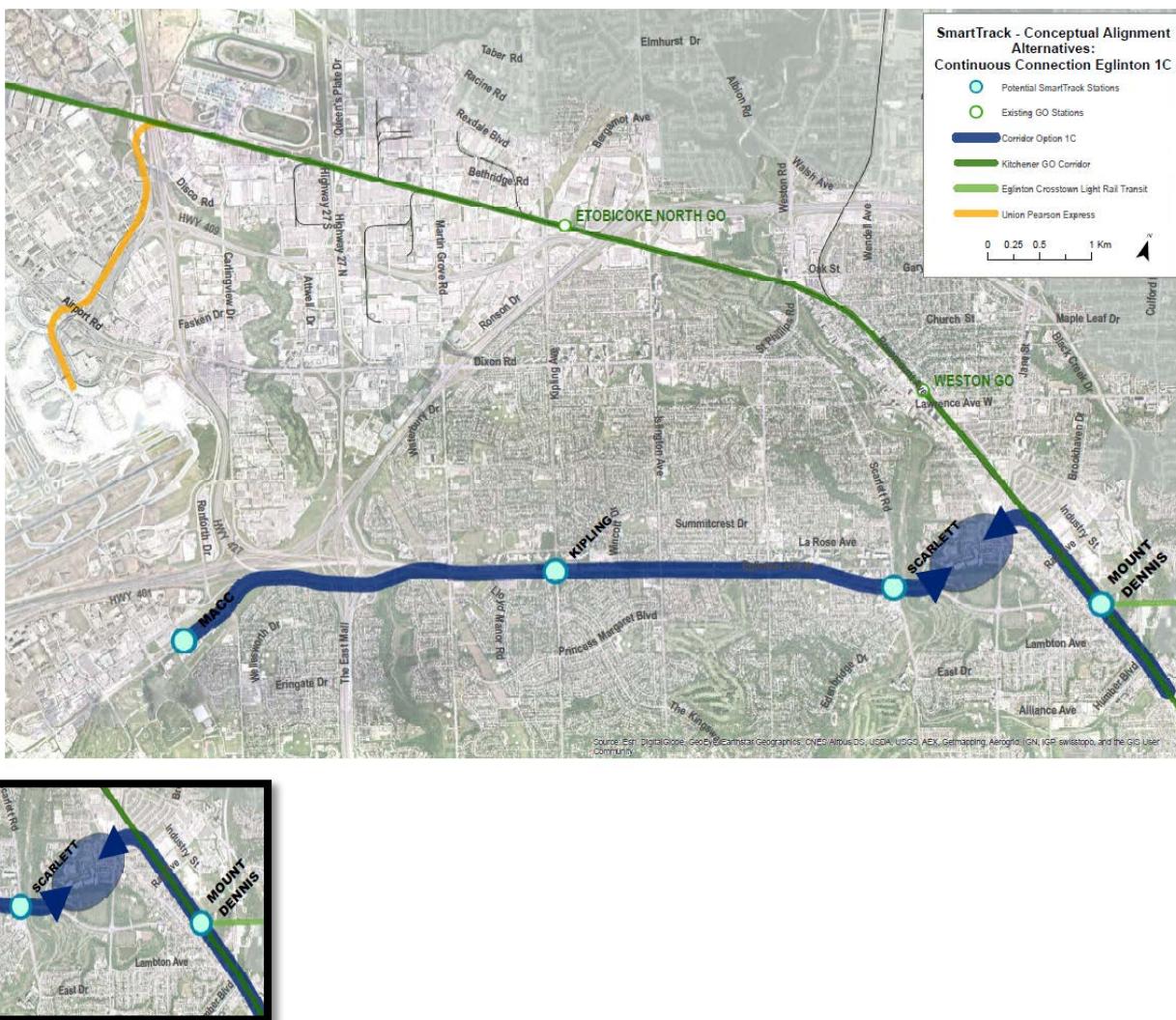


Corridor 1B turns to the west on Eglinton Avenue from the Kitchener Corridor. Again, two new tracks would need to be added to the Kitchener corridor in the vicinity of St. Clair Avenue, and would require widening of the corridor to the east similar to Corridor 1A. This option would miss Mount Dennis station, but would have a station at Jane Street. There are some significant challenges related to crossing the Eglinton Flats parkland in this option. As with Corridor 1A, this corridor would be elevated across Eglinton Flats. This option was developed in the event that a feasible option for connecting to Mount Dennis station was not found. Given that other options could successfully connect to Mount Dennis station, this option has little merit.

