Hamilton

The following outlines the complete list of documents associated with **Appendix A to Report PED17056.**

1. **Hamilton Light Rail Transit (LRT) 2017 Environmental Project Report (EPR) Addendum**

2. **Appendix A: City of Hamilton 2011 B-Line Light Rail Transit (LRT) Environmental Project Report (EPR)**

3. **Appendix B: Design Plates and Cross-sections**

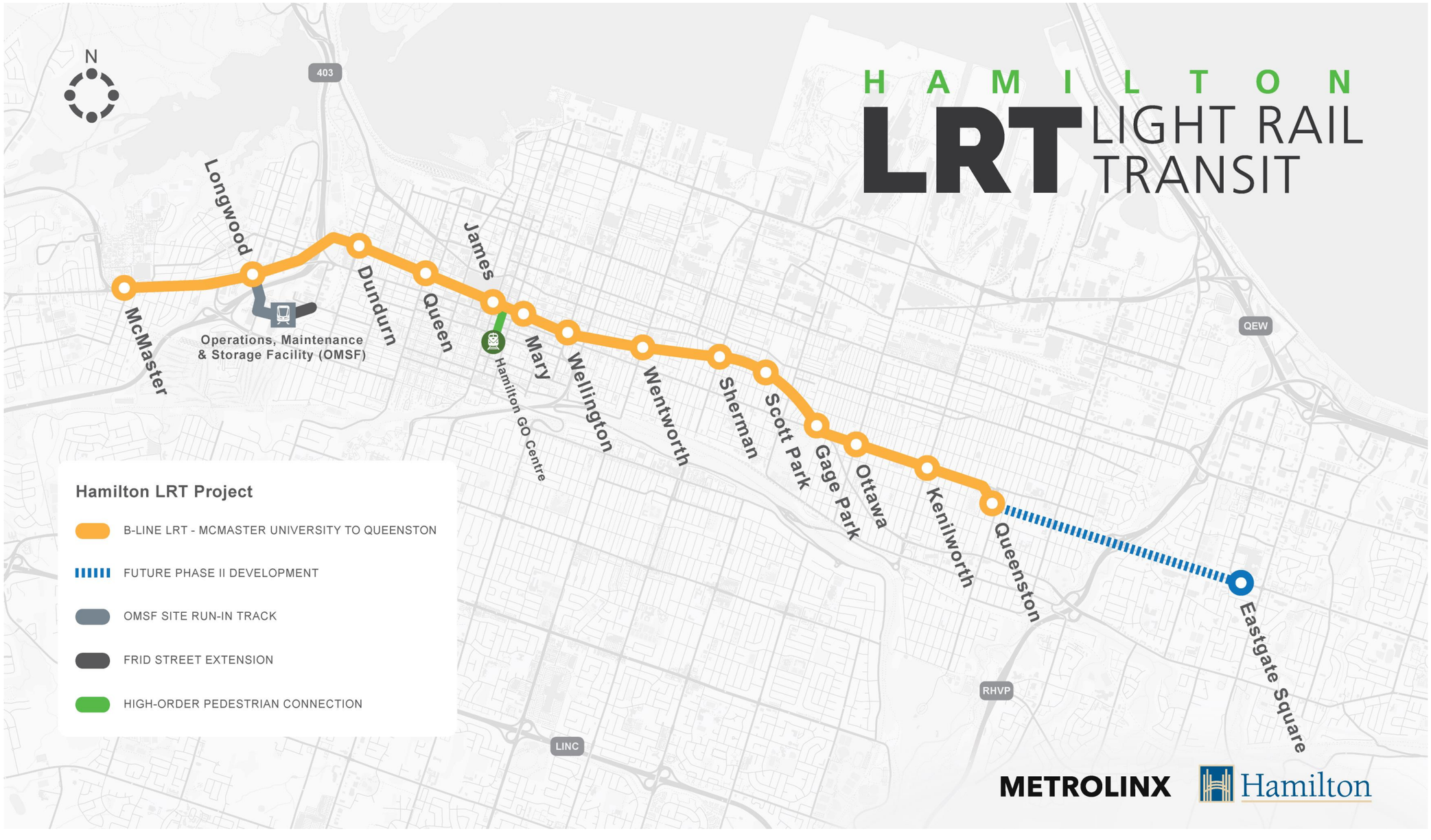
4. **Appendix C: Technical Supporting Documents**
   - Appendix C-1: Hydrogeology Report
   - Appendix C-2: Contamination Overview Study
   - Appendix C-3: Ecology Report
   - Appendix C-4: Arborist Memo, Endangered Species
   - Appendix C-5: Supplemental Tree Inventory
   - Appendix C-6: Air Quality Existing Conditions Report and Air Quality Study
   - Appendix C-7: Stormwater Management Report
   - Appendix C-8: Review of B-Line Geotechnical Report
   - Appendix C-9: Noise and Vibration Study
   - Appendix C-10: Stage 1 Archaeology Assessment Report
   - Appendix C-11 Volume 1: Cultural Heritage Screening Report
   - Appendix C-11 Volume 2: Gap Analysis
   - Appendix C-11 Volume 3, Part 1 of 4: Cultural Heritage Evaluation Reports
   - Appendix C-11 Volume 3, Part 2 of 4: Cultural Heritage Evaluation Reports
   - Appendix C-11 Volume 3, Part 3 of 4: Cultural Heritage Evaluation Reports
   - Appendix C-11 Volume 3, Part 4 of 4: Cultural Heritage Evaluation Reports

5. **Appendix D: Consultation Report**
   - Appendix D-1: Hamilton LRT PIC #1 Consultation Appendix
   - Appendix D-2: Hamilton LRT PIC #2 Consultation Appendix
   - Appendix D-3: Aboriginal Consultation Record
   - Appendix D-4: Record of Circulation of Draft EPR, Comments, and Responses
   - Appendix D-5: Public Consultation Record

6. **Appendix E: Ridership Modelling and Traffic**
   - Appendix E-1: EMME Ridership Forecasting Report
   - Appendix E-2: Wider Area Impacts Report
   - Appendix E-3: VISSIM Modelling Report

7. **Appendix F: High-Order Pedestrian Connection**

HAMILTON LIGHT RAIL TRANSIT (LRT) ENVIRONMENTAL PROJECT REPORT (EPR) ADDENDUM



METROLINX HAMILTON LRT LIGHT RAIL TRANSIT Hamilton

ENVIRONMENTAL PROJECT REPORT ADDENDUM

Table of Contents

METROLINX
HAMILTON LRT LIGHT RAIL TRANSIT
Hamilton

METROLINX
HAMILTON LRT LIGHT RAIL TRANSIT
Hamilton

List of Figures

List of Tables

METROLINX
HAMILTON LRT LIGHT RAIL TRANSIT
Hamilton

List of Appendices

GLOSSARY

Following are definitions of the common terms and acronyms referred to when discussing the Hamilton Light Rail Transit (LRT) Environmental Project Report (EPR) Addendum:

