



# Hurontario-Main Light Rail Transit (HMLRT)

## Brampton Alignment Peer Review

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# Project Report

Jan 27, 2015

City of Brampton

Hurontario-Main Light Rail Transit (HMLRT)

## Brampton Alignment Peer Review

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## Executive Summary

Over the last five years, the Cities of Brampton and Mississauga have worked towards the development of a plan to deliver fast, reliable higher-order transit along the Hurontario-Main Street corridor. This work culminated with the approval of the Transit Project Assessment process (TPAP) by the Minister of the Environment and Climate Change in the summer of 2014.

Though Ministerial approval of the Project was granted, a question was raised as to “whether the alignment segment north of Steeles Avenue to the Brampton GO Station would be better served by an alternate route to the TPAP approved route or alignment.” Subsequently, Brampton Council directed staff to conduct a review of potential alternative alignments north of Steeles Avenue to Downtown Brampton that is separate from the TPAP process. The original study team of SNC-Lavalin Inc. (SLI) was engaged to identify, review and evaluate potential alignment alternatives for possible future consideration and prepare the *Hurontario-Main LRT Brampton Alignment Alternatives Assessment Report* (dated September 26, 2014).

Following the preparation of the SLI report, City staff then engaged Hatch Mott MacDonald Ltd. (HMM) to undertake a peer review of the aforementioned report. This report, “Hurontario-Main LRT Brampton Alignment Peer Review” represents the peer review of the SLI report and is structured in seven parts as described below.

### Review of alignment alternatives

A desktop review of the alignment alternatives as presented in the SLI report was conducted as well as a number of site tours, some with City staff, to understand local challenges and opportunities.

All of the alignment alternatives presented were believed to be reasonable for consideration and the assessment of the options presented in the SLI report are defensible and appropriate for this level of screening.

An additional option (Valley Lands Tunneled, Option 3C) was reviewed and, for reasons similar to those noted for Options 3A and 3B, should not be carried forward in future phases of design.

### Review of assessment methodology

The assessment methodology, including the assumptions, and evaluation criteria were reviewed to confirm their relevance and applicability. SLI developed an evaluation methodology to provide a framework for organizing and using predictions of impacts to establish an order of preference among the alternative routes.

The assessment methodology as documented within the SLI Report involved the evaluation of eleven (11) new options along with the TPAP approved route (Base HMLRT Alignment), using a two-stage approach. Stage 1 involved an initial option screening based on technical feasibility or policy issues. Stage 2 involved a much more detailed review of the options carried forward after completion of Stage 1.

Our conclusion is that the assessment methodology was robust, logical, well laid out and provided conclusions, that when tested, were able to be replicated.

### **Review of assumptions**

Various assumptions and limitations associated with the assessment methodology were identified within the SLI report. Though the noted assumptions and limitations are fairly extensive, they are consistent with the level of detail typically available during an EA study.

### **Analysis of evaluation criteria**

With respect to the Stage 1 screening, five main categories comprising 30 sub-categories (or evaluation criteria) were used to evaluate the 12 total options (including the Base HMLRT Alignment). The five main categories are pertinent, and relevant to the evaluation, and included Infrastructure, Operations, Environment, Cost and Construction.

The checklist of criteria was applied to enable SLI to evaluate the 12 options, and to eliminate alternatives from further consideration in Stage 2. When using an unordered list of criteria in this way, it is necessary to ensure that the list is comprehensive, and that those alternatives discarded do not have offsetting benefits that would emerge only on consideration of a broader list of criteria. It is noted that the broad range of evaluation criteria applied included all aspects of the environment, which is in keeping with Ontario's *Environmental Assessment Act*.

It is agreed that the evaluation criteria, comprised of 5 main categories and 30 sub-categories, and the methodology for which they were applied, is appropriate for this level of screening.

### **Examination of constraints**

The constraint criteria was used to both comparatively evaluate the 12 options, as well as set a standard to exclude alternatives from further consideration in Stage 2. This is common in EAs as a means to reduce the alternatives to be considered further to a "manageable" number, by eliminating those that are deemed "unacceptable", as occurred with this assessment.

In addition, SLI also used a cursory cartographic approach known as constraint mapping, which is commonly used in EAs. In this approach, "unacceptable" characteristics were identified and taken into consideration as part of the analysis.

The constraints, as identified and applied against each alignment alternative option are reasonable and the conclusions are able to be replicated.

### **Review of agency responses**

Through the course of the Alternative Alignment Assessment Study, SLI identified a number of stakeholders that would be engaged as part of the study. The agencies having jurisdiction that would be contacted by SLI were:

- Toronto Region Conservation Authority (TRCA);
- Region of Peel, and
- Orangeville Brampton Railway (OBRY).

The responses provided by the agencies were reviewed and summarized in Section 9 of this report. While each stakeholder is interested in different aspects of the project, the responses received were in line with expectations for this type of a complex project.

### **Review of team responses and recommendations**

After review of the SLI report and the correspondence received from the agencies having jurisdiction, it is believed that the Stage 1 evaluation conclusions respected those comments and that the recommendation to carry forward the tunnelled options for Stage 2 assessment was an appropriate course of action.

### **Conclusions and Recommendations**

All of the alignment alternative options, including the tunnel options which passed through the Stage 1 screening assessment, were appropriate. It is noted that an additional tunnel option in the Valley Lands (Option 3C) was reviewed and, for reasons similar to those noted for Options 3A and 3B, should not be carried forward in future phases of design.

The SLI Report is well written, concise, and includes significant detail regarding the assessment approach, alternatives evaluated, results of the evaluation, and study recommendations. With the exception of a few noted minor shortcomings, the Report findings are clear, logical, traceable, and replicable. Given the level of detail of the information available, the SLI Report notes that further studies, investigations, and evaluation is required to confirm the feasibility of constructing a short tunnel section under Downtown Brampton. This is congruent with a study of this nature, and a valid recommendation. As such, the overall Report findings are defensible, and no additional alignments need to be identified and evaluated.

It is recognized that the evaluation method must produce a result that is clear, logical and traceable. Most importantly, it must allow anyone with the same information to reach the same conclusion, without any additional assumptions. Lastly, the method should clearly identify the relative differences and key impacts so as to select a preferred alternative. After carrying out a detailed review of the 12 options, coupled with their anticipated impacts, the results as presented in the Report can be replicated, and is thus deemed defensible.

The following are recommendations for consideration in future phases of the project:

- Undertake the necessary additional geotechnical and hydrological studies for all options carried forward.
- Undertake the necessary additional utility investigation for all options carried forward.
- Undertake the necessary TPAP amendments and updates to the Business Case Assessment should Brampton City Council decided to carry forward one of the recommended options.

## 1. Introduction

The Hurontario-Main Street corridor has been identified as an urban growth area in the Province of Ontario's *Places to Grow*<sup>1</sup> plans. In support of the growth plan and as part of *The Big Move*<sup>2</sup>, by Metrolinx, the Hurontario-Main Street corridor was determined to be a rapid transit corridor. In addition to this determination, the Cities of Brampton and Mississauga have also designated both Hurontario and Main Streets as primary growth corridors. In support of this designation, the Cities and Metrolinx jointly conducted an examination of the corridor and received Ministerial approval through the Transit Project Assessment Process (TPAP) for the Light Rapid Transit (LRT) project.