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Corridor 1C

Figure 4. Corridor Option 1C

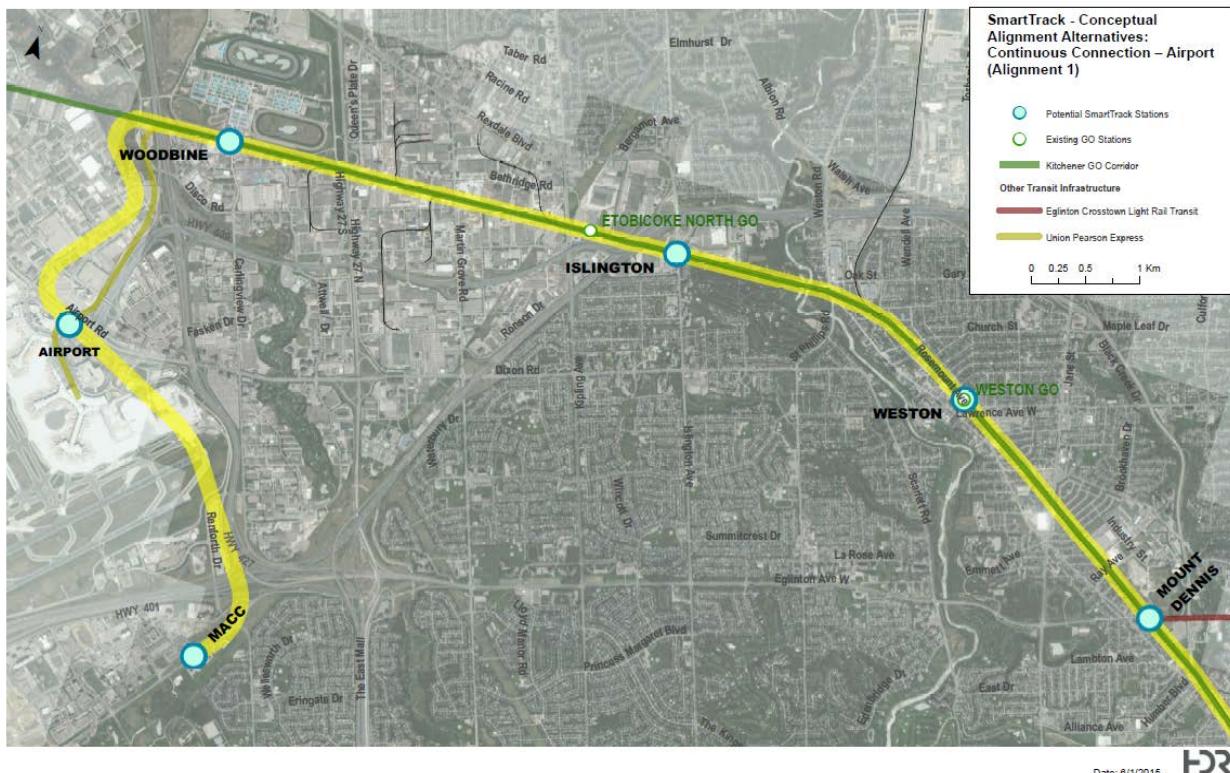


Corridor 1C takes advantage of the "Nickle Interlocking," a section of the Kitchener Corridor north of Mount Dennis through which trains can change tracks. This would allow for an easier turn off the GO corridor, and would not require additional tracks to St. Clair Avenue because the interlocking provides greater flexibility to manage trains. The GO corridor would need to be widened between Nickle Avenue and Jane Street in order to connect and tunnel two new tracks for the SmartTrack corridor. The widening would have an impact on areas bordering the Kitchener Corridor. The Corridor 1C option would be tunneled under industrial, residential and hospital properties, and would emerge south of the West Park Hospital to cross the Eglinton Flats park on elevated structures. There could be some technical challenges in confirming an alignment. The tunnel would emerge at Emmett Drive, requiring the severing of this road. This could have significant traffic impacts, the extent of which has not been assessed at this early stage of review.