AAQC	Ambient Air Quality Criteria
AFP	Alternative Financing and Procurement
ANSI	Area of Natural and Scientific Interest
BHR	Built Heritage Resource
B-Line	Proposed east/west rapid transit corridor along King Street (from McMaster University to Queenston Traffic Circle) in the City of Hamilton.
BLAST	Planned Higher Order Rapid Transit Network comprising five (5) new lines -. B-Line and is one of the lines in the network
BP	Before Present
BRT	Bus Rapid Transit
CEAA	*Canadian Environmental Assessment Act*
CHER	Cultural Heritage Evaluation Report
CHL	Cultural Heritage Landscape
CHR	Cultural Heritage Resources
Class EA	Municipal Engineers Association Class Environmental Assessment A planning process that must be applied to all municipal infrastructure projects. It is an evaluation of all environmental implications of a project and involves extensive public consultation to identify and mitigate any adverse impacts.
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CP Rail	Canadian Pacific Railway
CTA	Canada Transportation Act/Canadian Transportation Agency
CWR	Continuous welded rail
dBA	A-weighted decibels
EA	Environmental Assessment An Environmental Assessment (EA) is a process used in Ontario to determine the possible impacts that proposed infrastructure projects may have on the environment so that the best possible decisions can be made on if, where, when and how to construct such projects.
ECA	Environmental Compliance Approval
EMME	Software used for design for modelling multi-modal networks with all modes integrated, particularly used in public transport modelling.
EPR	Environmental Project Report The Hamilton LRT 2011 EPR is referred to as the Project.
ESDM	Emission Summary and Dispersion Modelling
GHG emissions	Green House Gas emissions
GRIDS	Growth Related Integrated Development Strategy GRIDS was an integrated planning process that identified a broad land use structure, associated infrastructure, economic development strategy and financial implications for the growth for the City of Hamilton over the next 30 years. It is based on the development of nodes (central foci of community activity) and corridors (mixed use, transit friendly linkages) throughout the city that will be interconnected as a result of their high transit potential.
GTHA	Greater Toronto and Hamilton Area The metropolitan region encompassing the City of Toronto, the four surrounding Regional Municipalities (Durham, Halton, Peel and York) and the City of Hamilton.
HADD	Harmful alteration, disruption or destruction of fish habitat, as defined in the federal *Fisheries Act*
HAMN	Hamilton Air Monitoring Network
HCA	Hamilton Conservation Authority
Headway	The scheduled time between successive transit vehicles on a given route.
HIA	Heritage Impact Assessment
High Order Transit	Bus or light/heavy rail that operates in its own right-of-way or in a priority situation, and, therefore, moves more efficiently than the regular flow of traffic and can carry large numbers of people quickly and comfortably.
HSR	Hamilton Street Railway (transit)
INAC	Indigenous and Northern Affairs Canada

METROLINX HAMILTON LRT LIGHT RAIL TRANSIT Hamilton

Intensification Corridors	Intensification areas along major roads, arterials or higher-order transit corridors that have the potential to provide a focus for higher density mixed-use development consistent with planned transit service levels. [Source: Ministry of Energy and Infrastructure, Growth Plan for the Greater Golden Horseshoe, 2006.]
IPS	Intersection Pedestrian Signal. A pedestrian crossing signal placed at an intersection solely to permit pedestrians to cross the major street. Side streets are typically stop-controlled.
ITSOP	Integrated Systems Operations Plan
IO	Infrastructure Ontario
LRT	Light Rail Transit
LRV	Light Rail Vehicle
Major Transit Station Areas	The area including and around any existing or planned higher-order transit station within a settlement area, or the area including and around a major bus depot in an urban core. Station areas generally are defined as the area within an approximate 500m radius of a transit station, representing about a 10-minute walk. [Source: Ministry of Energy and Infrastructure, Growth Plan for the Greater Golden Horseshoe, 2006.]
MBCA	*Migratory Birds Convention Act*
MEI	Ministry of Energy and Infrastructure
Metrolinx	The public authority that manages transportation planning, including public transport, within the Greater Toronto Area and Hamilton in the province of Ontario. Metrolinx is legally known as the Greater Toronto Transportation Authority (GTTA).
MNR	Ontario Ministry of Natural Resources
MOECC	Ontario Ministry of the Environment and Climate Change
MoveOntario 2020	A Provincial program to invest in 52 rapid transit projects across the GTHA, including two projects in Hamilton (A- Line BRT and B-Line LRT). The vision of the program is to improve the quality of life in the GTHA, by investing $17.5 billion in projects that will move people efficiently around the region. The goal is to create 800 million new transit trips per year, taking 300 million car trips off the GTHA roads.
MTCS	Ontario Ministry of Tourism, Culture and Sport
MTO	Ministry of Transportation of Ontario
NAPS	National Air Pollutant Surveillance Network
Natural Area	A geographical area having a physical and cultural individuality developed.
OMSF	Operations, Maintenance and Storage Facility
O. Reg.	Ontario Regulation
OCS	Overhead Contact System – wire and cable system to provide electrical power to LRVs.
Particulate Matter	Particulate matter is the general term used for a mixture of solid particles and liquid droplets found in the air[5].
PIC	Public Information Centre
POR	Point of Reception (- in the context of noise sensitive areas and receptors.)
PTTW	Permit to Take Water
Rapid Transit	Transit service separated partially or completely from general vehicular traffic and, therefore, able to maintain higher levels of speed, reliability and vehicle productivity than can be achieved by transit vehicles operating in mixed traffic.
ROW	Right-of-way
RTFS	Rapid Transit Feasibility Study The primary purpose of the Rapid Transit Feasibility Study was to provide City of Hamilton Council, staff and the public with an initial view of the opportunities that rapid transit can represent, and the constraints that need to be addressed in making the decision to pursue rapid transit.
SAR	Species at Risk
Streetscaping	Streetscaping refers to design of urban roadways and conditions as they affect the people that use them. Streetscapes are an important part of the public spaces where people safely interact, which help define a community's transport conditions, activities, aesthetic quality and identity. Streetscaping (programs to improve streetscape conditions) can include traffic management, sidewalk conditions, landscaping, street furniture (utility poles, benches, refuse disposal cans, etc.), building fronts and materials specifications.
Study area	This Environmental Project Report Addendum includes the following within its study area: ▪ LRT B-Line (McMaster University to Queenston Traffic Circle); ▪ High-Order Pedestrian Connection (King Street to Hamilton GO Centre); and ▪ Operations, Maintenance and Storage Facility (OMSF).
TDM	Transportation Demand Management TDM encompasses alternatives to the single occupancy vehicle (i.e., transit, walking, biking, car pooling) and the measures or techniques that encourage the use of these alternate modes in order to maximize the people moving capability of the overall transportation system.

TMP or HTMP	Transportation Master Plan (Hamilton Transportation Master Plan) The TMP was endorsed by Public Works Committee and Council in February 2007. The preferred strategy is to rely on transit, transportation demand management (TDM), in combination with road capacity optimization. It included a high-order transit strategy and outlined three potential rapid transit corridors: ▪ King/Main between Eastgate Square and McMaster University; ▪ James/Upper James between Downtown and Rymal Road; and ▪ An East-West route across the Mountain.
TOD	Transit Oriented Development TOD is a form of development that represents an alternative to urban sprawl. Major characteristics include: a sufficient density to encourage public transit use; location of residences, jobs, and retail destinations close to public transit; mixed uses, with retail and employment within walking distance of residential areas; and urban design guidelines and design features to encourage a safe pedestrian orientation.
TPAP	Transit Project Assessment Process – Part of *Ontario Regulation 231/08 (O. Reg. 231/08),* the TPAP provides a streamlined environmental review process for transit projects.
TPSS	Traction Power Substation
Twin track	Two parallel tracks allowing LRVs to operate in both directions simultaneously.
VISSIM	A micro simulation and modeling software package for modeling complex interactions between different transport modes. Can be used at a network or intersection level.
VISUM	A modeling software package for assessing network and intersection traffic impacts. Used to determine the overall traffic impacts of the LRT network changes at the intersection level.

INTRODUCTION

Table of Contents

List of Figures

1. INTRODUCTION

On December 22, 2011, the Ontario Ministry of the Environment and Climate Change (MOECC) issued a Notice to Proceed to the City of Hamilton for the B-Line Rapid Transit Project (The Project).

The basis for the Notice was the Environmental Project Report (EPR) prepared in October 2011, under the Transit Project Assessment Process (TPAP) found in *Ontario Regulation 231/08*. The purpose of the 2011 EPR was to assess the 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. Subsequently, a Statement of Completion was issued by the City of Hamilton, which signified the completion of the TPAP.

