

# EGLINTON CROSTOWN LIGHT RAIL TRANSIT

Transit Project Assessment Process  
Environmental Project Report Addendum

Jane Street to Keelesdale Park, Black Creek Maintenance  
and Storage Facility and Laird Station to Don Valley Parkway

**DRAFT**

April 2013





# **EGLINTON CROSSTOWN LIGHT RAIL TRANSIT**

**Jane Street to Keelesdale Park**

**Black Creek Maintenance and Storage Facility**

**DRAFT**

**April 10<sup>th</sup>, 2013**



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## GLOSSARY OF TERMS

AFP	Alternative Financing and Procurement
ANSI	Area of Natural and Scientific Interest
APEC	Areas of Potential Environmental Concern
ATO	Automated Train Operation
BHF	Built Heritage Features
CEAA	<i>Canadian Environmental Assessment Act</i>
CHER	Cultural Heritage Evaluation Report
CHDR	Cultural Heritage Documentation Report
CHL	Cultural Heritage Landscapes
COS	Contaminant Overview Study
CWS	Canada-Wide Standards
DFO	Department of Fisheries and Oceans Canada
EA	Environmental Assessment
EEB	Emergency Exit Building
ECLRT	Eglinton Crosstown LRT
EMI	Electromagnetic Interference
EPR	Environmental Project Report
ESA	<i>Endangered Species Act</i>
GTHA	Greater Toronto and Hamilton Area
HADD	Harmful Alternative, Disruption, or Destruction
HVAC	Heating, Ventilation, and Air Conditioning
HIA	Heritage Impact Assessment
IO	Infrastructure Ontario
LRT	Light Rail Transit
LRV	Light Rail Vehicle
MBCA	<i>Migratory Birds Convention Act</i>
MNR	Ministry of Natural Resources
MOE	Ministry of the Environment
MSF	Maintenance and Storage Facility
MTCS	Ministry of Tourism, Culture, and Sport
MTO	Ministry of Transportation
NFPA	National Fire Protection Association
OPSS	Ontario Provincial Standard Specification
PHC	Petroleum Hydrocarbons
PPUDO	Passenger Pick-Up/Drop-Off
PSW	Provincially Significant Wetland
PTTW	Permit to Take Water
RT	Rapid Transit
SAR	Species at Risk
SARA	<i>Species at Risk Act</i>
SWM	Stormwater Management
TBM	Tunnel Boring Machine
TPAP	Transit Project Assessment Process
TRCA	Toronto and Region Conservation Authority
TTC	Toronto Transit Commission

File: <https://www.ecollaboration.mmm.ca/livelinkdav/nodes/2090763/3212006> - Draft EPR Addendum - West Section, MSF-rev.docx

## 1. INTRODUCTION

### 1.1 Study Purpose

On May 17, 2010, the Minister of the Environment for the Province of Ontario issued a Notice to Proceed to the City of Toronto and the Toronto Transit Commission (TTC) for the Eglinton Crosstown Light Rail Transit (ECLRT) Project, a 33-kilometre electrically powered Light Rail Transit (LRT) line extending from the Lester B. Pearson International Airport in the City of Mississauga to Kennedy Station in the City of Toronto (see **Figure 1-1**). Subsequently, a Statement of Completion was issued that signified the completion of a process carried out under the Transit Project Assessment Process (Ontario Regulation 231/08) to assess potential environmental impacts associated with the project, identify measures to mitigate those impacts, and to develop systems to monitor the progress of implementing those mitigation measures. The Notice also served as an authorization for the City of Toronto and TTC as co-proponents of the Project to proceed with implementation of the Project.

Subsequent to the issuance of that Notice by the Minister, changes to the Project have been identified that are inconsistent with the project presented in the 2010 Environmental Project Report (EPR) that served as the basis for the Minister's Notice of May 17, 2010. As described in Section 15 of Ontario Regulation 231/08, any significant change that is inconsistent with a previously approved EPR requires a reassessment of the impacts associated with the project where changes are proposed, the identification of potentially new mitigation measures, and potentially new monitoring systems in an addendum to the previously approved EPR. This document serves as an addendum to the original EPR to document the effects of the changes described herein.

### 1.2 Background

The Project was one of seven new LRT lines endorsed by the TTC in March 2007 in the Transit City Plan (see **Figure 1-1**). This plan served as a blueprint to bring higher-order transit service to a broader geographic area within the City of Toronto. The purpose of the Transit City plan is intended to address future transit demands that cannot be met by existing or increased bus service. The plan received the support of the Province of Ontario in June 2007 as part of a strategic transit plan for the Greater Toronto and Hamilton Area, entitled Move Ontario 2020. Metrolinx, an agency of the Province of Ontario, approved the new proposed lines as part of their regional transportation plan called The Big Move in December 2008.

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**Figure 1-1: Toronto Transit City – 2007 Light Rail Transit Plan**

The 2010 EPR identified an alignment for the Project that consisted of LRT technology primarily on-surface within the centre of Silver Dart Drive, Commerce Boulevard and Eglinton Avenue West, along with a new bridge over Highway 401, between Pearson International Airport and Keelesdale Park, and the LRT is also within the centre of Eglinton Avenue East from east of Brentcliffe Road to Kennedy Station. The section between Keelesdale Park and Brentcliffe Road was identified as an underground section due to the narrow right-of-way width of Eglinton Avenue in this section. The preferred construction method for this underground section of the alignment was determined to be the use of Tunnel Boring Machine (TBM) technology. Passenger access to the LRT system is to be via surface stops or underground stations with vertical connections to surface from the LRT in the underground section. The preferred method to construct the stations in the underground section was identified as the cut-and-cover method.

This chapter introduces the ECLRT, the purpose for this Addendum, the Transit Project Assessment Process (TPAP) that was followed and presents the context by describing planning policies that applied to this study. **Chapter 2** of this report presents feasibility studies and major functional design options considered for the project. **Chapter 3** provides an update of the project description and presents the preferred alignment design. **Chapter 4** updates the existing conditions within the

study area since the 2010 EPR. **Chapter 5** discusses potential impacts, identifies mitigation measures, and recommends monitoring activities. **Chapter 6** outlines the consultation process and activities carried out throughout the TPAP for the addendum. **Chapter 7** presents the commitments of the proponents to future action during the design, construction and operational phases.

### 1.3 Study Scope

As discussed in **Section 1.1**, this Addendum focuses only on areas where the significant changes to the 2010 EPR are proposed. The following is a summary of the components of the proposed configuration of the ECLRT that differ significantly from those recommended in the 2010 EPR:

- Revised LRT alignment between Jane Street and Keelesdale Park (see **Section 2.1**);
- Revised track alignment connecting the LRT mainline and the proposed Black Creek Maintenance and Storage Facility (see **Section 2.1**);
- Relocation of the Weston Stop and removal of the Black Creek Stop (see **Section 2.1**);
- Additional passenger tunnel connections under the GO Kitchener Rail and Canadian Pacific Railway (CPR) corridors (see **Section 2.1**);
- Proposed Black Creek Maintenance and Storage Facility at Mount Dennis (see **Section 2.3**);
- Proposed 15 bay bus terminal and Passenger Pick Up and Drop off at the Mount Dennis LRT station (see **Section 2.4**); and
- Change of proponents. The 2010 ECLRT TPAP was carried out by the City of Toronto, the TTC, and Metrolinx; however, Metrolinx is now the sole proponent for this Addendum.

### 1.4 Study Area

The Addendum study area is broken down into two major areas along the approved ECLRT alignment where significant physical changes are proposed (see **Figure 1-2**). The study limits for each section are as follows:

#### **LRT - West Section**

This includes Eglinton Avenue from Jane Street to Keelesdale Park and also includes the bus terminal and Passenger Pick Up and Drop Off associated with the Mount Dennis Station.