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Corridor 2A – Under Airport Runways (Not Carried Forward)

Figure 5 Corridor Option 2A



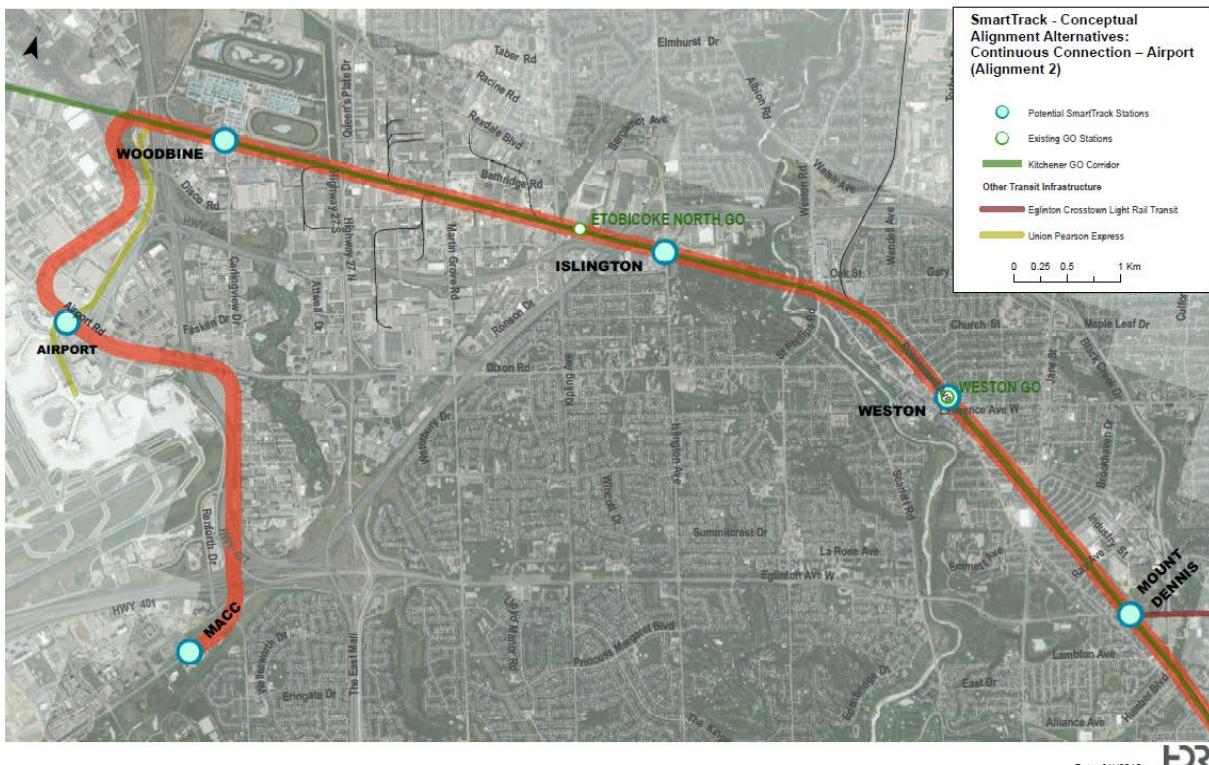
Corridor 2A would turn off the GO Kitchener Corridor to the west of Highway 427, and connect to Pearson Airport on Viscount Road at the proposed airport transit hub. The corridor would then tunnel under the airport property and under Highways 427 and 401 to terminate at the MACC. While it would be permissible to tunnel under the airport and runway, the required ventilation shafts and emergency exits would interfere with airport operations. As a result, this option was not carried forward for further assessment.

Corridor 2B – West of Highway 409

Corridor 2B would follow the same path as Corridor 2A to get to the airport transit hub. It would then be tunneled under Airport Road and head south to terminate at the MACC. While this is a longer route to the MACC than the Corridor 1 options, it would provide direct service to Pearson Airport for passengers and workers. There may be some impact on active industrial properties.