1.1. Purpose

On May 26, 2015, the Ontario Government announced $1billion in funding for an amended LRT project. The amended project would run from McMaster University to Queenston (B-Line), with an additional connection from Downtown to the West Harbour GO Station and the Waterfront (A-Line), as well as a High-Order Pedestrian Connection from the B-Line to the Hamilton GO Centre. The purpose of this Environmental Project Report Addendum document is to identify and assess changes to the original scope of work.

In addition to the B-Line, the Hamilton LRT 2011 EPR identified the need for an Operations, Maintenance, and Storage Facility (OMSF) for the LRT, but no suitable site for this had been identified by the time the EPR was submitted. The 2011 EPR noted that further work was needed to identify the OMSF site and its connecting tracks to the B-Line, and that an EPR Addendum would need to be progressed in due course to address this issue. As part of this work, the TPAP-approved route has been reviewed and updated.

These changes to The Project were determined to be inconsistent with the Hamilton LRT 2011 EPR. As described in *Section 15 (1) of Ontario Regulation 231/08,* any change that is inconsistent with a previously approved EPR requires a reassessment of the impacts associated with the project, the identification of potentially new mitigation measures, and potentially new monitoring systems in an Addendum to the previously approved EPR.

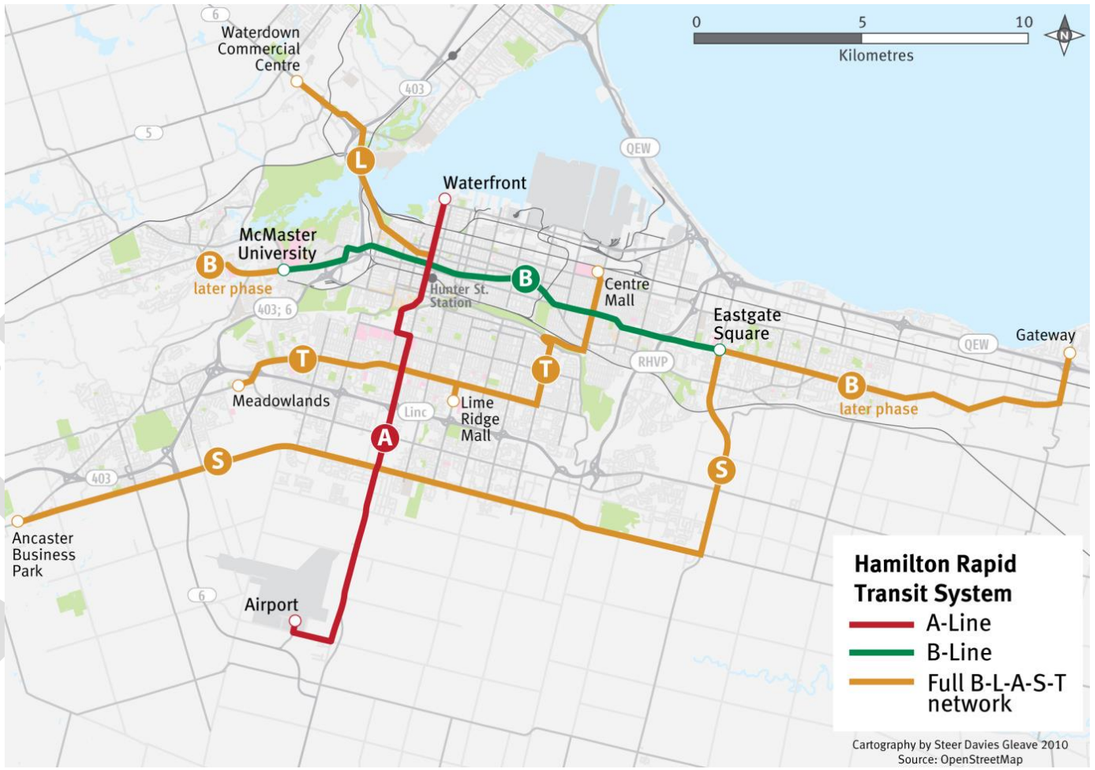
1.2. Hamilton LRT 2011 EPR

The Hamilton LRT 2011 EPR identified a Study Area that consisted of the alignment and related road layout changes for The Project (see Figure 1-1). These changes were identified along the B-Line corridor, from McMaster University to Eastgate Square via Downtown Hamilton, and running along Main Street West, King Street West, King Street East, Main Street East and Queenston Road.

A consultant team led by Steer Davies Gleave was appointed by the City of Hamilton to undertake the preliminary design and Environmental Assessment of the B-Line. The multi-disciplinary team included a range of specialists to provide the appropriate technical input for successful completion of the Transit Project Assessment Process and move forward to the design phase of project implementation:

- **Steer Davies Gleave:** Project management, transit and transportation planning, financial assessment, and stakeholder consultation;
- **SNC-Lavalin Inc.:** Transit system engineering, environmental assessment process, natural environment (fisheries/vegetation), and property contamination;
- **DIALOG:** Urban planning and public realm;
- **Thurber Engineering Limited:** Geotechnical and foundations;
- **J.E. Coulter Associates Limited:** Noise and vibration;
- **RWDI Air Inc.:** Air quality;
- **Archaeological Services Inc.:** Built heritage resources, cultural heritage landscapes, and archaeology; and
- **Natural Resource Solutions Inc.:** Natural environment (i.e. wildlife, species at risk).

Figure 1-1: Hamilton BLAST Network, Hamilton LRT 2011 EPR



In accordance with *Section 15 of Ontario Regulation 231/08*, Metrolinx and the City of Hamilton have assessed the significance of the changes to the Hamilton LRT project that are inconsistent with the approved 2011 EPR. The changes to the project are considered significant for the following reasons:

- The environmental effects of the OMSF were not addressed in the Hamilton LRT 2011 EPR;
- The environmental effects of the High-Order Pedestrian Connection to the Hamilton GO Centre were not addressed in the Hamilton LRT 2011 EPR;
- The environmental effects of design modification to the B-Line alignment, including new bus terminals at McMaster and Queenston, were not addressed in the Hamilton LRT 2011 EPR; and
- The environmental effects of improvements to Longwood Road and Frid Street, between Main Street West and the OMSF site, as well as the extension of Frid Street to complete the east-west connection and proved run-in access for the OMSF, were not addressed in the Hamilton LRT 2011 EPR.

1.3. February 2, 2017 Provincial Announcement

On February 2, 2017, the Province of Ontario announced that Ontario is moving forward with planning for a proposed 16km Bus Rapid Transit (BRT) line that would connect the Hamilton Waterfront to the Hamilton International Airport.

The 16km BRT will replace the previously-proposed 2km A-Line LRT spur, based on analysis and feedback received through public consultations. A separate Environmental Assessment process will be conducted for the A-Line BRT project.

Many of the technical reports prepared for this EPR Addendum, and attached in the Appendices, were completed and finalized prior to the February 2 announcement. The presentation in this main EPR Addendum report has been updated to reflect the removal of the A-Line LRT from The Project, but the technical reports that were completed prior to February 2, 2017, have not been updated, and still make reference to the A-Line LRT.

1.4. Hamilton LRT 2017 EPR Addendum

This Addendum focuses only on changes to the approved Hamilton LRT 2011 EPR. The following is a summary of the elements of the assessment that were updated or added from those components recommended in the Hamilton LRT 2011 EPR:

- Address design modifications to the Hamilton LRT 2011 EPR (the B-Line) alignment, which include moving some sections of the LRT route from side-running at the edge of the roadway to centre-running in the middle of the roadway, generally between Dundurn Street and Queenston, and moving one section from centre-running in the middle of the roadway to side-running at the edge of the roadway, generally between Dalewood Avenue and Cootes Drive;
- The addition of new bus terminals at the western terminus (McMaster University) and eastern terminus (Queenston), and the inclusion of a High-Order Pedestrian Connection from King Street B-Line to Hamilton GO Centre;
- Complete the assessment of an OMSF where Light Rail Vehicles (LRVs) would be maintained and stored, along with its run-in track in mixed traffic on Frid Street and Longwood Road to Main Street West, across the Longwood Road bridge; and
- Assess the completion of the Frid Street extension, connecting the existing east and west portions of Frid Street through the OMSF property.