#### **Black Creek Maintenance and Storage Facility (MSF)**

The study area for the Black Creek MSF includes the land north of Eglinton Avenue West to Ray Avenue, generally between the railway corridor to the west and Black Creek Drive to the east.



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#### 1.4.1 Studies Prepared in Support of the Eglinton Crosstown LRT Transit Project Assessment Process Addendum

The following is a list of studies that were conducted in support of this addendum report:

- Stormwater Management and Hydraulic Analysis, see **Appendix A**;
- Natural Environment, see **Appendix B**;
- Air Quality Assessment, see **Appendix C**;
- Noise and Vibration, see **Appendix D**;
- Contaminant Overview Study, see **Appendix E**;
- Archaeological (Stage 1-2 Archaeological Assessment Report), see **Appendix F**;
- Heritage (Cultural Heritage Assessment Report), see **Appendix G**; and
- Comparative Traffic Assessment, see **Appendix H**.

#### 1.4.2 City of Toronto Planning Policies

The Toronto *Official Plan, 2009* presented a vision for a more livable City that targets growth to specific communities. The areas that have the most potential to accommodate growth and redevelopment are the Downtown and Central Waterfront, the Centres, the Avenues, and Employment Districts. Generally, potential growth areas are well served by transit, the existing road network and existing infrastructure.

The Toronto Official Plan recognizes transit corridor expansion along Eglinton Avenue from Weston Road to Kennedy Station. This project will result in improvements to public transit service along Eglinton Avenue over the next decade. The construction of the Crosstown will significantly improve mobility and transportation options for Torontonians, while also bringing a number of planning opportunities and challenges.

The City of Toronto and Metrolinx are undertaking the *Eglinton Connects Study* to develop an urban design vision for the Eglinton Corridor. This comprehensive planning study of the Eglinton Avenue corridor is designed to complement the future ECLRT. The study is generally includes the Eglinton Avenue corridor between Jane Street and Kennedy Avenue, and examines where people will live and work and what kind and size of buildings will be along Eglinton in the future. The study will make decisions about how the streets will function, how they will look and what features/streetscapes they should have.

#### 1.4.3 Province of Ontario Planning Policies

The Province began addressing rapid growth in the Toronto region and throughout the province by enacting the *Places to Grow Act, 2005* and the *Greenbelt Act, 2005*. These land planning reforms established new frameworks

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for directing urban growth into designated areas while preserving natural and agricultural landscapes. The desired outcome is a substantial increase in the development density in areas designated for growth. The change in growth from lower density sprawl to higher levels of urban density will place an even greater strain on existing urban infrastructure that already operates at capacity, notably the transportation network.

To alleviate the fragmented system of planning, funding, and implementation of the region's urban infrastructure, the Province enacted the *Metrolinx Act, 2006*. The Act created Metrolinx, a regional planning agency. Metrolinx is the planning and funding agency for all modes of transportation identified in the region's long-term transportation plan, including the five-year capital investment program, and is responsible for implementation, ownership, and operation of all transportation projects identified in the plan.

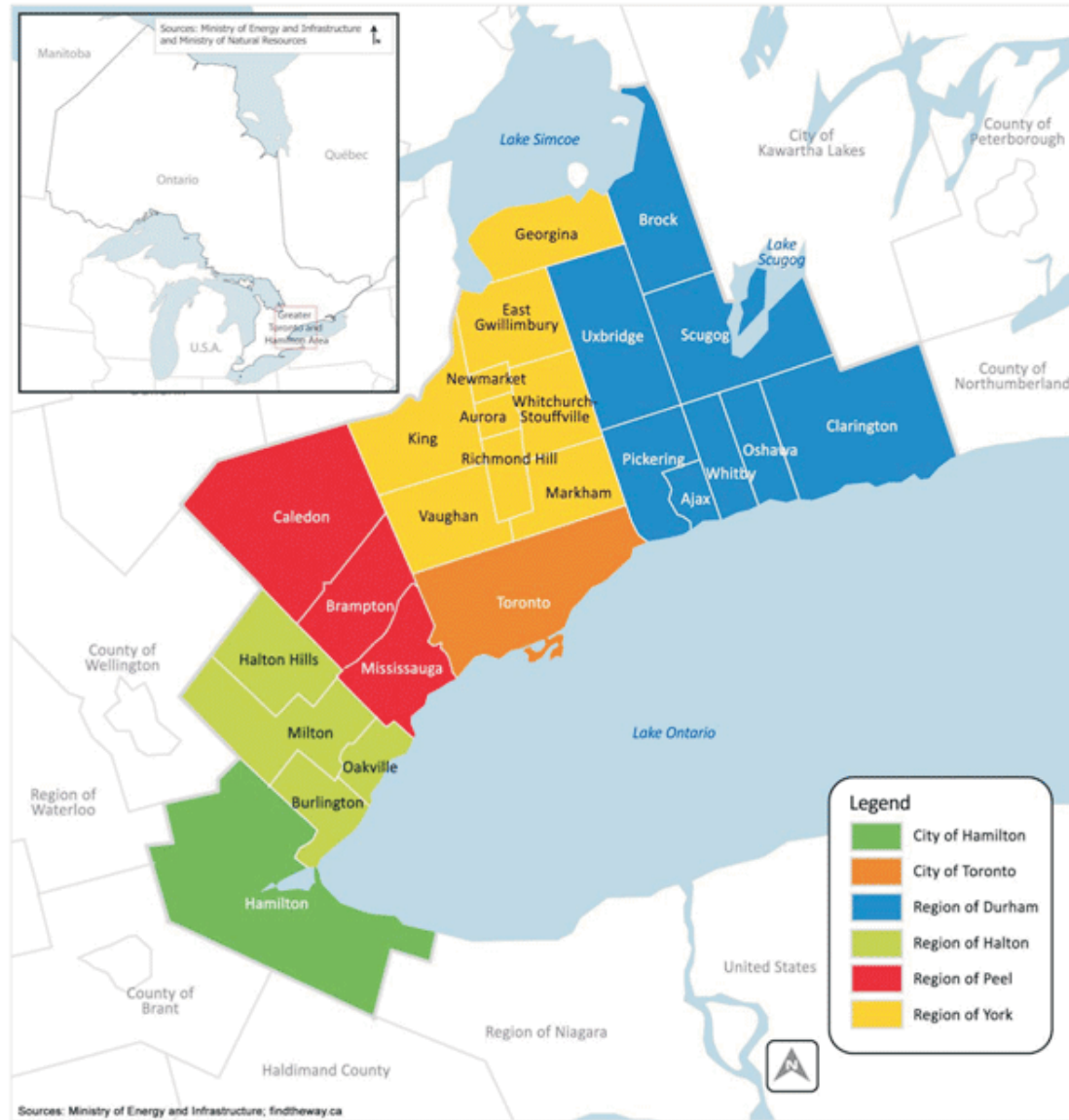
The Ministry of Transportation Ontario (MTO) and Infrastructure Ontario (IO), a crown corporation, both have critical roles in delivering the provincial urban growth and transportation investment strategies, and in implementing the Metrolinx program. Specifically, IO leverages Alternative Financing and Procurement (AFP<sup>1</sup>) in the implementation of transportation projects. MTO is responsible for transportation infrastructure and policy at the provincial level and serves as the conduit for the Province's investment in Metrolinx-funded transportation improvements. In addition, the Ministry of Infrastructure's Ontario Growth Secretariat is also charged with carrying out the provincial land use and growth planning mandates of the *Places to Grow Act, 2005* that serves as the basis for integrated transportation and land use planning. Numerous agencies are responsible for the local delivery of transportation, and the frameworks for delivering the multi-modal transportation system remain devolved to local implementation agencies.