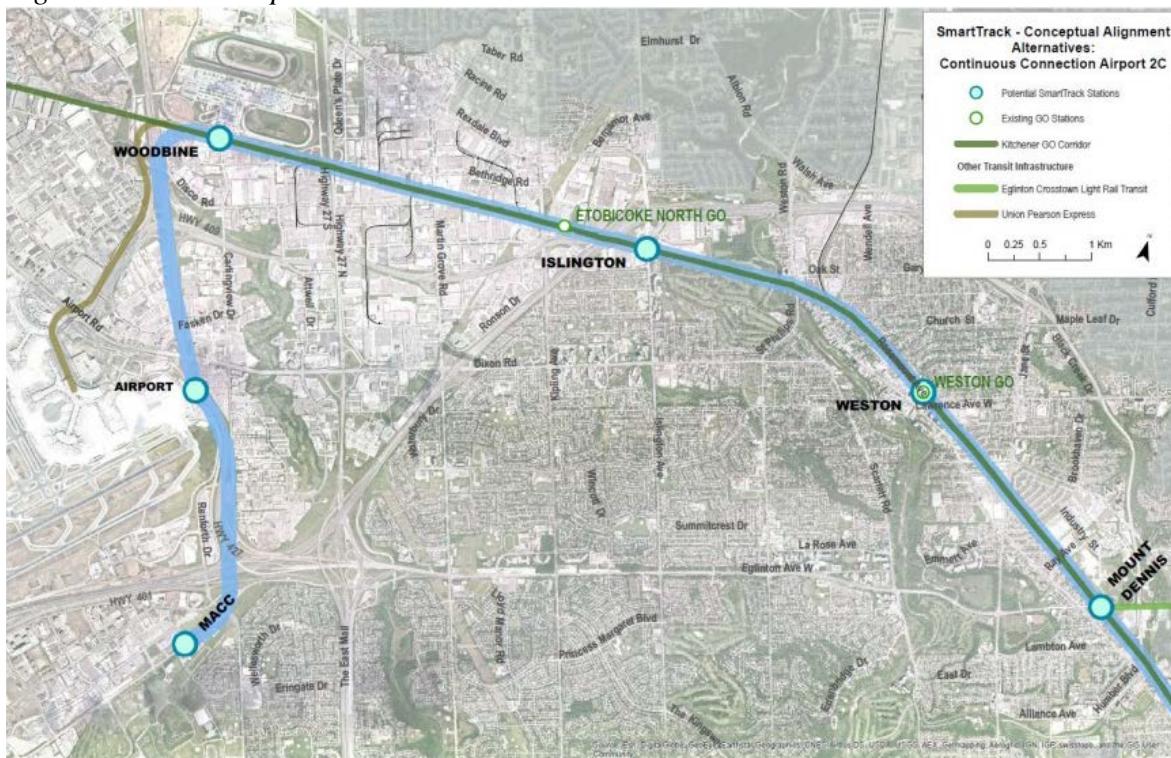
Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Figure 6 Corridor Option 2B