1.4.1. Study Area

The Addendum Study Area includes six key areas where physical changes are proposed. The study area description for each element are as follows:

LRT: B-Line: (McMaster University to Queenston (Map Key references refer to Figure 1-2)

The B-Line commences at McMaster University, with a new combined LRT and bus terminal (serving local HSR and regional GO Transit), to be constructed in the northeast corner of the intersection of Main Street West at Cootes Drive.

The B-Line route follows the north side of Main Street West to Dalewood Avenue, (Map Key 1) where it transitions to the centre of the two-way roadway, then continues in the centre of the two-way section of Main Street West to Paradise Road (Map Key 2), from which it continues on the north side of the one-way eastbound section of Main Street West to Highway 403 (Map Key 3).

The LRT route then crosses Highway 403 (The Chedoke Expressway) via a new LRT-only bridge (Map Key 4), and follows the south side of King Street West over the CP rail line to Dundurn Street (Map Key 5). From Dundurn Street to the Delta, the existing one-way westbound King Street West/East is, apart from a few short lengths, converted to two-way running with LRT in the centre of the street.

From Dundurn Street, the B-Line LRT route continues in the centre of King Street West to James Street (Map Key 6).

The route continues along King Street East through Downtown and International Village, generally with a single eastbound traffic lane on the south side of the route only (Map Key 7).

From Wellington Street, the route continues in the centre of King Street East to the Delta (Map Key 8). An underpass is provided to allow the LRT to cross beneath the CP freight line, crossing at East Bend Avenue (Map Key 9). Road traffic will continue to cross at grade as at present, to maintain access to adjacent properties.

From the Delta to Queenston, the B-Line runs in the centre of Main Street East, with one vehicle lane in each direction (Map Key 10). A new off-street LRT and bus terminal is provided at Queenston on the properties at 1620 Main Street East and 75 Queenston Road (Map Key 11). The proposed layout allows for the LRT to be extended in future to Eastgate Square.

A total of fourteen LRT stops are provided on the B-Line alignment at: McMaster University, Longwood Road, Dundurn Street, Queen Street, James Street, Mary Street, Wellington Street, Wentworth Street, Sherman Avenue, Scott Park, Gage Park, Ottawa Street, Kenilworth Avenue, and Queenston.

New Transit Terminals

Within the B-Line corridor, two new terminus bus facilities are proposed at

- Mc Master University, in the north-east quadrant of the intersection of Main Street West with Cootes Drive
- Queenston, east of the existing Queenston Traffic Circle

CP Grade Separation

Within the B-Line corridor, a grade separation of the LRT at the CP Rail spur line, on King Street East, east of Gage street is proposed. Traffic lanes are proposed to remain at grade.

Operations, Maintenance and Storage Facility (OMSF)

The OMSF site is located in the vicinity of Chatham and Frid Street, east of Longwood Road South, and shared running track will extend from the intersection of Longwood and Main Street, across Longwood Bridge over Highway 403, and via Frid Street to the north end of the site.

As part of the development of the OMSF site, Frid Street will be extended to connect the existing western portion from Longwood Road to the existing eastern portion to Main Street West. The previously approved Environmental Assessment report included an alignment that is being modified as part of this Addendum.

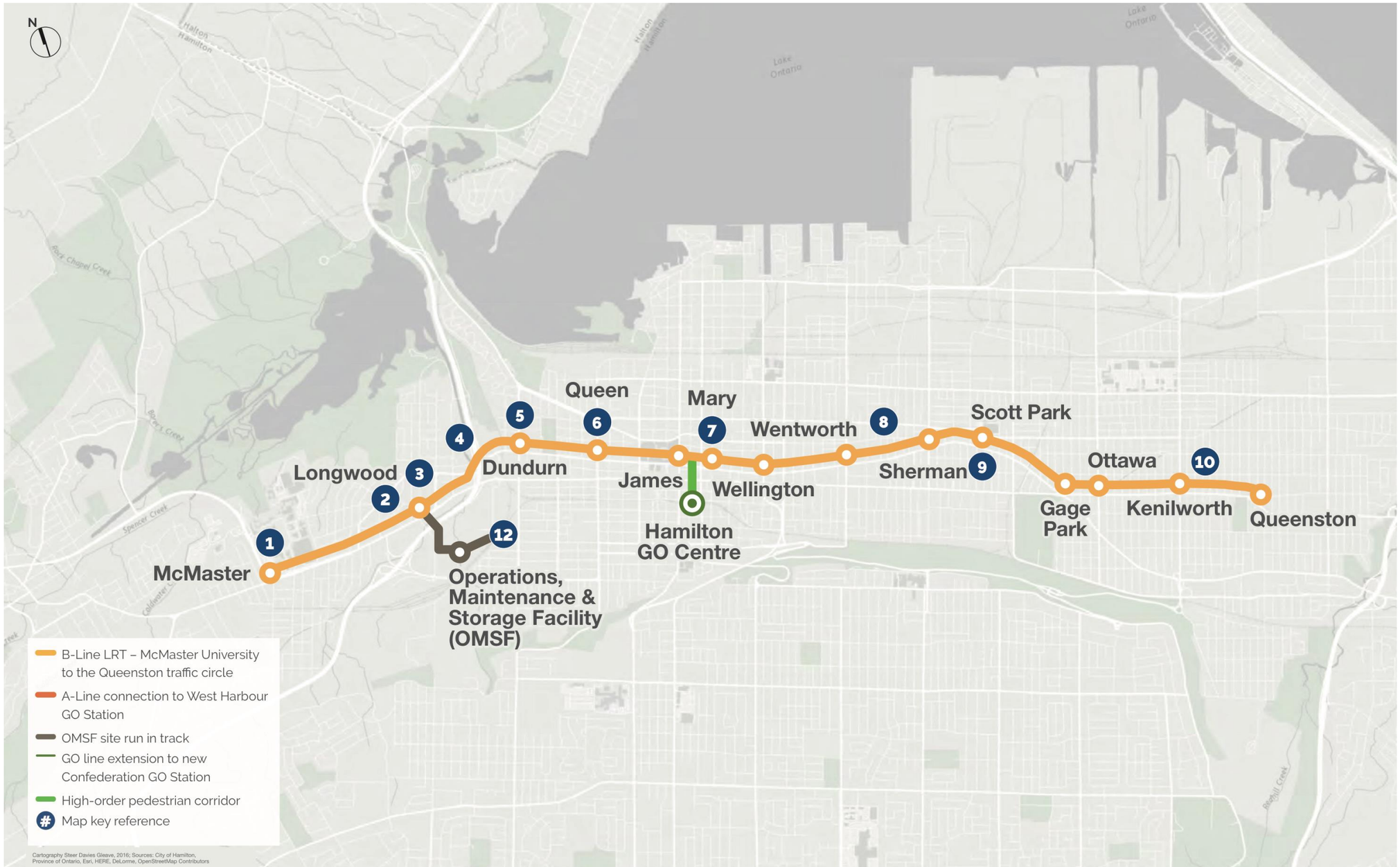
Frid Street Extension

As part of the development of the OMSF site, the planned alignment of the Frid Street extension from Longwood Road to Chatham Street is proposed to be altered to make a more contiguous development site for the OMSF (Map key 12).

High-Order Pedestrian Connection

An enhanced pedestrian connection will be developed connecting the Hamilton GO Centre, on Hunter Street East, to the B-Line at James Street, via Hughson Street.