On June 15, 2007, the Province of Ontario announced \$17.5 billion in funding transit projects for the Greater Toronto Area and Hamilton. Named 'MoveOntario 2020', this 12-year provincial investment strategy to deliver 52 Rapid Transit (RT) projects in the Greater Toronto and Hamilton Area (**Figure 1-3**) that forms the geographic area in which Metrolinx has the mandate to develop a comprehensive multi-modal transportation network. The Metrolinx Big Five Program was the transit capital investment program originally developed for the first five years of the implementation of the Big Move, the region's long-term transportation plan. The scope of the Big Five Program included four projects within the City of Toronto (City) and one project in the Regional Municipality of York which would be funded through MoveOntario 2020.

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<sup>1</sup> From [www.infrastructureontario.ca](http://www.infrastructureontario.ca), "AFP is an innovative way of financing and procuring large, complex public infrastructure projects...Under AFP, provincial ministries and / or agencies establish the scope and purpose of the project while the work is financed and carried out by the private sector. Only after a project is completed will the private sector company be repaid by the province...AFP allows large, complex infrastructure projects to be delivered faster and more efficiently (at a lower, long-term net cost) than traditional procurement, protects taxpayers from cost overruns, and transfers risks to the partner who has the expertise, experience and ability to handle that risk best."

**THE GREATER TORONTO AND HAMILTON AREA**



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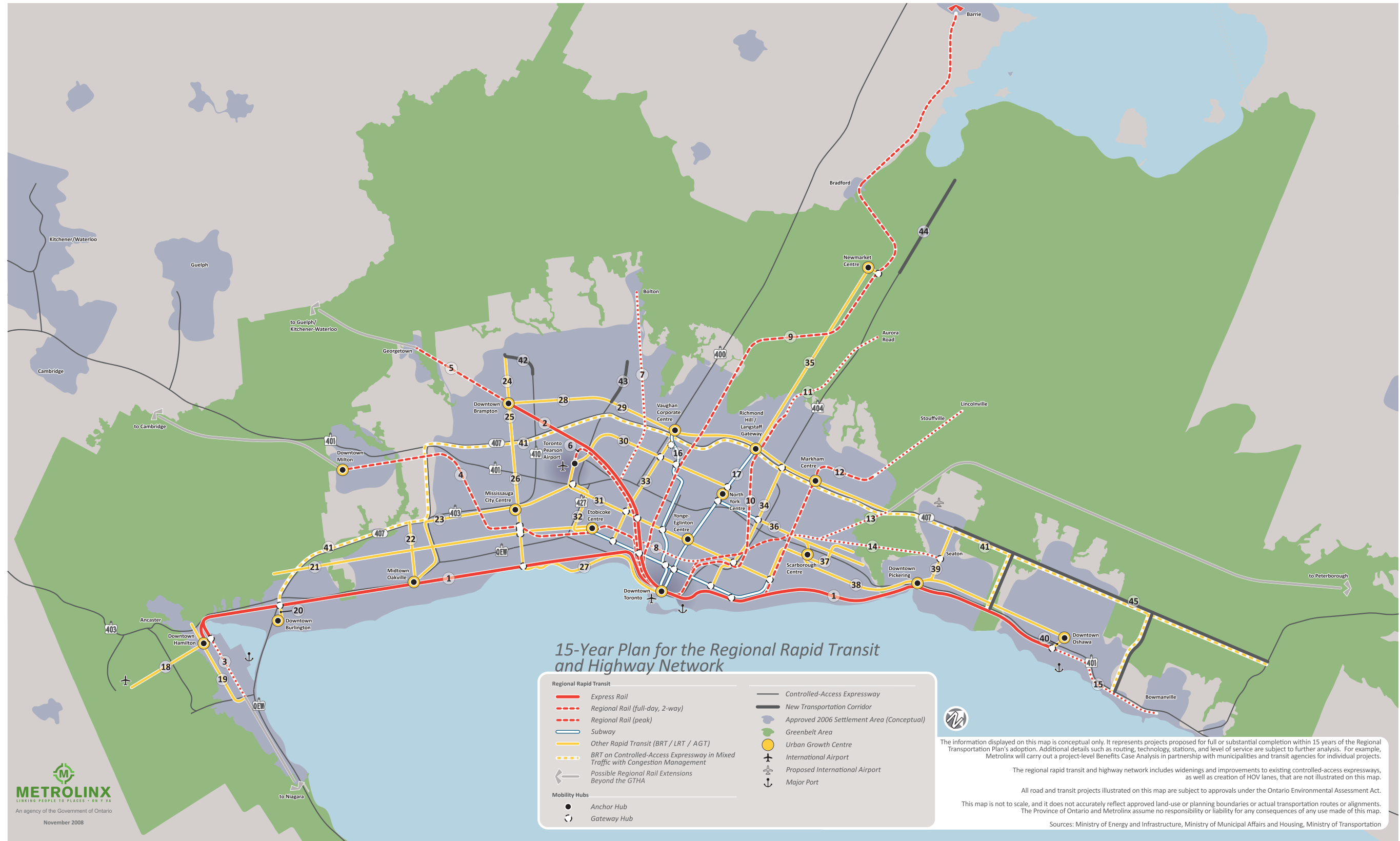
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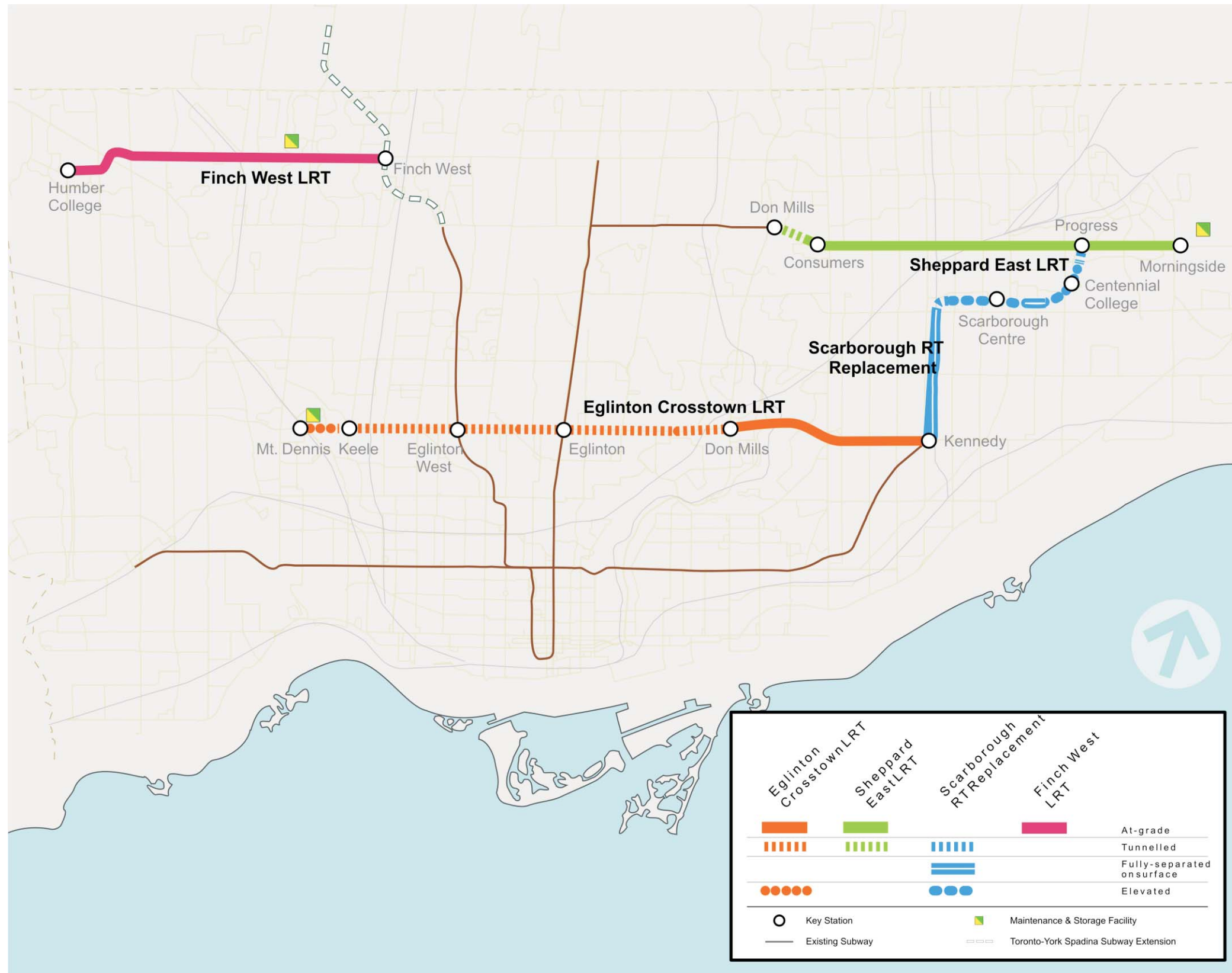
The Metrolinx Regional Transportation Plan (RTP) named “The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area (GTHA)” was approved on November 28, 2008. The plan identified the Eglinton Crosstown LRT from Pearson Airport to Scarborough Centre as one of its top priorities for early implementation within the first 15 years (see **Figure 1-4**).