Corridor 2C – East of Highway 427

Figure 7 Corridor Option 2C

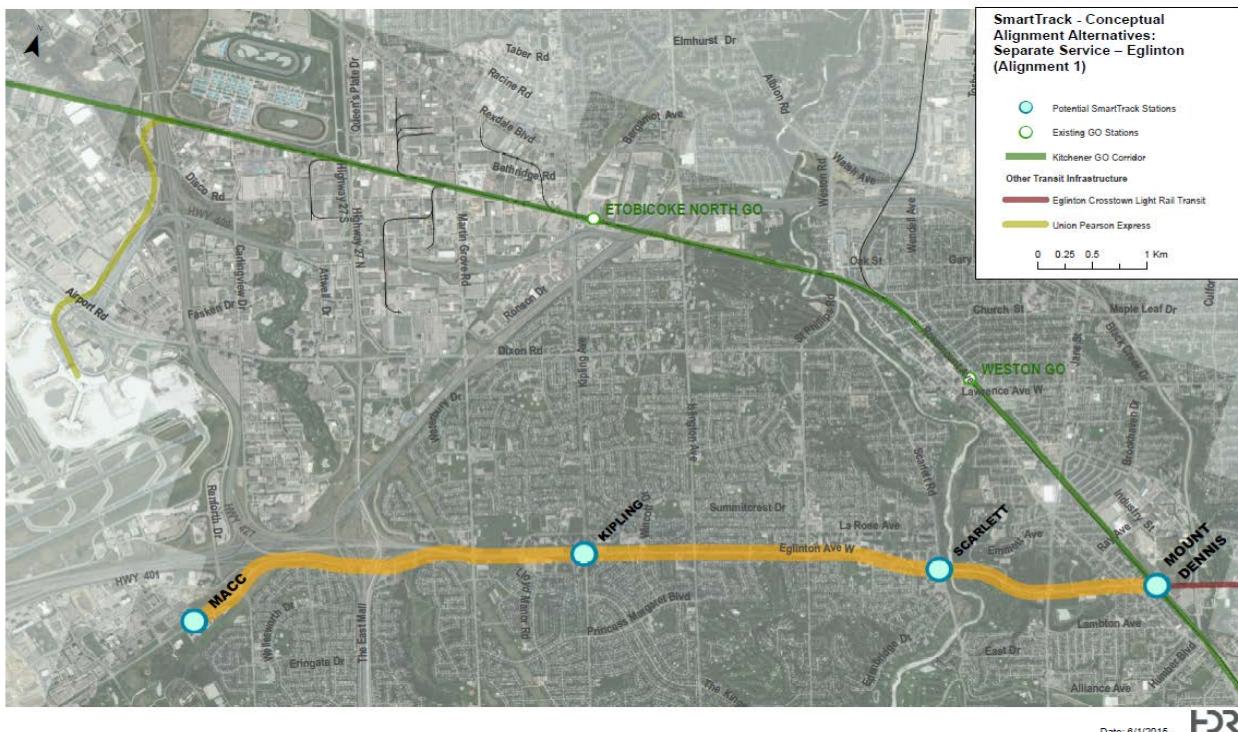


Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

Corridor 2C would run along the east side of Highway 427, with a potential station near the airport at Dixon Road. This would provide a more direct route to the MACC, but the connection to Pearson Airport is not optimal. This corridor could be elevated north of Airport Road and would then be tunneled to the MACC as in Corridor 2B. There may be some impact on active industrial properties.

Corridor 3 – Stand Alone (Not Carried Forward)

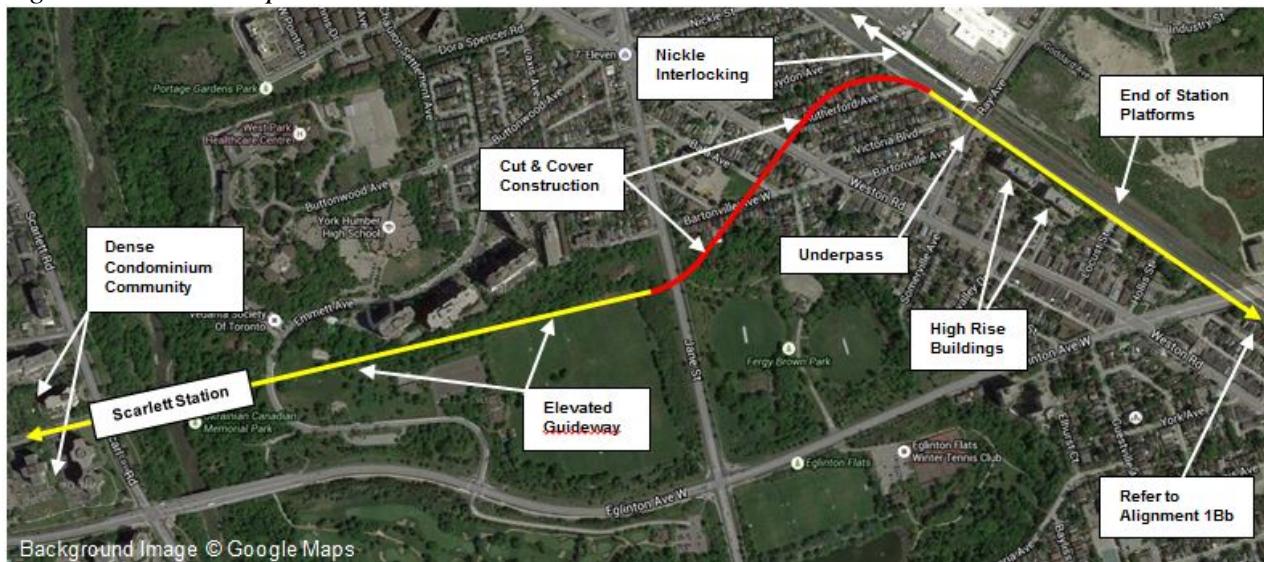
Figure 8 Corridor Option 3



Corridor 3, a stand-alone heavy rail corridor, was introduced to avoid the need for the turn at Mount Dennis Station onto Eglinton Avenue. Given the isolated nature of this operation, this option would require a separate Maintenance and Storage Facility (MSF) for the SmartTrack trains. No suitable property was found for locating an MSF along this corridor. Given that options have been identified for making the connection to the GO Kitchener Corridor, and given the difficulty in finding a site for a MSF, this option was not carried forward for further assessment.