The proposed LRT system is a key part of Mississauga and Brampton's vision for the Hurontario-Main Street Corridor, and is a large, complex city-building project from Port Credit in the south to Downtown Brampton in the north. In addition to being a means of economic and residential development, and improved quality of life, the Project is intended to support growth and positive change by connecting people with destinations using sustainable transit.

Though Ministerial approval of the Project was granted, a question was raised during the TPAP process as to "whether the alignment segment north of Steeles Avenue to the Brampton GO Station would be better served by an alternate route to the TPAP approved route or alignment". On November 20, 2013, staff were directed by Council to undertake a separate review of potential alternative alignments north of Steeles Avenue to Downtown Brampton, outside the bounds of the TPAP. Brampton staff engaged the original study team of SNC-Lavalin Inc. (SLI) to identify, review and evaluate potential alignment alternatives for possible future consideration.

Following completion of the review, SLI submitted the *Hurontario-Main LRT Brampton Alignment Alternatives Assessment Report* (dated September 26, 2014) to document their findings.

A final decision to construct the Hurontario-Main LRT north of Steeles Avenue is subject to approval by Brampton Council. To assist Council in the decision-making process, City staff then engaged Hatch Mott MacDonald Ltd. (HMM) to undertake a peer review of the aforementioned *Hurontario-Main LRT Brampton Alignment Alternatives Assessment Report*<sup>3</sup>.

### 1.1 Study Limitations

This report presents the findings of the peer review and was prepared with consideration of the PEO's guideline: *Reviewing Work Prepared by Another Professional Engineer*. Hatch Mott

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<sup>1</sup> Ontario. Ministry of Public Infrastructure Renewal. *Places to Grow: Growth Plan for the Greater Golden Horseshoe*. Toronto: 2006

<sup>2</sup> Ontario. Metrolinx. *The Big Move*. Toronto: 2008

<sup>3</sup> Hurontario-Main LRT Brampton Alignment Alternatives Assessment Report. SNC-Lavalin Inc., September 2014

MacDonald has undertaken a technical peer review as described in this guideline and in accordance with the scope of the assignment as described in Section 2.0 below.

## 1.2 Inputs

The following studies, reports, guidelines and publications were consulted for the purpose of preparing this peer review report:

- *Hurontario-Main LRT Brampton Alignment Alternatives Assessment Report*. SNC-Lavalin Inc., September 2014
- *Proposal for Brampton LRT Alignment Alternatives Assessment Report*. SNC-Lavalin Inc., February 2014
- Ontario. Ministry of the Environment and Climate Change. *Minister's Notice to Proceed with Transit Project*. Toronto, August 2014
- *Hurontario-Main LRT Environmental Project Report*. SNC-Lavalin Inc., June 2014
- *Hurontario-Main Street Corridor Master Plan*. MMM Group Ltd., October 2010
- City of Brampton. Committee of Council. *Report*. Brampton, November 13 2013
- City of Brampton. Council. *Resolution*. Brampton, November 20 2013
- *Professional Engineers Reviewing Work Prepared by Another Professional Engineer*. Professional Engineers Ontario. October 2011

## 2. Scope of Work

As detailed in the City of Brampton's Request for Informal Proposal, dated September 29, 2014, the scope of this report is limited to the following tasks:

1. Review of alignment alternatives
2. Review of assessment methodology
3. Review of assumptions
4. Analysis of evaluation criteria
5. Examination of constraints
6. Review of agency responses
7. Review of team responses and recommendations



### 3. Overview of the Transit Project Assessment Process

The TPAP process, and the associated *Transit Projects Regulation (Ontario Regulation 231/08, Transit Projects and Greater Toronto Transportation Authority Undertakings)*, was introduced as a means to expedite the approval of public transit projects in Ontario. Specifically, the *Transit Projects Regulation* outlines the Ministry of the Environment's (MOE) expectations, and enables proponents of all public transit projects to avoid being subject to the requirements of Part II of the *Environmental Assessment Act*, specifically, the need to complete an Individual Environmental Assessment.

The TPAP process is a proponent-driven, self-assessment process that requires proponents to complete the prescribed steps within specified time frames. The TPAP process does not specify the studies that must be carried out for a transit project; but does speak to the specific information needs and requirements of applicable regulatory agencies. As such, the TPAP process does not speak to the methodology or the types of evaluation criteria to be used to compare alternatives. Specifically, the 2014 Guide to Ontario's Transit Project Assessment Process provides a higher level overview of the consultation and reporting requirements, combined with the regulated timelines to complete the TPAP process.

As with other EA processes in Ontario, proponents must assess a project's environmental effects and proposed mitigation, and provide clear documentation of the assessment process followed, including public and agency consultation. For transit projects, proponents must complete the assessment process and document the results of the process and consultation undertaken within six months.

### 4. Review of Alignment Alternatives

A desktop review of the alignments alternatives as presented in the SLI report was conducted as well as a number of site tours, some with City staff, to understand local challenges and opportunities. The following sections describe the alignment alternatives and present comments on these options.

#### 4.1 Option 1: Base HMLRT (TPAP Approved)

This alignment was previously studied through the TPAP process and has received Ministerial approval. Further review of this alignment is not part of the scope of this review.

#### 4.2 Option 2: Tunnelled Options

The alignment selections are driven, appropriately, by the LRT functionality. Since only Options 2A, 2B and 2C include tunnels, only these three options have been reviewed from the tunnelling perspective.



The SLI report addresses three methods of tunnel building (Cut & Cover, SEM and Bored Tunnels). It is agreed that these three methods, or combinations thereof, will be most appropriate for the project, considering the size and length of the underground portion (approximately 2 km).

The cost estimates for the underground section seem to be reasonable. As an order of magnitude sanity check on the costs, at this level of detail it is reasonable to assume a cost of \$120 million per station and \$50 million/ kilometer of tunnels. For this length of tunnel this results in a cost of \$460 million for options 2A and 2C and \$340 million for 2B. Subtracting the at-grade cost of \$35 million/kilometer, the increment/premium can be calculated at \$390 and \$270 million respectively, matching well with the estimates contained in the report.

Nevertheless, one important piece of information that is required in order to establish practicality of each of the tunnel construction methods is the depth of bedrock and the overall ground type. While it is understood that the project is not advanced far enough to start geotechnical investigation, this information will be required for future phases of design.

#### 4.2.1 Option 2A: Tunnel via Main Street

This option is a surface and sub-surface alignment that generally follows the TPAP alignment along the entire Hurontario-Main corridor.

It is noted that the three (3) southernmost stop areas (Gateway Terminal, Charolais and Nanwood) are in the same location as the TPAP approved project while the northernmost two (2) stops (Queen Street and Brampton GO Station) are shifted slightly south from their original positions to respect access and integration requirements for an underground station and associated entrance buildings.