Figure 1-2: Study Area of the Hamilton LRT 2017 Project Update



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1.4.2. Studies Prepared in Support of the Hamilton LRT EPR Addendum

The following is a list of studies that were conducted separately prior to work commencing on the Addendum report:

- Frid Street Alignment and Extension between Main Street and Longwood Road (Schedule C ESR).

The following is a list of studies that were prepared to support the Addendum report:

- Hydrogeology Report (Appendix C-1);
- Contamination Overview Study (Appendix C-2);
- Ecology Report (Appendix C-3);
- Arborist Memo, RE: Endangered Species (Appendix C-4);
- Supplemental Tree Inventory (Appendix C-5);
- Air Quality Existing Conditions Report and Air Quality Study (Appendix C-6);
- Stormwater Management Report (Appendix C-7);
- Review of B-Line Geotechnical Report (Appendix C-8);
- Noise and Vibration Study (Appendix C-9);
- Stage 1 Archaeology Assessment (Appendix C-10);
- Cultural Heritage Screening Report (Appendix C-11);
- EMME Ridership Forecasting Report (Appendix E-1);
- Wider Area Impacts Report (Appendix E-2);
- VISSIM Modelling Report (Appendix E-3); and
- High-Order Pedestrian Connection design (Appendix F).

1.4.3. EPR Addendum Process

The Hamilton LRT 2017 EPR Addendum is being conducted following *Ontario Regulation 231/08*, the Transit Project Assessment Process.

The stipulated public and agency review steps, and timelines for finalizing the Addendum to an EPR, are similar to the TPAP. The proponent does have greater discretion regarding the scope of public consultation, and the City of Hamilton and Metrolinx assumed an extensive consultation program to engage stakeholders. This process is outlined in Section 1.6.

The following outline and Figure 1-3 describe key steps in the EPR Addendum process under TPAP:

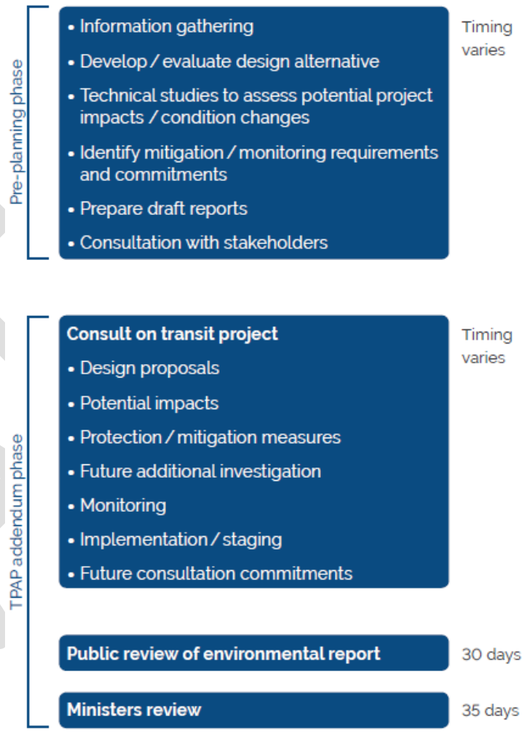
- Prepare an assessment of the impacts the proposed change may have on the environment;
- Prepare and distribute an Addendum report;
- Prepare and distribute a Notice of Environmental Project Report Addendum; and
- Conduct a final review by the public and stakeholders prior to proceeding with the proposed Addendum.

Contents of the EPR Addendum Relative to Section 15 of Ontario Regulation 231/08

Consistent with *Ontario Regulation 231/08, Section 15 (1)*, for all changes to the project that are inconsistent with the EPR, the Addendum to the EPR includes the following information:

- A description of the changes (Section 2);
- Reasons for the changes (Section 2);
- An assessment and evaluation of any impacts that the change may have on the environment (Sections 3 and 4);
- A description of proposed mitigation measures for any negative impacts that the change to the project may have on the environment (Section 4); and
- A statement of whether the proponent (City of Hamilton and Metrolinx) is of the opinion that the change to the transit project is a significant change, and the reasons for the opinion (Section 2).

Figure 1-3: EPR Addendum Process under TPAP



1.4.4. EPR Addendum Approval Process

Subsequent to completion of the 2017 EPR Addendum, and filing a Notice of Environmental Project Report Addendum, the EPR Addendum document is made available to: the public, regulatory agencies, MPs & MPPs, aboriginal communities and other interested persons for review. The public review period will be for 30 days, in accordance with *Ontario Regulation 231/08 (Ont. Reg. 231/08)*.

During the 30-day public review period, should objections be received, the Minister of the Environment and Climate Change has 35 days to consider any objections regarding negative impacts of the transit project; during which time the Ministry would provide notice to the project proponents. A notice from the Minister will state either that "the project can proceed", "the project can proceed subject to conditions", or "the proponent must conduct additional work prior to proceeding".

1.5. Other Relevant Planning Policies, Studies and Documents

A comprehensive summary of the Project Policy Framework is found within the Hamilton LRT 2011 EPR document, located in Appendix A.

1.5.1. Province of Ontario Planning Policies

The Province of Ontario began addressing rapid growth throughout the Greater Golden Horseshoe Area by enacting the *Places to Grow Act,* in 2005 and the *Greenbelt Act*, also in 2005. These land planning reforms established a framework to direct urban growth into designated areas, while preserving natural and agricultural landscapes. The desired outcome is an increase in development density in areas which are designated for growth. This creates a change in growth from lower density sprawl to higher levels of urban density, and notably places a greater strain on existing urban infrastructure currently operating at capacity.

To attenuate the implementation of an adequate response to the regions' infrastructure needs, the Province passed legislation through the enactment of the *Metrolinx Act*, in 2006. This Act created Metrolinx, as a regional planning and funding agency for all modes of transportation identified in the region's long-term Transportation Plan, including a capital investment program, and responsibility for implementation, ownership, and operation of transportation projects identified in the Plan.

Infrastructure Ontario (IO) and the Ministry of Transportation of Ontario (MTO) have a mandate with essential functions and responsibilities for delivering the provincial urban growth and transportation investment strategies, as well as implementing the Metrolinx program. Notably, IO leverages Alternative Financing and Procurement in the implementation of transportation projects. MTO is responsible for transportation infrastructure at a provincial level, and Metrolinx is a Crown Agency of the Province accountable to the Minister of Transportation. Furthermore, the Ministry of Municipal Affairs Ontario Growth Secretariat is responsible for carrying out the provincial land use and growth planning mandates of the *Places to Grow Act* (2005). Multi-modal transportation systems require numerous agencies to implement the delivery of local transportation networks, and include areas that fall within both provincial and municipal jurisdictions.

The *Metrolinx Regional Transportation Plan* (RTP) entitled "*The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area*" (GTHA) was approved by the Metrolinx Board in 2008 and established a 25-year plan for expanding regional rapid transit across the GTHA. Additional information is available online at: www.metrolinx.com/thebigmove.

1.5.2. City of Hamilton City-wide Planning Studies

Growth Related Integrated Development Strategy (2006)

The Growth Related Integrated Development Strategy (2006) was prepared prior to the Official Plan, and informed the Official Plan's development. This study evaluated a series of growth options for the City, based on nine (9) directions that express the community's vision for future growth, namely:

- Mix of uses within neighbourhoods to provide opportunities to live, work and play;
- New development within existing built-up area;
- Protect rural areas for rural economy;
- Design neighbourhoods to improve access to community life;
- Retain and attract jobs in strength areas and new sectors;
- Encourage travel by foot, bike, and transit; and enhance regional connections;
- Maximize the use of existing buildings, infrastructure, and vacant or abandoned land;
- Protect ecological systems; and
- Maintain and create attractive public and private spaces, and respect the unique character of existing buildings, neighbourhoods and settlements.