Corridor 1D – Additional Option (brought forward following public consultations)

Figure 9 Corridor Option 1D



Corridor option 1D was brought forward following public consultations. This option has two tunneled tracks turning just north of Mount Dennis station and skirting the northern edge of the Eglinton Flats parkland on an elevated structure. This option would not take advantage of the Nickle Interlocking, and therefore, two new tracks would be required on the west side of the Kitchener corridor, south to St. Clair Avenue. This would require a widening of the Kitchener Corridor in an established neighbourhood area. The elevated corridor would reach Scarlett Road at Richview Road rather than Eglinton Avenue, and the corridor would be tunneled starting just west of Scarlett Road. There would be challenges to begin a tunnel along Richview Road, a neighbourhood of several condominium towers, the extent of which have not been assessed at this early stage of review.

3.1 Cost Estimates

Given the degree of uncertainty about many aspects of the SmartTrack corridor options considered in this feasibility review, cost estimates remain under development. Cost estimates will include design, engineering, project management and construction (including tunnelling, cut and cover options, and grade separations) of the corridors, plus additional infrastructure required to connect into the Kitchener GO corridor. In addition, cost estimates are being developed for required property acquisition and appropriate contingencies. Costs will also depend on the purchase of vehicles (depending on vehicle type, fleet size, etc.), municipal road modifications, environmental mediation requirements and additional power supply infrastructure.

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

The available cost estimates for the extension of the Eglinton LRT from Metrolinx are based on the approved plan and reflects the stage of planning for this project. The costs estimates are preliminary as Metrolinx is currently reviewing the LRT plan.

3.2 Alignment Characteristics

Detailed alignments

Within the corridors that have been carried forward, alignment options have been developed for further assessment. The alignments look at the specific path that SmartTrack could follow within the broadly defined corridors. The alignments also address questions of the position of the track at street level, elevated and/or tunneled. Certain characteristics are common to all the alignment options as noted in the following sections.

Renforth Gateway

Metrolinx is currently constructing the Renforth Gateway at Renforth and Eglinton, on the eastern edge of the MACC within the City of Mississauga. The Renforth Gateway will be an important transit hub in the City's west end, connecting the TTC, Mississauga transit and other services, to each other and to Pearson Airport. Connecting SmartTrack to this new regional hub would be an important part of building a connected regional transit network. For the purposes of this Feasibility Review, the Renforth Gateway was selected as the initial end point for SmartTrack. City staff will work with the City of Mississauga in the next phase of this review to assess opportunities to extend SmartTrack toward the western edge of the MACC.

Scarlett Road to the MACC

All Eglinton Corridor options follow the same alignment from west of Scarlett Road to the MACC. This section of the corridor would be tunneled. Heavy rail is fundamentally different from an LRT, particularly where federal railway safety rules governing grade crossings are applied. These rules, combined with the number of stops, the grades on Eglinton Avenue and the desired train speed, make an at-grade SmartTrack alignment impractical; options would have to be elevated or below grade.

An elevated alignment would also be challenged by the grades on Eglinton Avenue, albeit to a lesser degree than an at-grade option, but there would also be significant impacts in terms of land acquisition and other community impacts. Crossings of the Hydro One corridor and Highway 427/27 bridges, and the connection to the Renforth Gateway at the MACC all require tunnelling. Given these challenges and requirements, the options assume tunnelling of this western portion for all the Eglinton Corridor options.

Tunnelling this portion introduces the need for emergency exits and ventilation shafts. There would also be additional impacts associated with siting stations and launch and extraction shafts for the tunnel boring machine.

4. KITCHENER CORRIDOR

While detailed analysis related to the full length of the Kitchener corridor is beyond the scope of this feasibility review, the review provides some insights pointing to areas requiring further analysis. The technical analysis indicates that without significant signalling upgrades, improvements to train control systems, or modifications to GO RER, SmartTrack or Union Pearson Express service concepts, two additional parallel tracks "are highly likely" to be required in the Kitchener corridor between Union Station and Mount Dennis or Woodbine Racetrack to make the connection to the new SmartTrack heavy rail corridor from Mount Dennis to the MACC.