**The Wellington Stop:** The main entrance on the south side may be too close to Wellington Street West. Generally, the minimum entrance setback would be in the order of 3m from sidewalk or property line (for the surge/queuing space). The secondary entrance at Wellington stop may be best located at the intersection of Main and John Street. Vent Shafts may be better suited at the main entrance in this option, away from concentrated area where possible.

**Brampton GO Stop:** The main station entrance near the GO station may end up being larger than indicated. It will be setback away from the GO track Right-of-Way (ROW) and will possibly block the access into the parking. The secondary entrance at the Market Square Boulevard may also be optimistic. Additional property take may be required.

More detailed station stop layouts will be required in future phases of design if this option is taken forward.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### 4.2.2 Option 2B: Tunnel via George Street, 2 Downtown Stops

This option is a surface and sub-surface alignment that generally follows the TPAP alignment along the Hurontario-Main corridor up to Woodbrook Drive and then shifts westward off the roadway corridor into Gage Park to avoid Downtown Brampton.

It is noted that the three (3) southernmost stop areas (Gateway Terminal, Charolais and Nanwood) are in the same location as the TPAP approved project while the northernmost two (2) stops (Queen Street and Brampton GO Station) are shifted over to George Street and into the Brampton GO Station slightly west from the original position.

**George Street Stop:** In general, primary entrances should be fronting a main street. Given direction on past projects, lane facing entrance may possibly not be acceptable to Metrolinx. Proper minimum setback is required at the main entrance. However, a main entrance near Wellington Street is conceivable.

**Brampton GO Stop:** The entrances appear to be too close to each other and they may not provide sufficient egress for the station. The entrances are also within the CNR ROW. It may be possible for this arrangement to occur but there will be potential for extensive disruption to the GO service at this station.

As noted in the SLI report, this option is slightly longer (i.e. more costly) than Option 2A but reduces disruption in Downtown Brampton.

More detailed station stop layouts will be required in future phases of design if this option is taken forward.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### 4.2.3 Option 2C: Tunnel via George Street , 1 Downtown Stop

This option is a surface and sub-surface alignment that generally follows the TPAP alignment along the Hurontario-Main corridor up to Woodbrook Drive and then shifts westward off the roadway corridor into Gage Park to avoid Downtown Brampton.

It is noted that the three (3) southernmost stop areas (Gateway Terminal, Charolais and Nanwood) are in the same location as the TPAP approved project while the northernmost stop (Queen Street) is shifted over to George Street, west from the original position. This sub-option is similar to 2B but only provides a single stop in the downtown area. This single downtown stop has been shifted further north than in Option 2B to capture the ridership from the existing bus terminal and the GO Station.

**George Street Stop:** Main entrance will likely require more property than that which is shown.

A potential drawback for this option is the limitation for any future extension to the north of the GO station.

For consideration in future phases of design, the station could be moved closer to Queen St. and the remainder of the tunnel could combine the tail track and the pedestrian tunnel.

More detailed station stop layouts will be required in future phases of design if this option is taken forward.

As noted in the SLI report, this option is slightly shorter (i.e. less costly) than Option 2A.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

### 4.3 Option 3: Valley Land Options

#### 4.3.1 Option 3A: Valley Lands, At Grade

This option is a surface alignment that generally follows the TPAP alignment along the Hurontario-Main corridor up to Etobicoke Creek valley and then shifts eastward into the valley lands, running at grade within the Etobicoke Creek valley then crossing under the CN Halton Sub Division (S/D) through a new underpass structure up to Queen Street and eventually running parallel along the CN Halton S/D to the Brampton GO Station.

It is noted that the three (3) southernmost stop areas (Gateway Terminal, Charolais and Nanwood) are in the same location as the TPAP approved project while the northernmost stops are relocated along the new alignment servicing areas not originally accounted for in the TPAP project. The future Peel Memorial Hospital is serviced by this alignment alternative however Downtown Brampton is not and would therefore still require regular transit service in the downtown and Main Street South Heritage area.

Significant challenges were noted regarding the displacement of flood plain volume as a result of this option and the comments received from the TRCA are not supportive. Specifically, TRCA noted concerns regarding development within this “highly flood prone area...”<sup>4</sup>, and further, the TRCA highlighted that this alignment was contrary to their “Valley and Stream Corridor Management Program”<sup>4</sup> and would be subject to “significant flood hazard”<sup>4</sup>. Lastly, TRCA noted that the alignment contradicted general policies for infrastructure as per the Living Cities Policy and “...does not demonstrate that intrusions to natural features contributing to the conservation of land can be avoided”<sup>4</sup>.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

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<sup>4</sup> Hurontario-Main LRT Brampton Alignment Alternatives Assessment Report. Appendix I. SNC-Lavalin Inc., September 2014

#### 4.3.2 Option 3B: Valley Lands, Elevated

This option is a surface alignment that generally follows the TPAP alignment along the Hurontario-Main corridor up to Etobicoke Creek valley and then shifts eastward into the valley lands, running on an elevated structure within the Etobicoke Creek then crossing under the CN Halton S/D through a new underpass structure up to Queen Street and eventually running parallel along the CN Halton S/D to the Brampton GO Station.

It is noted that the three (3) southernmost stop areas (Gateway Terminal, Charolais and Nanwood) are in the same location as the TPAP approved project while the northernmost stops are relocated along the new alignment servicing areas not originally accounted for in the TPAP project. The future Peel Memorial Hospital is serviced by this alignment alternative however Downtown Brampton is not and would therefore still require regular transit service in the downtown and Main Street South Heritage area.

Even though this option produces far less of an impact to the flood plain volume when compared to the at-grade Option 3A, this does not void the significant challenges of building in a flood plain as referenced in the comments received from the TRCA. As noted in Section 4.3.2 above, the TRCA's concerns relate to development in highly flood prone areas and the significant flood hazard this creates as well as the contradiction of a number of policies and best practices.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### 4.3.3 Option 3C: Valley Lands, Tunneled

While surface and elevated options in the Valley Lands were considered, it was noted that the SLI report did not speak to a tunnelled option. A cursory review of this sub-option was undertaken and the following are some of the challenges and opportunities related to this alternative.

This alignment will be definitely the most expensive since it is the longest tunnel and would have 4 underground stations.

While the running tunnels can be constructed parallel to a watercourse, construction of stations or emergency exit buildings (anything that leads from the tunnels to the surface) in a flood plain does create issues with the prevention of flooding and has a complex approval process that would need to be dealt with before this option could be considered. Additionally, significant challenges were noted regarding the displacement of flood plain volume as a result of this option and the comments received from the TRCA are not supportive. As noted in Section 4.3.2 above, the TRCA's concerns relate to development in highly flood prone areas

and the significant flood hazard this creates as well as the contradiction of a number of policies and best practices.

With this base alignment, the sharp 90 degree turn at the Peel Memorial Hospital station is unrealistic and, depending on the type of tunnel construction, the minimum radius may be as large as 200m which may require property easements in this area.

Similar to the comments made in section 3.2 above, geotechnical conditions are not known and would need to be evaluated further in order to comment on tunnelling risks details and specific construction methodology.