In spring 2009, the Province announced an investment of \$8.15B (\$2008) for four LRT projects in Toronto: ECLRT, Scarborough RT conversion/extension, Finch West LRT, and Sheppard East LRT. These four projects were a part of a wider municipal plan known as Transit City (see **Figure 1-1**), and were identified in the top 15 priority projects in the Metrolinx Big Move plan (see **Figure 1-4**). In mid-2010, the four projects in Toronto were re-scoped to include a phased implementation approach to meet the capital budget limitations. The portion of the ECLRT west of Jane Station (from Jane Street in Toronto to Pearson Airport in Mississauga) was deferred, along with other sections from the other three projects. A further scope revision in late 2010 consolidated the ECLRT project with the Scarborough RT conversion to LRT, while reducing the number of stations and modifying at-grade portions of the alignment to a completely grade separated alignment between Jane and McCowan (the extension to Sheppard Avenue was deleted from the project). As part of this revision, the City took responsibility for the rapid transit improvements to the Finch West and Sheppard East corridors, proposing express bus improvements on Finch West and a Sheppard subway extension east to Scarborough Centre station. A grade separation of the GO Transit Stouffville line was undertaken prior to termination of the Sheppard LRT and Finch West LRT projects in late 2010.

On April 25, 2012, the Metrolinx Board of Directors voted to move forward with all four Toronto transit projects—ECLRT, Scarborough RT conversion/extension, Sheppard East LRT, and Finch West LRT—as originally approved by the Metrolinx Board on May 19, 2010, and consistent with the Big Move plan. **Figure 1-5** is a map showing the four approved Toronto transit projects. Metrolinx will use IO on all projects, as directed by the Treasury Board, to maximize value and increase certainty of on-time, on budget delivery, subject to the completion of value-for-money analysis on each project. Metrolinx staff were authorized to finalize and execute legal agreements with the City and the Toronto Transit Commission (TTC) relating to the funding and implementation of the projects. This project delivery approach is to be implemented through a newly formed subsidiary corporation of Metrolinx known as the Rapid Transit Implementation (RTI) team.







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Metrolinx have undertaken two studies related to this study. They include:

- **Mount Dennis Mobility Hub** –In The Big Move, the Regional Transportation Plan for the Greater Toronto and Hamilton Area (GTHA), one priority calls for “a system of connected mobility hubs” that provides travellers with seamless access to the regional transit system, supports higher density development, and demonstrates excellence in customer service. Mount Dennis was identified as a Mobility Hub in The Big Move. The Mount Dennis Mobility Hub Study being undertaken by Metrolinx is planning for seamless mobility around the station, maximizing connections to transit for the surrounding neighbourhoods, creating an attractive public realm and leveraging transit investment for future investment in the community within an 800m radius around the proposed transit station. Mount Dennis has been identified as a Gateway Hub, meaning that it is a major transit station area to be located at the interchange of two or more current/planned regional rapid transit lines (Eglinton LRT and the GO Rail Corridor); and
- **Georgetown South Corridor Expansion and Airport Transportation Link** – The Georgetown South Project, which includes the new Union Pearson Express (UPEXpress - formerly known as the Air Rail Link), runs through the study area along the CPR/GO Transitrail corridor. Studies are being conducted to provide infrastructure improvements to meet existing GO Transit ridership demand and future growth expected from the UPEXpress. Additional studies examined the potential electrification of the rail system as a future alternative to diesel trains now in service. Although no GO Rail station currently exists at Mount Dennis, this study protected for its future implementation.

## 1.5 TPAP Addendum Process

This Addendum is being carried out under the Transit Project Assessment Process (TPAP), Ontario Regulation (O. Reg.) 231/08. The original Environmental Project Report for this study was approved by the MOE in May 2010. As noted in previous sections, there have been a number of changes proposed to the configuration of the ECLRT since the 2010 approval. In accordance with O. Reg. 231/08, section 15(1), any significant changes made to the transit project following the statement of completion that are not considered to be consistent with the EPR referred to in the statement require an addendum to the EPR. The formal public and agency review processes and timelines for finalizing an Addendum to an approved EPR are essentially the same as the TPAP; however, the proponent has discretion regarding the scope of public consultation.

The following are the key steps in the TPAP Addendum process:

- Complete assessment of any impacts the change might have on environment;
- Complete addendum report;

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- Prepare and distribute a Notice of Environmental Project Report Addendum; and
- Final review by stakeholders prior to proceeding with Project

In addition to these steps, consultation has been undertaken to review the proposed changes, potential impacts and proposed mitigation with the public, agencies and stakeholders prior to the completion of this report.

### 1.5.1 Content of the EPR Addendum

In accordance with O. Reg. 231/08, Section 15 (1), for all changes to the project inconsistent with the EPR, this addendum to the ECLRT EPR includes the following information:

- A description of the changes (**Chapter 3**);
- Reasons for the changes (**Chapter 2**);
- Assessment and evaluation of any impacts that the change may have on the environment (**Chapter 5**);
- A description of proposed mitigation measures for any negative impacts that the change to the project may have on the environment (**Chapter 5**); and
- A statement of whether the proponent (Metrolinx) is of the opinion that the change is a significant change to the transit project, and the reasons for the opinion (**Chapter 3**).

### 1.5.2 EPR Addendum Approval Process

After completing the addendum report and filing a Notice of Environmental Project Report Addendum, the report will be made available to the public, regulatory agencies, aboriginal communities or other interested persons for review for a period of 30 days in accordance with the Ontario Regulation 231/08.

If objections are received during the 30-day public comment period, the Minister of the Environment has 35 days to consider the objections (if any) regarding negative impacts of the transit project and can act by providing notice to the proponent. Notice from the Minister will state either that the project can proceed, the project can proceed subject to conditions, or that the proponent must conduct additional work prior to proceeding.

### 1.5.3 Study Organization

This study has been undertaken under the direction of Metrolinx. MMM Group was retained by Metrolinx as the prime consultant to undertake the project management and associated technical work. A project team was created with the following sub-consultants to provide specific expertise for the study. These sub-consultants include:

- Novus Environmental Inc.;



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- Unterman McPhail Associates; and
- New Directions Archaeology.