Urban Hamilton Official Plan (2013)

The Urban Hamilton Official Plan, Urban Structure, identifies the LRT corridor as a Primary Corridor. A Primary Corridor is intended link the City's nodes with commercial services and higher density land uses with higher order transit service. In addition to the policies for a Primary Corridor, the UHOP also includes policy direction for nodal development, complete streets, active transportation and multi-modal transportation connections in support of an effective transit network.

1.5.3. Secondary Plans and Local Area Studies

A number of Secondary Plans have been completed affect the LRT corridor and the OMSF site. The following secondary plans are in effect along the corridor:

- Downtown Hamilton Secondary Plan (approved 2001; effective date 2004);
- Ainsle Wood/Westdale Secondary Plan (approved 2005);
- West Hamilton Innovation District (WHID) (approved 2007; effective date); and
- Strathcona Secondary Plan (adopted 2013; effective date 2015).

The Downtown Secondary Plan is currently under review. The policies and mapping revisions will align the Downtown Secondary Plan with the UHOP, address emerging trends in uses and built form and recognize the influence higher order transit will have on the corridor.

Zoning

In October 2016, Council approved new zoning for lands along the LRT Corridor. *By-laws 16-264 and 16-265* introduced new Transit Oriented Corridor Zones into *Zoning By-law 05-200*. The By-laws are currently before the Ontario Municipal Board.

1.5.4. Additional Studies

Additional studies that affect the LRT Corridor:

- Kirkendall Neighbourhood Traffic Management Plan;
- McMaster Innovation Park (MIP): Master Planning Study (McMaster); and
- Secondary Plans and Local Area Studies.

A number of local area studies have been completed and polices established that affect the LRT corridor and the OMSF site. These include a variety of Secondary Plans and Local Area Planning Studies:

- Strathcona Secondary Plan;
- Downtown Hamilton Secondary Plan;
- Kirkendall Neighbourhood Traffic Management Plan;
- West Hamilton Innovation District (WHID): Land Use and Servicing Review (City);
- Ainslie Wood / Westdale Secondary Plan (2005);
- Traffic Oriented Corridor Zones study; and
- McMaster Innovation Park (MIP): Master Planning Study (McMaster).

1.5.5. Secondary Plans and Local Area Studies

A number of local area studies have been completed and polices established that affect the LRT corridor and the OMSF site. These include a variety of secondary plans and local area planning studies:

- Strathcona Secondary Plan;
- Downtown Hamilton Secondary Plan;

- Kirkendall Neighbourhood Traffic Management Plan;
- West Hamilton Innovation District (WHID): Land Use and Servicing Review (City);
- Ainslie Wood / Westdale Secondary Plan (2005);
- Traffic Oriented Corridor Zones study;
- McMaster Innovation Park (MIP): Master Planning Study (McMaster);
- West Hamilton Bicycle Network Review (City); and
- McMaster Innovation Park (MIP) and West Hamilton Innovation District Coordination Study: Traffic Impact Study (City).

An Environmental Study Report for Longwood Road Class EA (Schedule C) was then undertaken for the corridor from Aberdeen Avenue to Main Street West.

A Class C Environmental Assessment for the Frid Street extension was completed. The current plans for the OMSF amend the Frid Street alignment, and this is addressed in this EPR Addendum.

- West Hamilton Bicycle Network Review (City); and
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A Class C Environmental Assessment for the Frid Street extension was completed. The current plans for the OMSF amend the Frid Street alignment, and this is addressed in this EPR Addendum.

Additional project related studies are also discussed within the Hamilton LRT 2011 EPR document located in Appendix A.

1.6. Consultation Program Overview

The consultation program was developed for the EPR Addendum, and follows the TPAP consultation requirements for public and stakeholder engagement. Specifically, the following approach was used:

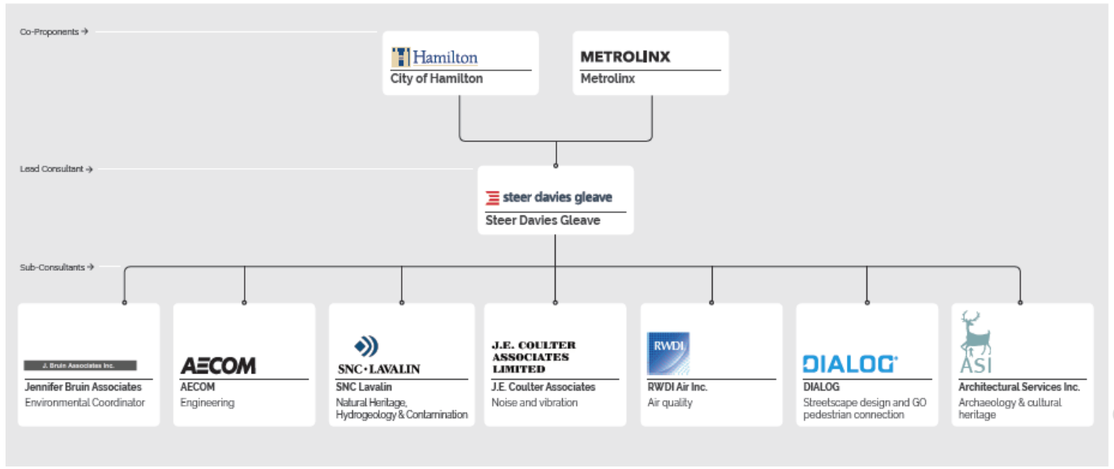
- Notice of Public Information Centres (PICs)
  - To notify all residents, agencies and stakeholders about Public Information Centres (PICs), and provide information on how to participate/provide comments. Letters were sent to all properties within 30m (PIC #1) and 45m (PIC #2) of the corridor.
- Preparation of contact/property owner lists
  - Created and maintained an active contact list to know who needs to be informed of project updates.
- Development and maintenance of websites
  - Project updates provided, including information shared at the PICs, an online comment form, project related reports, community meetings, frequently asked questions, and technical study reports.
- Supplemental meetings, including stakeholder meetings and workshops, public committee and Council meetings, for specific and general information and input.
- Hosted Ten Public Information Centres (PICs)
  - Advertised through newspaper, social media, e-newsletter, projects websites, and through registered mail notification to names on the project contact list and directly mailed to addresses within the corridor. Sign-in sheet for meeting attendees to receive project updates and comment sheet provided for attendees to provide input to the project. The PICs were advertised in both official languages (English and French).
  - In seven separate events, PIC #1 was intended to show the new developments and improvements to the project and to give the opportunity for the public to provide their input on the preliminary plans alignment. Specific questions were presented for input on various project elements.
  - The focus of three separate events during PIC #2 was to identify modifications to the project design and present the environmental effects of the proposed changes to the project.
  - As part of PIC #2, three additional community information meetings were held in areas outside of the LRT corridor for overview presentations and discussion.
  - Management of comment tracking/responses, to manage all comments received through the project phone line and email inbox, and ensure that all questions from stakeholders and the public are addressed.
- Agency review of Draft EPR
  - A draft of the EPR was circulated for comment to the Hamilton Conservation Authority, Ministry of Natural Resources and Forestry (MNRF), Ministry of Transportation (MTO), Ministry of the Environment and Climate Change (MOECC) and the Ministry of Tourism, Culture and Sport (MTCS).
  - Comments received from these agencies were addressed in the final Environmental Project Report Addendum.
- Notice of Environmental Project Report (EPR) Addendum
  - To notify relevant technical stakeholders, the general public, and residents of the Study Area about the completion of the project, and to provide information on how to access the final report and provide comments.