Similar to the other Valley Land options, a tunnelled solution would still be subject to the corridor constraints along the CN Halton S/D as well as the physical constraint that Downtown Brampton imposes on this expansion. The future Peel Memorial Hospital is serviced by this alignment alternative however Downtown Brampton is not and would therefore still require regular transit service in the downtown and Main Street South Heritage area.

For reasons similar to those noted for Options 3A and 3B, it is recommended that this option should not be carried forward in future phases of design.

#### **4.4 Option 4: Steeles - Kennedy**

This option is a surface alignment that deviates significantly from the approved TPAP alignment and follows Steeles Avenue east to Kennedy Road, north to Queen Street and west to the CN Halton S/D eventually running parallel along the CN Halton S/D to the Brampton GO Station.

It is noted that all of the stops in Brampton, with the exception of the northernmost stop at Brampton GO are all relocated along this new alignment servicing areas not originally accounted for in the TPAP project. The future Peel Memorial Hospital is serviced by this alignment alternative however Peel Village, Main Street South Heritage Area and Downtown Brampton are not and would therefore still require regular transit service in these areas.

Significant challenges were noted with regard to impact and capacity along Steeles Avenue as well as access impacts along Kennedy Road. Significant property takings were identified along the rear of a number of properties – some of which may require full takings as the property requirements are rather significant. The challenges noted in the SLI report for this option are reasonable and assessed accurately.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### 4.5 Option 5: Steeles – McLaughlin – Queen - OBRY

This option is a surface and sub-surface alignment that deviates significantly from the approved TPAP alignment and follows Steeles Avenue west to McLaughlin Road, north to Queen Street east to the Orangeville Brampton Railway (OBRY) north to the CN Halton S/D where the alignment then goes under the freight corridor and runs parallel along and below the CN Halton S/D to an underground station at the Brampton GO Station.

It is noted that all of the stops in Brampton, with the exception of the northernmost stop at Brampton GO are all relocated along this new alignment servicing areas not originally accounted for in the TPAP project. Peel Village, Main Street South Heritage Area and Downtown Brampton are not serviced by this alignment and would therefore still require regular transit service in these areas.

Significant challenges were noted with regard to impact and capacity along Steeles Avenue as well as access impacts along McLaughlin Road. Heritage impacts were identified along Queen Street and significant challenges to operating along the OBRY were identified.

The challenges noted relating to the shared use of a freight rail corridor is significant from a regulatory and operating perspective. The OBRY currently has lease agreements with shippers and offers daytime freight service which would conflict with the operating window of the LRT system. In addition, having a transit operator on the corridor while the OBRY is trying to sell the property is viewed by them as an encumbrance.

While it is recognized that a northern extension of the LRT system may be desirable at some point in the future, a sub-option where the northern end of the alignment stays on the south side of the CN Halton S/D and doesn't cross the freight rail corridor could be considered. Parking at the south-east corner of the OBRY and CN Halton S/D would be impacted and full taking of properties would likely be required on Railroad Street in addition to retaining walls to account for the grade differential in order to provide for a stop area that would interface with the Brampton GO Station on the south side. It must be noted that this option would pose great difficulties for future extension of the service northward to the City boundary and it could result in an alignment that could not be extended north without significant rework and cost.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### 4.6 Option 6: Charolais – McLaughlin - OBRY

This option is a surface and sub-surface alignment that deviates significantly from the approved TPAP alignment and follows Charolais Boulevard west to McLaughlin Road, north to the Orangeville Brampton Railway (OBRY) and north to the CN Halton S/D where the alignment then goes under the freight corridor and runs parallel along and below the CN Halton S/D to an underground station at the Brampton GO Station.

It is noted that the two (2) southernmost stop areas (Gateway Terminal and Charolais) and the northernmost stop at Brampton GO are in the same location as the TPAP approved project while all others are relocated along this new alignment servicing areas not originally accounted for in the TPAP project. Peel Village and the Main Street South Heritage Area are not serviced by this alignment and would therefore still require regular transit service in these areas.

While the LRT corridor appears to fit within the available ROW on Charolais Boulevard, significant challenges were noted with regard to access impacts along McLaughlin Road. The vertical grade along Charolais is steeper than with other options but does not appear to be beyond what the Light Rail Vehicles (LRVs) could navigate. Challenges were noted similar to those for the OBRY portion contained in Option 5 however the running distance along the railway corridor is significantly longer than in Option 5.

The challenges noted relating to the shared use of a freight rail corridor is significant from a regulatory and operating perspective. The OBRY currently has lease agreements with shippers and offers daytime freight service which would conflict with the operating window of the LRT system. In addition, having a transit operator on the corridor while the OBRY is trying to sell the property is viewed by them as an encumbrance.

Given that this alignment stays on one side of the OBRY corridor and doesn't need to cross the freight track, any physical separation between the freight and light rail vehicles may be easier to provide than when compared to Option 5.

While it is recognized that a northern extension of the LRT system may be desirable at some point in the future, a sub-option where the northern end of the alignment stays on the south side of the CN Halton S/D and doesn't cross the freight rail corridor could be considered. Parking at the south-east corner of the OBRY and CN Halton S/D would be impacted and full taking of properties would likely be required on Railroad Street in addition to retaining walls to account for the grade differential in order to provide for a stop area that would interface with the Brampton GO Station on the south side. It must be noted that this option would pose great difficulties for future extension of the service northward to the City boundary and it could result in an alignment that could not be extended north without significant rework and cost.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### **4.7 Option 7: McMurphy - OBRY**

This option is a surface and sub-surface alignment that deviates significantly from the approved TPAP alignment and follows Charolais Boulevard west to McMurphy Avenue, north to the Orangeville Brampton Railway (OBRY) and north to the CN Halton S/D where the alignment then goes under the freight corridor and runs parallel along and below the CN Halton S/D to an underground station at the Brampton GO Station.



It is noted that the two (2) southernmost stop areas (Gateway Terminal and Charolais) and the northernmost stop at Brampton GO are in the same location as the TPAP approved project while all others are relocated along this new alignment servicing areas not originally accounted for in the TPAP project. Peel Village and the Main Street South Heritage Area are not serviced by this alignment and would therefore still require regular transit service in these areas

The LRT corridor appears to fit within the available ROW on both Charolais Boulevard and McMurchy Avenue, however a significant change in the type of road along McMurchy – from a quiet residential road with most properties fronting onto McMurchy to a transit thoroughfare – may make this option less desirable from the neighbourhood perspective. Along with the change in road type is the substantial impact to property access and the need to signalize many residential roads. The vertical grade along Charolais is steeper than with other options but does not appear to be beyond what the Light Rail Vehicles (LRVs) could navigate. Challenges were noted similar to those for the OBRY portion contained in Option 5 however the running distance along the railway corridor is longer than in Option 5.

The challenges noted relating to the shared use of a freight rail corridor is significant from a regulatory and operating perspective. The OBRY currently has lease agreements with shippers and offers daytime freight service which would conflict with the operating window of the LRT system. In addition, having a transit operator on the corridor while the OBRY is trying to sell the property is viewed by them as an encumbrance.