## 1.6 Consultation Program Overview

The consultation program for the EPR Addendum study was developed based on the public and stakeholder consultation requirements specified for a TPAP.

The following approach was used:

- Notice of Public Information Centres
  - To notify all residents about Public Information Centres, and provide information on how to participate/provide comment
- Prepare Contact/Property Owner Lists
  - Created and maintained an active contact list to know who needs to be informed of project updates.
- Develop Website (Eglinton Crosstown Website)
  - Updates to the website advertised and summarized information shared at the Public Information Centres.
- Hosted Public Information Centres
  - Advertised by newspaper, website and through mailed notification to names on the contact List. Sign-in sheet for meeting attendees and comment sheet provided input to the project.
- Manage Comment Tracking/Responses
  - To manage all comments received during the project, and ensure that all questions from stakeholders and the public are addressed.
- Notice of Environmental Project Report Addendum
  - To notify relevant technical stakeholders, the general public, and all residents of the study area about the completion of the project, and provide information on how to access the final report and provide comment.

The consultation program is discussed in further detail in **Chapter 6** of this EPR Addendum.

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## 2. FEASIBILITY STUDIES AND MAJOR FUNCTIONAL DESIGN OPTIONS

The changes to the 2010 EPR plan for the Eglinton LRT presented herein were identified through design activities and feasibility studies carried out subsequent to the approval of the previous Eglinton LRT Environmental Project Report, 2010. These feasibility studies not only identified localized design issues with the previous plan, but also compared alternatives and identified a technically-preferred approach to resolve the issues. The following sections summarize the feasibility studies that led to the identification of proposed changes to the 2010 ECLRT EPR, including their analyses and the recommendations arising from each as they relate to the significant Eglinton LRT changes that form the focus of this Addendum study.

### 2.1 Eglinton Crosstown LRT

Metrolinx is proposing changes to 2010 ECLRT EPR for the LRT alignment and LRT stops/stations in the section between Black Creek to Jane Street.

#### 2.1.1 Reason for Change

The 2010 ECLRT TPAP considered a number of different LRT alignment options for the LRT in the Jane Street to Keele Street section, and ultimately recommended a surface median LRT facility on Eglinton Avenue with stops at Jane Street, Weston Road, and Black Creek Drive, at-grade intersections with Weston Road and Black Creek Drive and an at-grade connection to the proposed Black Creek MSF (requiring LRT vehicles to cross the westbound general traffic lanes in order to access the facility). Metrolinx has subsequently identified a need to implement an Automated Train Operation (ATO) system for trains leaving the Black Creek MSF site in order to achieve the desired service frequency and reliability along the line. However, the ATO system can only be used where the LRT is in a protected right-of-way, and there is now a need to grade-separate the LRT from general traffic at the Black Creek MSF site access. If ATO operation out of the yard was not possible, mainline operations in the vicinity of Black Creek Drive would be impacted as trains transitioning from manual to automatic operation are required to stop to ensure all systems are functioning prior to proceeding. ATO operation within the tunnelled section of ECLRT will also operate at shorter headways providing a higher level of service into the Mount Dennis interim terminal station, as noted in **Section 3.2.1**.

Further, in light of a future GO Rail station at Mount Dennis, as envisioned in the Georgetown South Corridor EA (2009), relocation and redesign of the Weston LRT Stop to a full station under the rail corridor would allow for a fully-integrated LRT/GO Rail station.

Through the Metrolinx *Eglinton Crosstown Light Rail Twin Tunnels: Jane – Keele Study (August 2011, updated November 2011)* eleven different alignment options for the LRT alignment through the Jane Street to Keele Street section were

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developed and assessed, including options for crossing the Black Creek River Valley and accessing the proposed Black Creek Maintenance and Storage Facility (MSF) on the former Kodak Lands.

### **2.1.2 Key Challenges and Constraints**

There are a number of notable challenges and constraints for the creation of the ECLRT alignment in the section between Jane Street and Keele Street:

- Black Creek is an environmentally sensitive area and presents a vertical alignment constraint;
- Black Creek Drive is a major north-south thoroughfare carrying large volume of traffic between the City and the 401 Highway;
- The former Kodak property, which will accommodate the Black Creek MSF, is at an elevation approximately 9 metres above the adjacent Eglinton Avenue West surface elevation. This elevation difference introduces a challenge for the vertical alignment of the connecting tracks into the yard due to maximum acceptable grades for the design vehicle. Alternative solutions such as lowering the former Kodak property to reduce the elevation difference were determined to be prohibitively costly;
- The Eglinton Avenue alignment west of Black Creek Drive is in a deep cut under the GO Transit and CP lines (protected by high retaining walls on both sides of the road). Eglinton Avenue West returns to grade as it approaches the intersection with Weston Road. These steep grade changes and large elevation differences between the ground levels inside and outside of the road right-of-way make the LRT alignment design challenging; and
- At Weston Road, the site of a potential future station, the street right-of-way is very narrow limiting the choices of station configurations without property acquisition.

### **2.1.3 Alternative Design Methods Considered**

During the investigation of alternatives, Metrolinx developed eleven different alignment options with a variety of horizontal and vertical profiles between Keele and Jane Streets and the required connections to the proposed Black Creek MSF site, taking into account the need to:

- Minimize the property requirements;
- Utilise the proposed TBM West Launch Shaft at Black Creek currently under construction under contract ECLC1-1;
- Facilitate the connection to the Black Creek MSF from both the east and west directions;
- Protect for the possibility of passenger interchange between the ECLRT and GO Transit rail service at Weston Road;
- Minimize environmental impacts;

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- Investigate the construction of this section of the Eglinton LRT in phases, with Phase 1 from Keele Street/West Launch Shaft to the Black Creek MSF and Phase 2 from the Black Creek MSF to Jane Station; and
- Assess cost and schedule impacts of the scheme.

The following is a summary of the key characteristics of each alignment option considered. The options are illustrated in **Figures 2-1 to 2-4**.

**Option 1 - Underground (Centre of Eglinton):** Option 1 is proposed to be constructed entirely underground. The horizontal alignment of this option generally follows the centre of Eglinton Avenue with the exception of the Jane Station area, where it veers towards the northern side of Eglinton Avenue. The vertical alignment would be, in large measure, driven by the constraint of the Black Creek Bridge and the adjacent sanitary sewer. In order to provide appropriate clearance to these structures, the alignment has to be quite deep at this location, precluding the ability to cost-effectively implement a stop/station at Black Creek Drive. Between Jane Street and the West Launch Shaft, the tunnel depth (from ground to top of structure) varies from 12m to over 20m. The assessment from existing drawings indicate that the tunnel alignment would pass through the timber piles below the Black Creek bridge, and the bridge would likely be required to be underpinned.

**Option 2 – Underground (South of Eglinton Avenue):** Option 2 would be entirely underground. The horizontal alignment would be to the south of Eglinton Avenue west of Keele Station, and switch back onto the centre of Eglinton Avenue once past the Black Creek MSF site. The alignment has been placed to the south to avoid the foundations of the Black Creek Bridge. The vertical alignment would be driven by the constraint of the sanitary sewer, and so the alignment must be deep at this location, as in Option 1, and would also result in the elimination of the proposed Black Creek Drive LRT Stop. Accordingly, the tunnel would be deep (12 to 20m from ground to top of structure), resulting in deep cuts for the station box and the MSF connection box.

The lead-in track would need to rise approximately 25 metres in height over its length, resulting in a gradient of 4% that will mean that the ramp is approximately 625 metres in length.

The Mount Dennis and Jane Stations would be underground.