1.7. Study Team

This study has been undertaken under the direction of Metrolinx and The City of Hamilton. Steer Davies Gleave was retained by the project proponents 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 (see Figure 1-4):

- **J. Bruin Associates Inc.:** Environmental coordinator;
- **AECOM:** Engineering support, and Storm Water and Geotechnical Reports;
- **SNC-Lavalin Inc.:** Hydrogeology Report, Contamination Overview Study, and Ecology Report;
- **Bruce Tree:** Arborist Memo, RE: Endangered Species;
- **J.E. Coulter Associates:** Noise and Vibration Study;
- **RWDI Air Inc.:** Air Quality Existing Conditions Report, and Air Quality Study;
- **DIALOG:** Urban Planning and Public Realm, and High-Order Pedestrian Connection design; and
- **ASI Archaeological & Cultural Services:** Stage 1 Archaeology Assessment, and Cultural Heritage Screening Report.

Figure 1-4: Project Team



UPDATE TO THE PROJECT DESCRIPTION

Table of Contents

List of Figures

List of Tables

2. UPDATE TO THE PROJECT DESCRIPTION

As part of the assessment in the Hamilton LRT 2017 EPR Addendum, a shift in the design concept was made to make the LRT B-Line more consistent with the common objectives of the City of Hamilton and Metrolinx, to ensure that the LRT is "Rapid, Reliable and Safe". This required changes to the alignment, stop re-configurations, and traffic circulation changes. This section describes the project in its entirety, consistent with the design principles.

2.1. The Rapid Transit Vision

The City of Hamilton has reconfirmed the Rapid Transit Vision for the project:

> *"Rapid Transit is more than just moving people from place to place. It is about providing a catalyst for the development of high quality, safe, environmentally sustainable and affordable transportation options for our citizens, connecting key destination points, stimulating economic development and revitalizing Hamilton."*

This Vision, set for the Hamilton LRT project, envisages the project to provide a modern and efficient transit system, designed to be attractive to passengers, but also to achieve wider objectives including: supporting the City's continued economic transformation, improving the quality of life for its citizens, realizing environmental improvements, and connecting key destinations. Key to the delivery of an LRT project that meets these objectives is the requirement to design a system that is "Rapid, Reliable and Safe"; this being the key criteria for an efficient transit system that attracts passengers, retains and grows transit market share, and provides a realistic transportation alternative to car use for many trips.

2.2. Translating Vision/Objectives into Design Principles - "Rapid, Reliable and Safe"

Hamilton LRT needs to be "Rapid, Reliable and Safe" for it to meet its wider Vision and Objectives. Modern urban style LRT projects around the world follow this approach with a series of basic design and operational principles, sometimes referred to as "Putting the Passenger First":

- **Maximum Separation for LRT:** LRT on its own dedicated right of way, minimizing interfaces with other traffic.
- **Maximum Priority:** Modern LRT systems, remain at-grade in most instances, to minimize costs and maximize ease of access and egress for passengers. This requires LRT to pass through intersections at-grade. To minimize delays, LRT is given priority at signals whenever possible. Stops adjacent to intersections, designed to maximize passenger catchment and convenience, are linked to the signals.
- **Minimize Property Requirements:** Modern LRT systems are commonly integrated within existing urban corridors. The aim is to minimize property requirements, to keep construction costs to a minimum; but where property is required for the LRT project, to seek development of any surplus land in a way that contributes to wider transit-oriented development.
- **LRT, Area-wide Designs, and Streetscape Enhancements:** Linked to wider planning and urban improvement objectives, LRT designs become part of a wider urban planning process. To make space for LRT - on its own right of way, and with priority - several other street functions are often relocated into side streets or parallel routes. Opportunities for streetscape enhancements are also included in the design process, to fully integrate the LRT design and to support the aim of meeting wider project objectives.
- **LRT and Smart Operation:** Operating at-grade, modern urban style LRT systems feature operational advantages to complement the priorities afforded through LRT design measures (as listed above).
    - **LRT Operations and Control:** LRT system operations are coordinated from a central control room that monitors the performance of all operational Light Rail Vehicles (LRVs). Signal priority at intersections, and intermediate pedestrian and cyclist crossings, are all linked to the LRT signalling system. LRT is given priority, and the LRV operator has certainty for the appropriate speed and performance of the system. Uncontrolled crossings introduce uncertainty and unreliability into LRT operations, as the operator must proceed "with caution", anticipating random traffic or pedestrian/cyclist movements. Exclusive rights of way, priority at main intersections, and smart signalling combine to produce the required LRT speed and reliability advantages.
    - **LRT Stops:** LRT stops are located at key locations to maximize passenger numbers. Stop facilities are based on a standard kit-of-parts, with bespoke features added to enhance stop identity. Pedestrian access to and from LRT stops is signal-controlled. Stops are low-level and step-free, with level access to and from LRVs to provide access for all.
    - **Fares and Ticketing:** Simple proof of payment systems are used, combined with boarding through multiple LRV doors to minimize dwell times at stops. Pre-paid ticketing and smart/contactless tickets are becoming the norm. Ticket machines are located at stops, and there is no fare payment function for the LRV operator.
    - **LRT as part of a Wider Transit Network:** LRT systems are designed to form part of a wider transit network. Connections with regional rail and local transit services are included in the design process. Simple transfers are often provided, with integrated fares and ticketing, as well as high quality way-finding and travel information to make passenger journeys as simple and convenient as possible.

2.3. "Rapid, Reliable and Safe" Design Approach

The "Rapid, Reliable and Safe" approach has been proposed to give more efficient LRT operation, better journey times, and improved reliability compared to the original 2011 Plan. The key features of this approach are:

- Provide a westerly terminus at McMaster University, integrated into the north side of Main Street West. The alignment is side-running east to Dalewood Avenue, where it transitions to the previous centre-line alignment through the remainder of Main Street West to Paradise Road, then side-running to a new bridge over Highway 403;
- Provide an exclusive LRT right of way with centre running on the remainder of the B-Line route to Queenston (except in International Village), a portion of King Street West from Queen Street to Hess Street, and a portion of King Street East from James to John;
- Provide for two-way traffic on King Street West(except Queen Street to Hess Street), King Street East (except from James Street to John Street and in international Village), Main Street West, and Main Street East;
- Minimize the number of locations where road vehicles are permitted to cross the LRT tracks. Most of local road intersections thus become right-in/right-out only, with crossings allowed at nearby arterial roads with signalized intersections;
- Permit U-turns at signalized intersections to maintain local accessibility;
- Pedestrian access to stops is mainly provided at the intersection end of stop platforms, to assist with controlling passenger movements and enhance safety. In some instances, access from both platform ends will be used for passenger convenience;
- Design the alignment for 65m long platforms to accommodate (future) use of different LRV configurations and sizes to increase system capacity;
- Consider the use of a curb face alongside the exclusive LRT alignment to minimize incursion by other vehicles. To allow emergency services vehicles to use portions of the guideway, while discouraging unauthorized use by other vehicles, a mountable roll curb to demark the LRT lanes is proposed;
- In International Village, on King Street between Catharine Street and Wellington Street, the LRT alignment is offset to the north side to allow eastbound traffic on the south side, and to maintain access for south side properties; and
- An alternative means of servicing and deliveries for the International Village area to be developed using side streets, laneways, and open areas to the rear of the frontage properties, particularly the rear lane from Wellington Street to Mary Street.

The updated alignment, with plan and profile, designed to "Rapid, Reliable and Safe" principles, is shown on the drawings included in Appendix A. The following general points should be noted:

- East of Dundurn Street, most of the route comprises an approximately 20m wide right of way with a 4-lane roadway. Use of the two centre lanes for LRT allows for one lane of traffic on either side;

- There is very limited opportunity for on street parking and servicing. These activities will need to take place within individual lots, or from side streets, to be determined during the detailed design phase;
- At stops, the route widens to accommodate the platforms and turn lanes. This in turn leads to a need for land and property acquisition; and
- At the right-in/right-out side street intersections, turns have to be made from and to the curbside lane on King/Main Street. This in turn requires some street corners to be cut back to allow access by garbage collection vehicles, EMS vehicles, and school buses. In some cases, this requires land and property acquisition.