Given that this alignment stays on one side of the OBRY corridor and doesn't need to cross the freight track, any physical separation between the freight and light rail vehicles may be easier to provide than when compared to Option 5.

While it is recognized that a northern extension of the LRT system may be desirable at some point in the future, a sub-option where the northern end of the alignment stays on the south side of the CN Halton S/D and doesn't cross the freight rail corridor could be considered. Parking at the south-east corner of the OBRY and CN Halton S/D would be impacted and full taking of properties would likely be required on Railroad Street in addition to retaining walls to account for the grade differential in order to provide for a stop area that would interface with the Brampton GO Station on the south side. It must be noted that this option would pose great difficulties for future extension of the service northward to the City boundary and it could result in an alignment that could not be extended north without significant rework and cost.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### **4.8 Option 8: Steeles to Bramalea GO**

This option is a surface alignment that deviates significantly from the approved TPAP alignment and follows Steeles Avenue east to the Bramalea GO Station.

It is noted that all of the stops along this alignment, including northernmost stop at Brampton GO, are all relocated along this new alignment servicing areas not originally accounted for in the TPAP project. This alignment terminates at the Bramalea GO Station and provides a connection to a point where two-way, all day GO service will be provided in the future. As a result of this alignment, Peel Village, Main Street South Heritage Area and Downtown Brampton are not serviced and would therefore still require regular transit service in these areas.

Similar to those significant challenges noted along Steeles Avenue for Option 4 and 5, this option reflects those same challenges including property impacts, restricted access and capacity issues.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

#### **4.9 Option 9: George Street Loop**

This option is a surface alignment that generally follows the TPAP alignment along the entire Hurontario-Main corridor with the exception of a one-way pair that has been introduced along Main Street, Railroad Street, George Street and Wellington Street.

It is noted that the three (3) southernmost stop areas (Gateway Terminal, Charolais and Nanwood) are in the same location as the TPAP approved project while the northernmost stops (Queen Street and Brampton GO Station) are adjusted to suit the loop configuration.

The Brampton GO Station stop is shown on the north side of the CN corridor, as per the master plan. While an LRT stop on the south side of the CN Halton S/D would likely result in full taking of properties on Railroad Street in addition to retaining walls to account for the grade differential, this may offer an opportunity to eliminate the costly tunnel under the Halton S/D and allow for easier interface with the existing bus terminal.

Comments in the SLI report speak to the challenges associated with the 90m stop lengths. The loop option was favourably ranked in the summary matrix for Stage 1 Assessment with the exception of receiving an 'unacceptable impact' ranking for 'space for stations and stops'.

This option does not address the concerns raised regarding the operation through the Main Street South Heritage Area.

It is agreed that this option is reasonable for consideration as an alternative alignment and that the assessment of this option presented in the SLI report is defensible and appropriate for this level of screening.

## 4.10 Additional Alignment Options

Notwithstanding the specific comments made above regarding minor variations to individual alignment alternatives and the preliminary screening of an additional tunneled option in the Valley Lands, after careful review of the SLI proposal and the SLI report, it is believed that all reasonable alignment alternatives were identified and studied.

## 5. Review of Assessment Methodology

The assessment methodology, including the assumptions, and evaluation criteria were reviewed to confirm their relevance and applicability. Key to the study carried out by SLI, was the identification and evaluation of alternative alignments or routes. In summary, an evaluation methodology was developed to provide a framework for organizing and using predictions of impacts to establish an order of preference among the alternative routes. A formal evaluation method is intended to provide a rationale (or reason) for decisions that on examination can be traced or replicated, which is paramount, as the results of this study will be used to assist Brampton Council in making a final decision on whether or not to consider alternative alignment options for the Hurontario-Main LRT project north of Steeles Avenue.

The assessment methodology as documented within Section 2.0 of the SLI Report involved the evaluation of eleven (11) new options along with the TPAP approved route (Base HMLRT Alignment), using a two-stage approach. Stage 1 involved an initial options screening based on technical feasibility or policy issues. Stage 2 involved a much more detailed review of the options carried forward after completion of Stage 1.

Section 2.2 of the SLI Report lists the various assumptions and limitations associated with the assessment methodology. The identification of important assumptions are essentially SLI's expert judgments to guide the study, and it is recognized that some assumptions affect the outcome of the study more than others. SLI has listed the limitations associated with its study.

Though the noted assumptions and limitations are fairly extensive, they are consistent with the level of detail typically available during an EA study. It is noted that the assessment carried out was based on materials provided by the City of Brampton, or based on existing materials produced as part of the HMLRT Preliminary Engineering and TPAP project.

In summary, the assessment methodology was robust, logical, well laid out and provided conclusions, that when tested, were able to be replicated.

### 5.1 Validity of Applied Evaluation Criteria

With respect to the Stage 1 screening, five main categories comprising 30 sub-categories (or evaluation criteria) were used to evaluate the 12 total options (including the Base HMLRT Alignment). The five main categories are pertinent, and relevant to the evaluation, and included Infrastructure, Operations, Environment, Cost and Construction. Each of the

respective sub-categories (or evaluation criteria) were discussed in detail in Section 3.1 of the Report, including the rationale for the criterion, for the most part. It is noted that the Visual Impact sub-category is not defined within Section 3.1, but is included in the Summary of Stage 1 Assessment (Section 3.3).

This checklist of criteria was applied to enable SLI to evaluate the 12 options, and to eliminate alternatives from further consideration in Stage 2. When using an unordered list of criteria in this way, it is necessary to ensure that the list is comprehensive, and that those alternatives discarded do not have offsetting benefits that would emerge only on consideration of a broader list of criteria. It is noted that the broad range of evaluation criteria applied included all aspects of the environment, which is in keeping with Ontario's *Environmental Assessment Act*.

As noted above, the criteria were used to both comparatively evaluate the 12 options, as well as set a standard to exclude alternatives from further consideration in Stage 2. This is common in EAs as a means to reduce the alternatives to be considered further to a "manageable" number, by eliminating those that are deemed "unacceptable", as occurred with this assessment.

In addition to the above, SLI also used a cursory cartographic approach known as constraint mapping, which is commonly used in EAs. In this approach, "unacceptable" characteristics were identified and taken into consideration as part of the analysis.

It is agreed that the evaluation criteria, comprised of 5 main categories and 30 sub-categories, and the methodology for which they were applied, is appropriate for this level of screening.

## 5.2 Result of the Stage 1 Evaluation

As part of Stage 1, SLI applied the criteria and summarized the results of the assessment of the 12 options in Section 3.3. In this regard, SLI organized and focussed on the differences among the possible alternatives to enable the reader to follow the assessment. In addition, SLI provided a detailed description of the advantages and disadvantages associated with each respective option in Section 3.2 of the Report.

It is recognized that there may be another more suitable alignment to service Downtown Brampton than the Base HMLRT Alignment. Thus, in keeping with good EA principles, SLI considered a reasonable range of alternatives. As noted previously, 11 new options were identified within an overall area bounded by Steeles Avenue to the south, McLaughlin Road to the west, Queen Street/CN Rail's Halton Subdivision to the north, and Kennedy Road to the east. In addition, a direct route along Steeles Avenue to the Bramalea GO Station was also identified.