**Option 3 – Underground and Elevated (South of Eglinton):** Option 3 is a variation of Option 2 with similar horizontal alignment but incorporates combination of underground and elevated sections of LRT mainline for the vertical alignment. It features an elevated connection to the MSF. The key difference is the improved arrangement to reach the elevation of the MSF lead, at 124m. Once clear of the mainlines, the Black Creek MSF Eglinton tracks would rise towards the west, and then turn towards the north to cross Eglinton Avenue and arrive at the MSF site.

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The original intent was that a similar leads arrangement would be possible on the west side of the MSF, however due to the depth of the alignment and the proximity of the rail structures, it was not possible to achieve this arrangement on the west side of the rail structures. Therefore two lead tracks would be provided from the east side only. LRVs approaching from the east or outbound to the west would have to switch direction after crossing over onto the appropriate mainline in a 'switch back' movement which is highly undesirable from an operations perspective.

The Mount Dennis and Jane Stations would be underground. The previously proposed Black Creek Drive LRT stop would be eliminated.

**Option 4 – Underground and Elevated (Centre of Eglinton):** Option 4 has mixed elevated and underground elements. West of the West Launch Shaft the vertical alignment rises to the surface and continues to rise on an elevated structure over Black Creek Drive and descends under the rail bridges on the west side of the Black Creek MSF. This option has turnouts from the main line to enter the MSF site at grade (elevation 124m).

This option would require the reallocation of a significant portion of the existing Eglinton Avenue road surface to accommodate the tunnel portal and the elevated structure as it changes from the elevated alignment to tunnel east of the railway structures. The width required is approximately 10m. At this location there are retaining walls on either side of Eglinton Avenue, and therefore there is limited space available. Accordingly, two traffic lanes would have to be removed to accommodate the LRT right-of-way (consistent with the 2010 LRT plan), resulting in a reduction in the road capacity of Eglinton Avenue.

Similarly to Option 3, it would be possible to provide an MSF lead from the east side only, and this would result in the same 'switch back' operation described earlier.

Similar to Options 2 and 3, the Mount Dennis Station would be underground. The Jane Station would be underground. The previously proposed Black Creek Drive LRT stop would be eliminated.

**Option 5 – Underground and Elevated (North of Eglinton):** Option 5 also has mixed elevated and underground portions. West of the West Launch Shaft, the vertical alignment of the LRT rises to the surface and continues to rise on an elevated structure over Black Creek Drive, then moves towards the north to enter the Black Creek MSF site at grade (elevation 124m). At the West Launch Shaft, the permanent alignment is further north than that of the TBM launch alignment. The portion of the launch alignment between Keele Station and the Black Creek Launch would have to be excavated and modified as a cut and cover structure to accommodate the permanent alignment.

Connections to the MSF could be made using a typical 'delta' double track arrangement, providing switches to both mainline tracks from the west and the



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east side of the MSF. Eastbound LRVs inbound and outbound from the MSF will cross the westbound mainline, but 'switch back' movements will not be required.

The Mount Dennis and Jane Stations would be underground. The previously proposed Black Creek Drive LRT stop would be eliminated.

**Option 6 – Elevated (Centre of Eglinton):** Option 6 would be entirely elevated. West of the West Launch Shaft the vertical alignment would rise to the surface and continue to rise on an elevated structure over Black Creek Drive, rising to a maximum elevation of 134 metres, approximately 10m above the rail tracks (20m above Eglinton Avenue).

At the West Launch Shaft, the alignment is shallower than that of the TBM launch alignment. The portion of the launch alignment between Keele Station and the West Launch Shaft would have to be filled in and modified as a cut and cover structure to accommodate the permanent alignment.

Connections to the Black Creek MSF would be made using a typical 'delta' double track arrangement, providing switches to both mainline tracks from the west and the east side of the MSF. Eastbound LRVs inbound and outbound from the MSF will cross the westbound mainline, but 'switch back' movements would not be required.

The MSF leads enter the MSF site at an elevation of approximately 124m, or 10 metres above grade, and are on a 5% declined plane (i.e. on the same plane as the 5% grade on the main line) for approximately 150 metres. To accommodate the track crossings, all tracks are coplanar. Whilst this 5% falls within acceptable design guidelines, detailed analysis will be necessary at the next stage of project development to determine entry speed into the MSF.

The Weston Station would be directly above the GO Rail corridor. The Jane Station would be above Jane Street in this arrangement. Transfers to/from buses would be made via stairs/elevators and escalators to the bus station on the north east side of the Jane Street / Eglinton Avenue intersection. The previously proposed Black Creek Drive LRT stop would be eliminated.

**Option 7 – Underground and Elevated (Centre of Eglinton, North of Eglinton through MSF only):** Option 7 is a variation of Option 4. It features the mainline moving to the north such that it is north of Eglinton through the Black Creek MSF site.

The alignment would be partially elevated and partially underground. West of the West Launch Shaft the vertical alignment would rise to the surface and continue to rise on an elevated structure over Black Creek Drive. After crossing Black Creek Drive the alignment would move to north of the north retaining wall and descend to pass under the rail tracks to the north of the bridge structures, precluding the ability to introduce an LRT stop in this location. The alignment would then stay underground to Jane Station.

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The short (400m) underground section between Jane Station and Weston Station would be constructed by TBMs, which is expected to be more cost effective than a cut and cover approach since the TBMs and lining elements will already be available. All other underground sections, including the rail crossings would be constructed by cut and cover. The rail crossing would require pre-installed trestles to support the rail lines. Road and bridge widening will be required at the portal and the elevated structure abutment.

Connections to the MSF are made using a typical 'delta' double track arrangement, providing switches to both mainline tracks from the west and the east side of the MSF. Eastbound LRVs inbound and outbound from the MSF will cross the westbound mainline, but 'switch back' movements will not be required. The MSF leads enter the MSF site at an elevation of approximately 124m.

**Option 8 – Underground and Elevated (Centre of Eglinton, North of Eglinton through MSF only):** Option 8 is a variation of Option 7. The horizontal alignment has been modified on the approach to the Black Creek MSF from the east to avoid impact to the adjacent property.

Option 8 is similar to Option 7, but modified to avoid any impact on the adjacent property. The results of this design would be an increased number of lead tracks in/out of the MSF and an increased number of elevated structures crossing Eglinton Avenue in the area.

The movement of Option 8 to avoid unnecessary impacts on MSF property at the eastern end of the site does result in significantly increased impacts on the properties to the south of the alignment. A more comprehensive analysis would be needed to examine these impacts (including property requirements) in further detail. At the same time, Option 8 provides for a much higher degree of LRT grade separation than the other options, and the reduction of conflicting movements onto and off the main running lines would allow for potentially higher overall operating speeds.

**Option 9 – Underground (Centre of Eglinton) and Temporary Elevated (Centre of Eglinton, North of Eglinton through MSF only):** Option 9 is, in principle, a hybrid of Option 6 and Option 1. It would allow for a low cost connection from Keele Station to the Black Creek MSF during Phase 1 of the ECLRT implementation, and a fully underground LRT line west of Weston Road in its ultimate configuration (i.e. after implementation of Phase 2). The main drawbacks of this option would be:

- The need for a four track cut-and-cover box west of Keele, a structure needed for connection to the future Phase 2 underground line construction and to allow a transition structure to an elevated alignment in Phase 1.
- The line portion from Keele to the MSF is, in effect, constructed twice; once using an elevated alignment and in the future, using a fully underground alignment.



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- The ultimate configuration will require yard connection leads from the west portion of the ECLRT line. The horizontal and vertical locations of the connections will have to be planned so that the yard operation is not disrupted during the additional leads construction and the match with the yard layout. At this point in time their layout has not been developed.