Two new tracks for SmartTrack service would require a widening of the Kitchener corridor between Mount Dennis or Woodbine Racetrack and Union Station and associated property acquisition for *all* heavy rail options to the MACC.

The service concept in the feasibility study assumes two additional tracks all the way to Union Station to allow SmartTrack to run alongside GO RER, UP Express and VIA Rail services on the Kitchener corridor. The services to be accommodated in this corridor include:

- 15 minute GO RER service from Union Station to Bramalea
- 15 minute peak GO RER express and local service from Union Station to Mount Pleasant
- 15 minute Union-Pearson Express service
- 15 minute SmartTrack service from Union Station to the MACC
- VIA service

All of these services have different operating patterns that make management of operations on the corridor complex. This assumption of two additional tracks could possibly be adjusted if there were to be some form of integration of GO RER, SmartTrack and/or Union Pearson Express services and/or adjustments to service frequencies. Further analysis is required to test assumptions with respect to such integration.

Adding more tracks to the Kitchener corridor raises some technical challenges:

- a SmartTrack station at St. Clair Avenue may not be possible if additional tracks are required;
- this may also have potential impacts to the City's current St. Clair Avenue West Traffic Congestion Environmental Assessment Study which is examining ways to improve east-west connections across the Kitchener Corridor;

Appendix 3: Update on the SmartTrack Western Corridor Feasibility Review

- adding tracks to the Kitchener corridor could require significant modifications to recent rail improvements in the Weston and Junction Areas; and
- existing development adjacent to the Kitchener corridor may also limit corridor expansion in some sections.

These potential challenges would require further examination as plans for SmartTrack as a whole are developed.

Metrolinx is expected to upgrade the signalling systems as part of RER, although the specific details of the upgrades remain to be confirmed. In addition, Metrolinx is determining the vehicles for electrified GO service. These upgrades and changes may reduce the need for new tracks in some parts of the Kitchener Corridor.

5. SUMMARY AND NEXT STEPS

The consultant's high-level engineering feasibility analysis of the alignment options is largely complete. The work has produced initial construction costs for the corridors reviewed.

Initial ridership projections, and their implications for overall feasibility, will be added to the consultant's report when they become available, as will the results of the ongoing public consultation.

This feasibility review was an initial step, and further technical and planning analysis would be required to develop a preferred approach and undertake the required TPAP (Environmental Assessment). Other questions that will be considered include:

- The wider policy fit including social and environmental benefits and impacts
- Ideas for phased implementation.
- The impact of the full SmartTrack service on the operation of the transit network.
- Operating costs for the full SmartTrack service based on assumptions on line speed, train control systems, size and type of vehicles and the service pattern.
- Operating revenues for the full SmartTrack service based on transit vehicle capacity, fare assumptions and projected ridership.
- User impacts in terms of travel time savings as well as the wider economic benefits, for example, as a result of a stronger connection to the airport and the MACC.
- Non-user benefits including safety benefits and decongestion benefits assuming there is mode shift from cars to transit.

The outputs of the feasibility review and this further analysis would be inputs into the development of a business case for the recommended option for this corridor.

Public Consultation

Appendix 5 to this report provides a summary of public consultations on SmartTrack held in June. The public was asked for their views on both the approach to the study and the seven corridor options. The comments can be grouped into five key categories:

- Some comments indicated that land-use compatibility was a concern, particularly for communities and areas that would be impacted.
- Some comments related to the service concept, looking to gain a better understanding of how SmartTrack would impact other transportation services.
- Other comments related to technical analysis and asked if building heavy rail along the Eglinton corridor is feasible from engineering and operational standpoints.
- A majority of people preferred the Base Reference Case LRT, indicating support for the proposed LRT station stops and LRT technology as most appropriate for the Eglinton corridor.
- Other comments on the Base Reference Case LRT proposed improvements to the LRT including grade separations and removing some station stops to increase speed and travel times.

Based on Council's direction in February, City staff will consult the public on the draft full results of the Feasibility Review. Further consultations are expected to take place in November 2015 and Q1 2016. Public input will be incorporated into the final report and recommendations be brought to Council in Q1 2016. City staff will also continue to work with surrounding municipalities (City of Mississauga) and the Greater Toronto Airport Authority.