Based on the evaluation, the three Tunnel options (2A, 2B, and 2C) were carried forward for further analysis in Stage 2. Conversely, the 8 other new options were eliminated from further consideration due to a wide range of disadvantages or "critical issues" which rendered them



"unacceptable" as reported in Section 3.2 and summarized in Section 3.4 of the Report. The result of the evaluation of the 11 options is defensible, and in keeping with typical EA studies.

It is recognized that the evaluation method must produce a result that is clear, logical and traceable. Most importantly, it must allow anyone with the same information to reach the same conclusion, that is to replicate the evaluation, without any additional assumptions. Lastly, the method should clearly identify the relative differences and key impacts so as to select a preferred alternative. After carrying out a detailed review of the 12 options, coupled with their anticipated impacts, the results as presented in the Report can be replicated, and is thus deemed defensible.

### 5.3 Result of the Stage 2 Evaluation

During Stage 2 (as detailed in Section 4.0 of the SLI Report), the three Tunnel options (2A, 2B, and 2C) were comparatively evaluated against the Base Scheme (Base HMLRT Alignment), on a one to one (or pair-wise comparison) basis. This is a common step (or approach) during EA studies, as it enables detailed comparison of two options versus many options. It provides an opportunity to facilitate the identification of advantages and disadvantages associated with each of the three remaining Tunnel options in comparison to the Base Scheme.

Based on the evaluation, all three options have both advantages and disadvantages similar to the Base Scheme. The most significant noted disadvantage of the three Tunnel options is their relative cost compared to the Base Scheme. This is attributed to the fact that tunnelling requires additional detailed geotechnical and hydrogeological investigations to support the design and construction approach, coupled with a more complex construction process which is to occur over a much greater duration.

It is noted that the Stage 2 evaluation as documented in Section 4.0 is defensible as the evaluation has produced a result that is clear, logical, traceable, and replicable. However, as above for Stage 1, the evaluation involved application of the same sub-categories to carry out the analysis. The noted difference is that Heritage and Character was applied under the Infrastructure, as opposed to, the Environment category.

## 6. Review of Assumptions

The assumptions as stated in Section 2.2 of the SLI report lists the various limitations and constraints associated with the evaluation. As noted above, the assumptions noted therein, seem logical and defensible. The noted limitations are consistent with an environmental assessment (EA) level of study and consistent with the evaluation and screening of other LRT projects such as Waterloo LRT and Hamilton LRT.

## 7. Analysis of Evaluation Criteria

The Stage 1 assessment structure was reviewed in detail to understand each of the five (5) categories and thirty (30) sub-categories. The following sections provide an explanation and comment on each of the sub-categories within the evaluations.

### *Infrastructure*

**Length:** Simple total length was used as a measure to calculate capital and operating costs as well as run time. This is a straight-forward metric that is appropriate to include in the evaluation.

**TPSS Property Availability:** This metric considered if property was available to locate the TPSS. If property was required from residential lands, the option was determined to have an unacceptable impact. Option 7 fell into this category, with six (6) other options being identified as most impact. Given the relative flexibility available when locating a traction power substation, it was felt that this metric may disadvantage options more than is justified. However, the need to purchase property to locate a TPSS in the Main Street South Heritage Area can be considered a significant project hardship.

**Available Right-of-Way (ROW):** The current ROW was assessed and ranked with respect to available width for the LRT corridor and road requirements. This is a straight-forward metric that is appropriate to include in the evaluation.

**Space for Stations and Stops:** This criterion considers the available linear space for stops (platforms length plus end ramps for Accessibility for Ontarians with Disabilities Act [AODA] compliance) along the route alternative. An unacceptable rating is given where the ROW prevented options from serving a key area. This is a justifiable metric that is appropriate to include in the evaluation.

### *Operations*

**Run Time:** Average speeds of 27km/h for road level segregated guide way, 15km/h for shared use lanes and 40 km/h for fully segregated/tunnelled guide way were used to calculate the run time based on the length of the option. This is a straight-forward metric that is appropriate to include in the evaluation.

**Run Time Differential:** This value is a simple calculation to determine the difference between the base run time against the run time of the alternative option. This is a straight-forward metric that is appropriate to include in the evaluation.

**Vehicles Required:** This criterion is a calculation of the alternative length and run time to determine the number of vehicles required. This is a straight-forward metric that is appropriate to include in the evaluation.



**Vehicle Count Variation:** This value is a simple calculation to determine the difference between the numbers of vehicles required for the base option against the number of vehicles required for the alternative option. This is a straight-forward metric that is appropriate to include in the evaluation.

**Impacts to Access:** This criterion considers the impacts to access as a result of the alignment alternative. Impact ranking was based on the number of impacts, less than 10, 10 to 60, 60 to 100 and greater than 100. An unacceptable rating was given to options where the impacts exceeded 100 access points. This is an acceptable metric that is appropriate to include in the evaluation.

**Compatibility with Future Queen RT:** This criterion considered impacts to the future Queen Street RT alignment on the north side of the current CN Halton S/D. This was a simplified yes/no ranking where most impact was assessed where a conflict exists and least impact was assessed where no impact exists. This is a straight-forward metric that is appropriate to include in the evaluation.

**Safety:** This criterion is somewhat subjective as it relates LRT interaction with the general public based on the level of guide way segregation. It is important to note that this metric is not measuring the safety of the system, it is simply comparing alignment options to each other as a function of the level of public interaction. For the purpose of this evaluation, this is an appropriate metric to include.

## Environment

**Property Impacts:** This criterion considers the impact of the alternative alignments on property. The three (3) lower level impact assessments were applied when there was no, some or significant impact to properties impacted by the option. A ranking of unacceptable was given when an alignment caused:

- property impacts to a complete segment of the alignment at-grade,
- property impacts to the backyards of residential properties,
- complete property takes to residential or multi-unit properties that could not be mitigated through shared use LRT operation.

A substantial number of options (5 out of 11) were assessed with an unacceptable impact ranking for this criterion. Two (2) of the alternative alignments were eliminated by this criterion alone. While property takes are significant and should be carefully considered, a *partial* property take from the backyard of a residential property that doesn't materially impact the parcel or an individual complete property taking where the landowner is compensated fairly could be considered as a significant impact but not necessarily unacceptable, while a *full taking* as a result of unacceptable backyard encroachment is significant and warrants the unacceptable ranking.

For the purpose of this evaluation, this is an appropriate metric to include.

**Land Use Policy Supportive:** This criterion considered the level of supportive intensification and land use that the alternative alignment option provided. This was a simplified three level assessment where the least impact was given to options that were fully supportive of the current land use policies, some impact was assessed for options where some of the land uses were supported and most impact was assessed where few of the land use policies were supported. This is a straight-forward metric that is appropriate to include in the evaluation.

**Heritage and Character:** This criterion considered the level of heritage impact the option would cause on the character of the area. Similar to safety, this criterion is somewhat subjective and may be challenged by those questioning the broader impact to the look, feel and character impacts that any of the alignments may present on individual areas of the project. This metric is appropriate to include in the evaluation.