**Option 9A – Ultimate Underground (Centre of Eglinton) and Temporary Elevated (Centre of Eglinton, North of Eglinton through MSF only) with a temporary Mount Dennis Station:** Option 9A would be a variation of Option 9. It would allow for a lower-cost connection from Keele Station to the Black Creek MSF during the Phase 1 of the ECLRT implementation and a fully underground LRT line west of Weston Road in its ultimate configuration. The main advantage of Option 9A would be the provision of a temporary at-grade Weston LRT stop that would allow for increased functionality of the line at a relatively modest premium over Option 9.

The main drawbacks of this option would be:

- The need for a four track cut-and-cover box west of Keele Station, a structure needed for connection to the future Phase 2 underground line construction and to allow transition structure to an elevated alignment in Phase 1.
- The portion from Keele Station to the MSF is, in effect, constructed twice; once using an elevated alignment and in the future, using a fully underground alignment.
- The temporary station at Weston would be abandoned when the ultimate line section configuration is constructed.

**Option 10 - Eglinton and Black Creek Drive Intersection Elevated, Weston Close to Transit Hub:** Option 10 would be constructed at-grade and depressed east of Weston Station and underground west of Weston Station. The horizontal alignment of this option would be generally north of Eglinton Avenue with the exception of a portion west of Weston Station where it is within the Eglinton Avenue right-of-way. The vertical and horizontal alignment at the crossing of Black Creek is, in large measure, driven by the constraint of the West Launch Shaft which is currently under construction. In order to provide appropriate clearance to the LRT, existing Black Creek Drive would have to be raised by approximately 6 m above its current grade. To allow for an interchange with Eglinton Avenue, Eglinton Avenue must be raised as well, requiring a new bridge over Black Creek. The alignment geometry would have a speed restriction of 50 km/h through the launch shaft area. Moving towards the west to the MSF junction, the LRT operating speed would have to be reduced to 40 km/h or as limited by the special trackwork components. On the west side of Weston Station the speed would be a maximum of 60 km/h for a distance of approximately 150 m to the west of the station.

The Mount Dennis LRT Station would be in close proximity to the future Mount Dennis GO Station allowing a convenient passenger interchange with the GO

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Rail Station and with a contemplated bus terminal. Jane Station would be the terminal station and would require significant lengths of cut and cover structures associated with the tail tracks and crossover. It would therefore be placed at a shallow depth to reduce costs and to provide a reduced vertical circulation distance for the station users. The previously proposed Black Creek Drive LRT stop would be eliminated.

**Option 11 – Elevated on North Side of Eglinton, Weston Close to Transit Hub:** Option 11 would be constructed both elevated and depressed east of Mount Dennis Station, and underground west of Mount Dennis Station. The horizontal alignment of this option would generally be north of Eglinton Avenue with the exception of a portion west of Weston Station where it is within the Eglinton Avenue right-of-way. The vertical and horizontal alignment at the Black Creek crossing would be, in large measure, driven by the constraint of the West Launch Shaft which is currently under construction. In order to provide appropriate clearance to Black Creek Drive, the LRT profile must be raised by approximately 6 m above Black Creek Drive. Due to alignment constraint imposed by the location of the West Launch Shaft, Black Creek Drive may have to be slightly depressed by up to 1 m. The horizontal alignment is constrained by the foundations for the existing rail bridges over Eglinton Avenue and Kodak Building #9 and adjacent private properties. Shifting the alignment further north of Eglinton Avenue to create retail frontage, results in additional property acquisition, extensive construction under Kodak Building #9, impact to the sports field east of Black Creek Drive and substandard vertical track profile for the yard connection tracks.

The Mount Dennis LRT Station would be in close proximity to the potential future Mount Dennis GO Rail Station, allowing a convenient passenger interchange with the GO Station and with a contemplated bus terminal. Jane Station would be the terminal station and would include significant lengths of cut and cover structures associated with the tail tracks and crossover. It was therefore placed at a shallow depth to reduce costs and to provide a reduced vertical circulation distance for the station users. The previously proposed Black Creek Drive LRT stop would be eliminated.

#### 2.1.4 Evaluation

An initial screening was undertaken for the options, applying the following pass/fail criteria:

- Criterion 1: The option must have some clear advantages over the Base Case;
- Criterion 2: The option must use the West Launch Shaft (at least its footprint), although the shaft may need to be modified to allow the option to be implemented;
- Criterion 3: The option must be constructible at reasonable cost and with reasonable risk;

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- Criterion 4: The option must not impact Eglinton Avenue road traffic capacity on a permanent basis beyond the 4 lane cross section already approved;
- Criterion 5: The option must allow for technically acceptable alignment (curves and grades) for the running line, the stations and the connection to the Black Creek MSF as well as a connection to both mainline directions without “switch back”;
- Criterion 6: The option must be suitable for phased implementation, with the first phase to Weston and the second to Jane; and
- Criterion 7: The option must minimise impacts on property outside of Eglinton Avenue right-of-way, particularly to the East and South of the Black Creek MSF site.

Options that did not meet the above-noted criteria to an acceptable level were screened from further analysis. The preliminary screening resulted in the following six short-listed alternatives:

- Option 1
- Option 6
- Option 9
- Option 9A
- Option 10
- Option 11

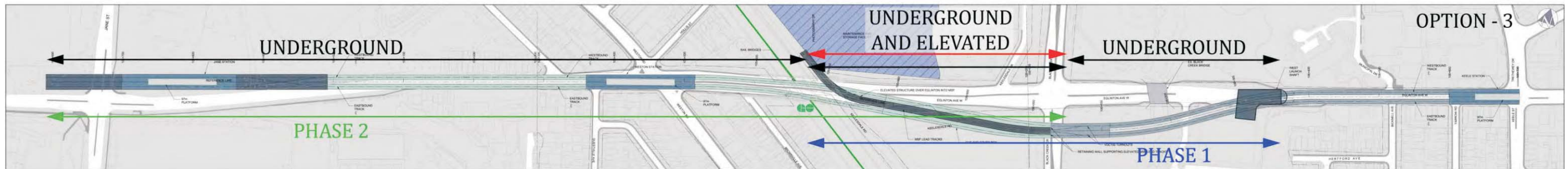
The following table summarizes the comparative evaluation of the six shortlisted options. All six options provide the full required functionality of the LRT, however, not to the same quality. In general, where quantifiable the evaluation ratings are presented in the table as:

- Excellent (Dark Green) – where an Option surpasses the minimum requirements by a notable margin.
- Good (Lime) – where an Option satisfies the minimum requirement.
- Poor (Coral) – where the solution is marginal and/or requires a design standards variation.

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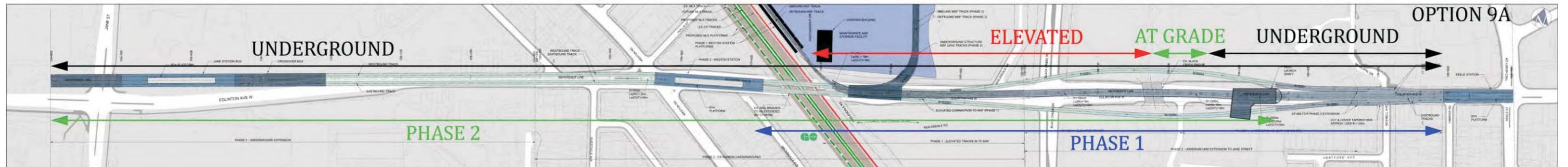
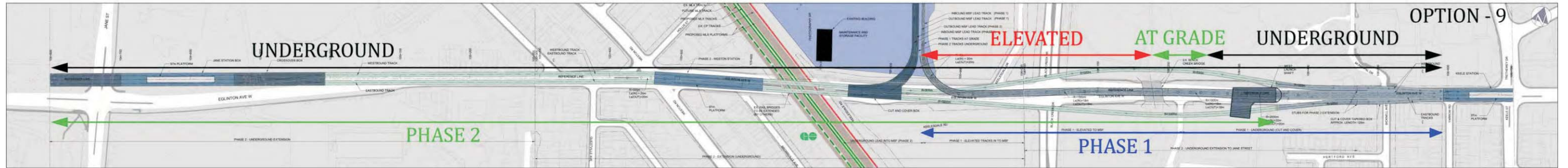
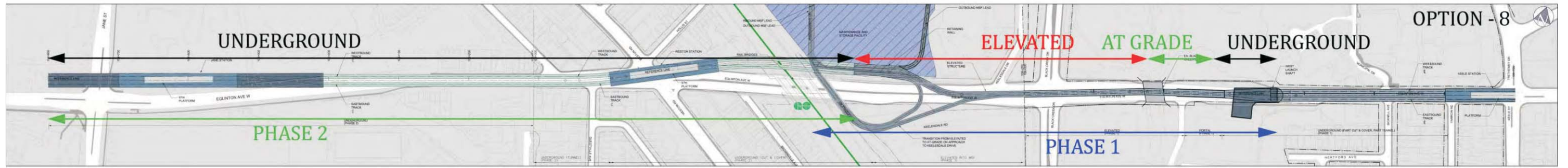












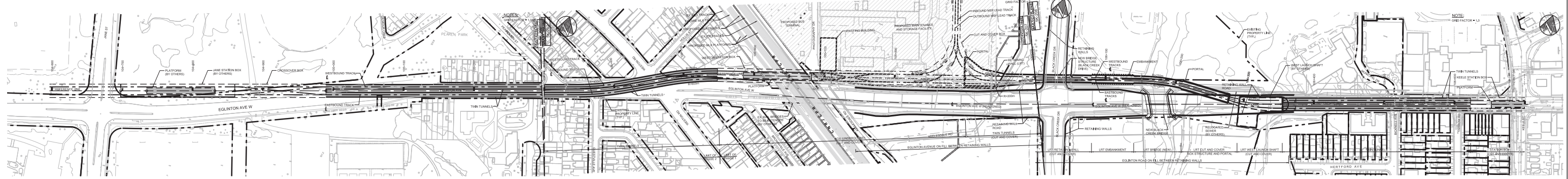


UNDERGROUND

AT GRADE

UNDERGROUND

OPTION 10



PHASE 2

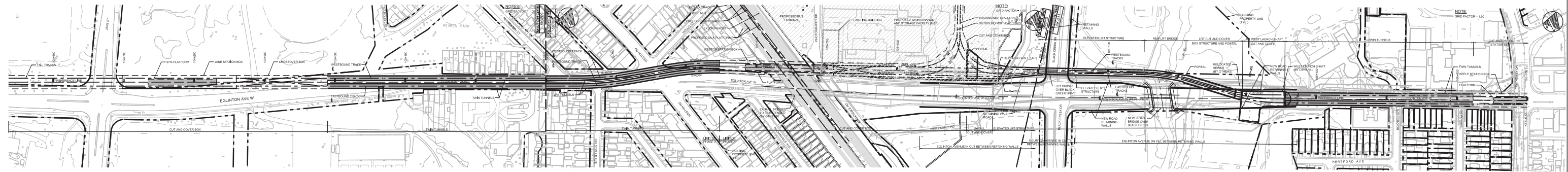
PHASE 1

UNDERGROUND

ELEVATED

UNDERGROUND

OPTION 11



PHASE 2

PHASE 1

EGLINTON-SCARBOROUGH  
**CROSTOWN**

**MRC** McCORMICK RANKIN  
A member of **MMM GROUP**

LEGEND:

DATE:

DECEMBER 2012

SCALE:

NOT TO SCALE

EGLINTON CROSTOWN LRT  
ENVIRONMENTAL PROJECT REPORT ADDENDUM

LRT – WEST SECTION ALIGNMENT OPTIONS 10-11

FIGURE

2-4



**Table 2-1: Summary of Comparative Assessment of LRT – West Section Alignment Options**

Description	Option 1	Option 6	Option 9	Option 9A	Option 10	Option 11
	All underground	All elevated	Staged hybrid	Staged hybrid with temporary Weston station	Below Black Creek Drive	Staged hybrid
Alignment geometry of the mainline and stations	Good	Good	Good	Good	Good	Good
Anticipated environmental impacts	Mitigatable	Mitigatable	Mitigatable	Mitigatable	Mitigatable	Mitigatable
Speed restrictions on main line	None	None	None	None	None	None
Geometry of MSF vertical connection	Poor – greatest elevation change	Good	Excellent (Phase 1) TBD (Ultimate)	Excellent (Phase 1) TBD (Ultimate)	Fair	Good
Geometry of MSF horizontal connection	Good	Good	Excellent (Phase 1) TBD (Ultimate)	Excellent (Phase 1) TBD (Ultimate)	Good	Good
Station depth (shallower is better)	Good	Excellent	N/A (temporary) Good (Ultimate)	Excellent (Phase 1) Good (Ultimate)	Excellent	Excellent
Property impact	Minimal	Minimal	Moderate	Moderate	Moderate	Moderate
Anticipated community impact	Minimal	Poor	Medium (Phase 1) Minimal (Ultimate)	Medium (Phase 1) Minimal (Ultimate)	Medium	Medium
Potential for connection to future rail services	Good	Excellent	None (Phase 1)	Excellent (Phase 1) Good (Ultimate)	Excellent	Excellent
Construction duration	Good	Poor	Excellent (Phase 1) TBD (Ultimate)	Excellent (Phase 1) TBD (Ultimate)	Excellent	Excellent
Maintenance requirements	Excellent	Poor	Poor (Phase 1) Excellent (Ultimate)	Poor (Phase 1) Excellent (Ultimate)	Medium	Medium
Cost for MSF connection (Phase 1)	Highest	Lowest	Intermediate	Intermediate	Intermediate	Intermediate
Cost for ultimate configuration	High	Lowest	Highest	Highest	Moderate	Moderate

### 2.1.5 Recommendation

Option 1 has the smallest (in-service) community impact, good durability, since it is fully underground and not exposed to elements, but has the highest cost with a steep grade to the Black Creek MSF. Conversely, Option 6 has a low cost and a good connection to MSF but it potentially has a very high community impact and will be exposed to elements and de-icing chemicals from the surrounding road traffic potentially affecting its lifespan. Option 9A has the highest total cost. However, if Phase 2, MSF to Jane, is deferred by more than 35 years, this option is cheaper than phased-in Option 1 based on a net present value assessment.

Options 10 and 11 both perform better than the other options and are similar in most aspects, with the variation mostly in the way the vertical profile of the LRT line crosses either under or over Black Creek Drive. Option 11 creates less disruption to the area and has a lower cost. Historically, there has been great community resistance to elevated transportation systems in urban built-up areas. In many instances conversions of existing elevated transit or transportation structures have been considered (Gardiner Expressway, Scarborough RT) and even executed (Central Artery/Tunnel Project in Boston).

On balance of the range of impacts under the alternatives, Option 11 is preferred and offers the best combination of cost, functionality, schedule and impacts, of all the options considered. Option 11 does not require the significant grade raise for Eglinton Avenue and Black Creek Drive and associated property requirements to support the 6 metre increase in grade.

Given that the recommended alignment is significantly different from that approved under the 2010 EPR, the change would trigger the need to reassess the potential impacts and mitigation measures associated with the plan under an Addendum to the previously-approved EPR. **Figure 2-5** illustrates the previously-approved and current proposed alignments for the ECLRT through this section.