**Regulatory Restrictions:** This criterion considered the level of regulatory issues that the alternative alignment option provided. This was a four (4) level assessment where the least impact was given to options where no regulatory issues existed, some impact was assessed for options where permitting would be required, the most impact was assessed where permitting would be required due to multiple regulations and unacceptable impact was assessed where the design would not be permitted under current regulations. This is a straight-forward metric that is appropriate to include in the evaluation.

**Urban Form Improvement:** This criterion considered the level of opportunity to provide urban form improvements along the alignment alternative. This criterion is primarily driven by the available ROW width to provide space for other urban form elements such as plantings and street amenities. This is a justifiable metric that is appropriate to include in the evaluation.

**Transit User Impacts:** This criterion considered the level of transit user impacts from a travel time perspective and also if the alignment alternative would require the maintenance of the existing bus route to provide service connections. This was a simplified three level assessment where the least impact was given to options that were the same of less travel time when compared to the base case plus no additional transit service was required. Some impact was assessed for options where there was an increase of less than three minutes and no additional service was required. Most impact was assessed where there was an increase of more than three minutes and additional transit service was required. This is a straight-forward metric that is appropriate to include in the evaluation.

**Flood Plain Impacts:** This criterion considered the level of impact to the flood plain and the affect that impact may have on the City of Brampton being able to revise the requirements of the development constraints imposed by the Special Policy Areas (SPA) on Downtown Brampton.

This is a four level assessment that ranges from least impact to most impact depending on the level of impact the alignment alternative has on the floodplain and for the lower three



assessment levels assuming no material impact on the floodplain. An unacceptable impact was assessed where the flood plain may be materially impacted by the option.

With the exception of Options 3A and 3B (the Valley Lands), all options were assessed at the same level – some impact because they crossed the floodplain. Options 3A and 3B were assessed the level of most impact, while the comments from TRCA contained in the report might suggest the stronger unacceptable impact may be more appropriate.

This is an appropriate metric to include in the evaluation.

**Tree Impact:** This criterion considered the level of impact to the street trees, parkland trees and woodlots. This is a simple three level assessment that ranges from least impact where only a few trees were impacted, some impact to for local trees and most impact for a significant removal of street trees or woodlots. The unacceptable impact level was not used for this criterion, while similar to flood plain impacts, the comments from TRCA contained in the report might suggest the stronger unacceptable impact may be more appropriate. This is a justifiable metric that is appropriate to include in the evaluation.

**Noise & Vibration:** This criterion considers the impact of airborne noise and ground borne vibration that the alignment alternative presents. Two factors affect the ranking level of the options;

- the location of sensitive receptors along the alignment,
- the existing ambient noise conditions along the alignment.

This criterion generally ranks most options with the same ‘most impact’ level with the exception of Options 4, 5 and 8 having lower levels of impact due to the reduced number of sensitive receptors in close proximity to the alignment and Options 3A and 3B having unacceptable impacts due to the very low ambient noise levels the Valley Lands offer the neighbouring residents.

This is a straight-forward metric that is appropriate to include in the evaluation.

**Visual Impact:** This criterion is not described in the SLI report but is anticipated to be directly related to the visual impact the system has on the surroundings. The tunnel options are assessed the lowest level impact – due to the fact that they are not visible from the surface. All other options are assessed the same ‘some impact’ level with the exception of the elevated Valley Land Option 3B which is assessed the ‘most impact’ level.

This is a straight-forward metric that is appropriate to include in the evaluation.

**Geotechnical Considerations:** This criterion assesses the need for additional geotechnical information as opposed to the identification of geotechnical concerns or challenges. Regardless of the option selected, all alignment alternatives will likely require some additional level of geotechnical information. Understanding that more design input will be required, this metric is appropriate as it recognizes that certain alignment options will have potential for more unknown influences related to geotechnical considerations.

**Hydrogeology:** This criterion assesses the need for additional hydrogeology information as opposed to the identification of hydrogeology concerns or challenges. Regardless of the option selected, all alignment alternatives will likely require some additional level of hydrogeology information. Understanding that more design input will be required, this metric is appropriate as it recognizes that certain alignment options will have potential for more unknown influences related to hydrogeology.

**Traffic Impact:** This criterion is somewhat subjective and based on limited available information. Traffic impacts were based on qualitative assessments of lane capacity versus daily traffic numbers. If traffic numbers were unavailable, generalised assessments were made comparing present to future road capacity.

The assessment levels have been assigned with what could be considered a reasoned argument approach which is an acceptable method and appropriate to include in the evaluation.

### *Cost*

**Capital Cost:** This criterion is based on a parametric cost per kilometre as determined through the base project as \$53 million/km (in 2014 dollars) for surface LRT. This cost was applied to the simple linear length of the project and adjusted as needed for those elements not captured by this elemental level cost analysis.

For the level of detail and intended use, this is an acceptable method and appropriate to include in the evaluation.

**Capital Cost Variation:** This value is a simple calculation to determine the difference between the capital cost for the base option against the capital cost for the alternative option. This is a straight-forward metric that is appropriate to include in the evaluation.

**Operating Cost:** This criterion is a simplified approach which considers the length of the alignment and the number of operating vehicles and then applies the impact assessment ranking based on the deviation from the base case. The assessment of 'least impact' was applied for options where the operating cost factor was equal to or less than the base case. The assessment of 'some impact' was assessed for options where the operating cost factor was up to 50% greater than the base case and 'most impact' was assessed for options where the operating cost factor exceeded the base case by more than 50%. The unacceptable impact level was not used for this criterion. This is a justifiable metric that is appropriate to include in the evaluation.

### *Construction Impacts*

**Extent:** This criterion considers the extent of the construction area as a result of the alignment alternative. The SLI report does not provide a description of the ranking of the assessment



levels. The tunneled options were assessed the lowest 'least impact' category. While the tunneled segments would have minimal impact at the surface if SEM or TBM tunneling methods were employed, open cut and cover and/or decked over open cut and cover would present significant construction impacts beyond the alignment corridor itself. Station areas, emergency access buildings, launch and extraction shafts also have tremendous impact on the construction area.

While this criterion may be appropriate to include in the assessment, the rankings associated with the alignment alternatives is not clear and may require more detailed explanation of the determination of the assessment levels.

**Severity:** This criterion considers the severity of the construction area as a result of the alignment alternative. The SLI report does not provide a description of the ranking of the assessment levels. The assessment levels have been assigned with what could be considered a reasoned argument approach whereby an observation that significantly more complicated construction means and methods associated with tunnelling and elevated structures will result in a greater construction severity than when compared to all other conventional options. This is an acceptable method and appropriate to include in the evaluation.

**Duration:** This criterion considers the duration of the construction area as a result of the alignment alternative. The SLI report does not provide a description of the ranking of the assessment levels. The assessment levels have been assigned with what could be considered a reasoned argument approach whereby an observation that significantly more complicated construction means and methods associated with tunnelling and elevated structures will result in a longer construction duration than when compared to all other conventional options. This is an acceptable method and appropriate to include in the evaluation.

## 7.1 Summary of Evaluation Criteria

The evaluation criteria, as categorized under the headings of Infrastructure, Operations, Environment, Cost and Construction Impacts, are consistent with an environmental assessment (EA) level of study and consistent with the evaluation and screening of other LRT projects.

## 8. Examination of Constraints

As noted above, the constraints and limitations identified in the SLI report were reviewed and are reasonable for a study of this nature.

## 9. Review of Agency Responses

Through the course of the Alternative Alignment Assessment Study, SLI identified a number of stakeholders that would be engaged as part of the study. The agencies having jurisdiction that would be contacted by SLI were:

- Toronto Region Conservation Authority (TRCA);

- Region of Peel, and
- Orangeville Brampton Railway (OBRY).

The responses provided by the agencies were reviewed and summarized as below.

## 9.1 Toronto and Region Conservation Authority

The Toronto and Region Conservation Authority (TRCA) have been engaged throughout the project duration and have provided comments on a number of issues through various stages of the project. Comments received from TRCA as part of this alternative alignment study indicate a strong objection to alternatives within the Etobicoke Creek valley. TRCA goes on to note that "...any concepts that would pose additional constraints within the valley would be highly detrimental to the revitalization of the Downtown area...".

Reference was made in the correspondence included in the SLI study to an earlier email where a more detailed response was provided to the City in response to the route through the valley.

## 9.2 Region of Peel

Minutes of the meeting between the project team and the Region of Peel were included in the report in addition to a follow up letter confirming the Region's position on the presented route alternatives. The project team provided an overview of the alignment alternative study and presented the options that would affect Regional roads:

- Option 8: Steeles Avenue east to Bramalea GO Station,
- Option 4: Steeles Avenue east to Kennedy Road north to Queen Street, and
- Option 5: Steeles Avenue west to McLaughlin Road north to Queen Street.

The Region of Peel made general comments about the principles that would govern the use of all Regional roads and then looked at each corridor in detail. These general comments included the following:

- the need to adhere to the road cross sections established in the Region of Peel's Road Characterization Study (RCS),
- the concern regarding the knock on effects to east-west corridors as a result of using Steeles, Kennedy and Queen,
- the need to maintain clear zone requirements, and
- that a reduction in speed along Regional routes is not easily changed and would have impacts on Regional road operations.



Individual corridor comments were made for all three Regional roads affected by the alignment alternatives. Some of these comments were similar to each alignment and are summarized below.

### **Steeles Avenue**

Steeles Avenue is a primary truck route with more than 10% truck traffic that experiences significant congestion during peak periods. Lane removal and speed reduction would create capacity and operational issues of “great magnitude”. There is insufficient right-of-way to provide for the proposed LRT corridor, active transportation requirements and RCS elements. The Region of Peel has indicated that restricting business accesses to right/in and right/out may not be acceptable. There is a significant trunk water main (2100mm) running along Steeles that would need to be accounted for.

### **Kennedy Road**

The Region noted that Kennedy Road contains a number of businesses and the current land use does not support an LRT corridor. Similar to Steeles Avenue, the Region of Peel has indicated that restricting business accesses to right/in and right/out may not be acceptable. There is also insufficient right-of-way to provide for the proposed LRT corridor and the required RCS elements. The Region noted possible concerns with the underpass at the CN Halton S/D. If this alignment option were to be considered in the future, this would need to be verified.

### **Queen Street West**

The Region noted that Queen Street is constrained with numerous private residences and business access points and land acquisition may not be possible due to the location of structures along the route. With the current lane configuration, the Region felt that the cross sections could not allow dedicated LRT operation while maintaining existing traffic capacity. If this alignment option were to be considered in the future, this would need to be verified.

## **9.3 Orangeville Railway Development Corporation**

Minutes of the meeting between the project team and the Orangeville Railway Development Corporation were included in the report. The project team gave an overview presentation for the project and explained the reasoning for the alternative alignment assessment. The alignment options that would impact the OBRY were presented to the ORDC.

While specific comments were made regarding the operation of the OBRY with respect to the operation of the LRT (i.e. freight has priority over LRT and freight must continue to operate



during construction), very little was noted in the minutes about support or opposition to the alignment alternatives.

The ORDC did note that contract language would need to be reviewed to confirm if there were any usage limitations with respect to transit operations on the corridor. ORDC noted that existing leasees would need to be consulted in future phases of the study if these options were to be taken forward.

They also noted that the corridor is currently up for sale and they were seeking interested buyers and felt that LRT along the corridor would encumber the property which would not be favourable to potential buyers.

Based on the comments noted in the meeting minutes, there appeared to be commitment on the part of the ORDC representatives to share the alternative alignment options with their board at the May 26<sup>th</sup>, 2014 meeting and provide a formal response to the study team establishing their position on the options presented. No further comments were received from the ORDC.

## 10. Review of Team Responses and Recommendations

Notwithstanding comments made earlier in this report, after careful review of the SLI report and the correspondence received from the agencies having jurisdiction, it is believed that the Stage 1 evaluation conclusions respected those comments and that the recommendation to carry forward the tunnelled options for Stage 2 assessment was an appropriate course of action.

## 11. Conclusions

As noted previously, a final decision to construct the Hurontario-Main LRT north of Steeles Avenue is subject to approval by Brampton Council. To assist Council in the decision-making process, a separate review of alternative alignments north of Steeles Avenue to Downtown Brampton was carried out by SLI and documented within the *Hurontario-Main LRT Brampton Alignment Alternatives Assessment Report* (September, 2014).

All of the alignment alternative options, including the tunnel options which passed through the Stage 1 screening assessment, were appropriate. It is noted that an additional tunnel option in the Valley Lands (Option 3C) was reviewed and, for reasons similar to those noted for Options 3A and 3B, should not be carried forward in future phases of design.

The SLI Report is well written, concise, and includes significant detail regarding the assessment approach, alternatives evaluated, results of the evaluation, and study recommendations. With the exception of a few noted minor shortcomings, the Report findings are clear, logical, traceable, and replicable. Given the level of detail of the information



available, the SLI Report notes that further studies, investigations, and evaluation is required to confirm the feasibility of constructing a short tunnel section from Nanwood Drive to Downtown Brampton. This is congruent with a study of this nature, and a valid recommendation. As such, the overall Report findings are defensible, and no additional alignments need to be identified and evaluated.

It is recognized that the evaluation method must produce a result that is clear, logical and traceable. Most importantly, it must allow anyone with the same information to reach the same conclusion, without any additional assumptions. Lastly, the method should clearly identify the relative differences and key impacts so as to select a preferred alternative. After carrying out a detailed review of the 12 options, coupled with their anticipated impacts, the results as presented in the Report can be replicated, and is thus deemed defensible.

## 12. Recommendation

The following section presents various recommendations for consideration in future phases of the project:

- Undertake the necessary additional geotechnical and hydrological studies for all options carried forward.
- Undertake the necessary additional utility investigation for all options carried forward.
- Undertake the necessary TPAP amendments and updates to the Business Case Assessment should Brampton City Council decided to carry forward one of the recommended options.

Eric Cone  
EJC:ec  
Attachment(s)/Enclosure