Associated land requirements are described in Section 3 and Section 4.

2.4. Outline Route Description

The revised B-Line route is described here in outline. More detail is provided in later Section 4 of this report.

2.4.1. B-Line McMaster University to Queenston

The B-Line route comprises twin track and is entirely separated from other traffic over its full length, using the "Rapid, Reliable and Safe" principles set out in this document.

The B-Line commences at McMaster University, with a new combined LRT and bus terminal (serving local HSR buses and regional GO and other bus services), to be constructed at the edge of the university campus. The alignment is side-running from a stop integrated into the McMaster University property, on the north side of Main Street West, east of Cootes Drive to a transition to centre running at Dalewood Avenue.

The B-Line route then continues in the centre of the two-way section of Main Street West to Paradise Road, from where it continues on the north side of the one-way eastbound section of Main Street West to Highway 403.

The LRT route then crosses Highway 403 (The Chedoke Expressway), and the associated ramps on a new LRT-only bridge to and from King Street and Main Street. It then follows the south side of King Street West over the CP rail line to Dundurn Street.

From Dundurn Street to the Gage Park stop, at the intersection of Main Street East and King Street East (The Delta), the existing one-way westbound King Street West/East is, apart from a few short lengths, converted to two-way traffic with LRT in the centre of the street.

The route continues along King Street East through Downtown and International Village, generally with a single eastbound traffic lane on one side of the route only.

From Wellington Street, the route continues in the centre of King Street East to The Delta. An underpass is provided to allow the LRT to cross beneath the CP freight line, crossing at East Bend Avenue. Road traffic will continue to cross at-grade as at present, to maintain access to existing properties.

From The Delta to Queenston, the B-Line runs in the centre of Main Street East.

A new off-road LRT and bus terminal is provided at Queenston, on the properties located at 1620 Main Street West and 75 Queenston Road, near the current Queenston Traffic Circle. The proposed layout allows for the LRT to be extended in future to Eastgate Square.

A total of fourteen (14) LRT stops are provided on the B-Line alignment, as shown in Figure 1.2 (see Section 1 of this Addendum), and are listed in Table 2-1, with the stop types shown diagrammatically in Figure 2-6.

2.5. New Transit Terminals

2.5.1. McMaster University Terminus

Under the approved Hamilton LRT 2011 EPR, the proposed western terminus of the Hamilton LRT facility was at McMaster University, with configuration that saw the alignment diverted from the centre-running alignment to a terminal station parallel to Cootes Drive on the McMaster University parking lot.

As a result of additional assessment, optional configurations were considered that would keep the terminal station close to the edge of the property to:

- Increase the distance between the terminal platform and the Canadian Centre for Electron Microscopy(CCEM) facility to reduce EMF impacts on the facility;
- Enable the design and construction of an expanded bus terminal to accommodate both GO Transit buses as well as HSR buses;
- Facilitate a possible future westerly extension of the LRT; and
- Better integrate with McMaster University long-term plans.

2.5.2. Queenston Terminus

With the change in the proposed terminus from Eastgate Square, the development of a new terminus and bus facility at Queenston was required. Figure 2-1 shows a possible concept for proposed facility, used for assessment purposes. Any changes to this design that affect the assessment will be addressed in future work at the time.

2.5.3. MacNab Terminal

The future configuration of the MacNab Terminal is under review by the City of Hamilton and Metrolinx. Any requirement for reconfiguration will be addressed through future study

2.6. CP Rail Crossing

To ensure the integrity of LRV operation with minimal delays, a grade separation of the CP rail spur on King Street East, east of Gage Street is proposed. This facility will allow the LRVs to pass under the CP rail spur without delay. Road traffic and pedestrian facilities will remain at grade.

Several options were considered to minimize utility and property impacts, including alignments within or outside the road allowance, and with LRVs over or under the rail crossing. The preferred facility is shown in Figure 2-2.

Figure 2-1: Queenston Terminus and Bus Facility

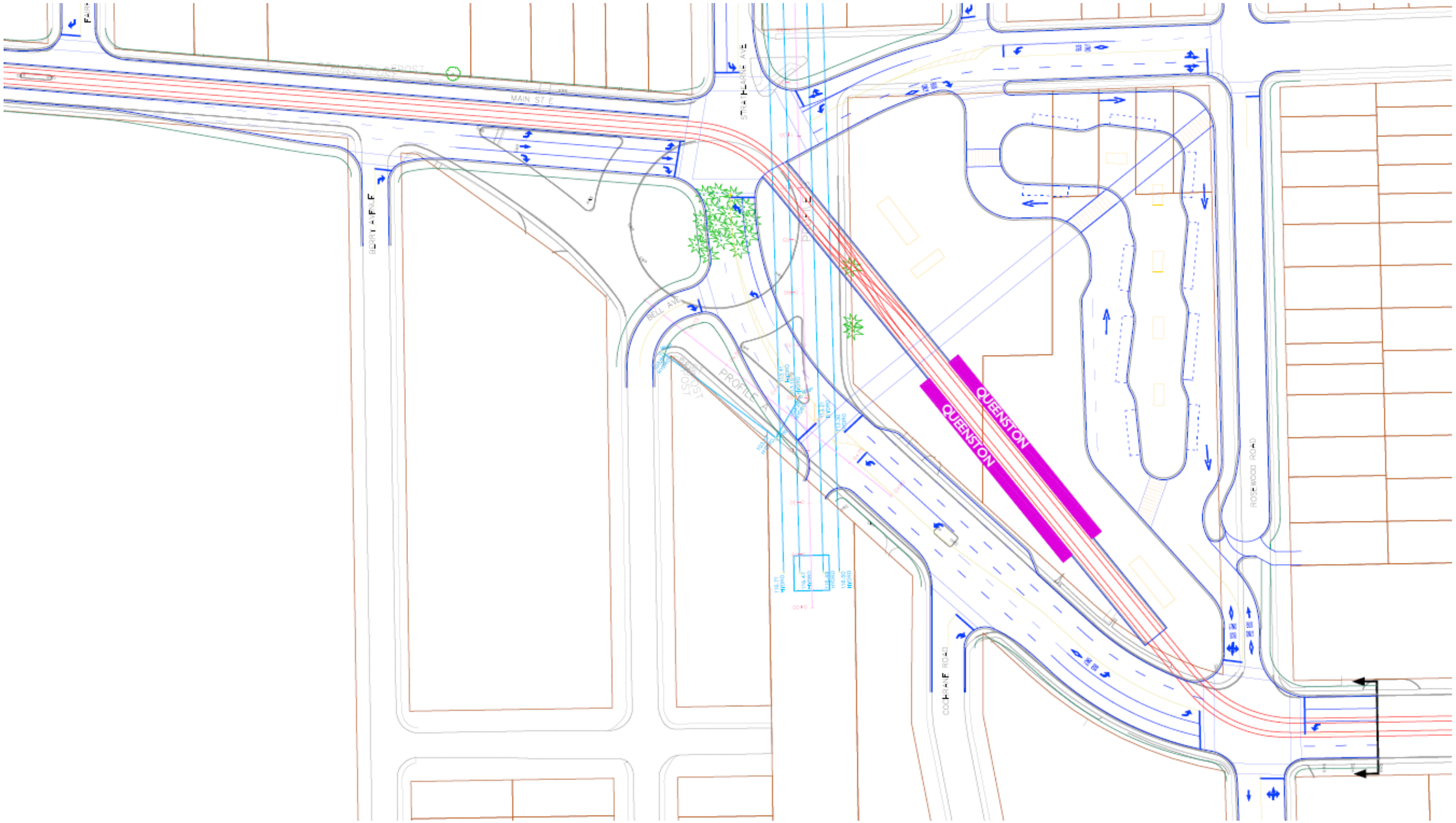
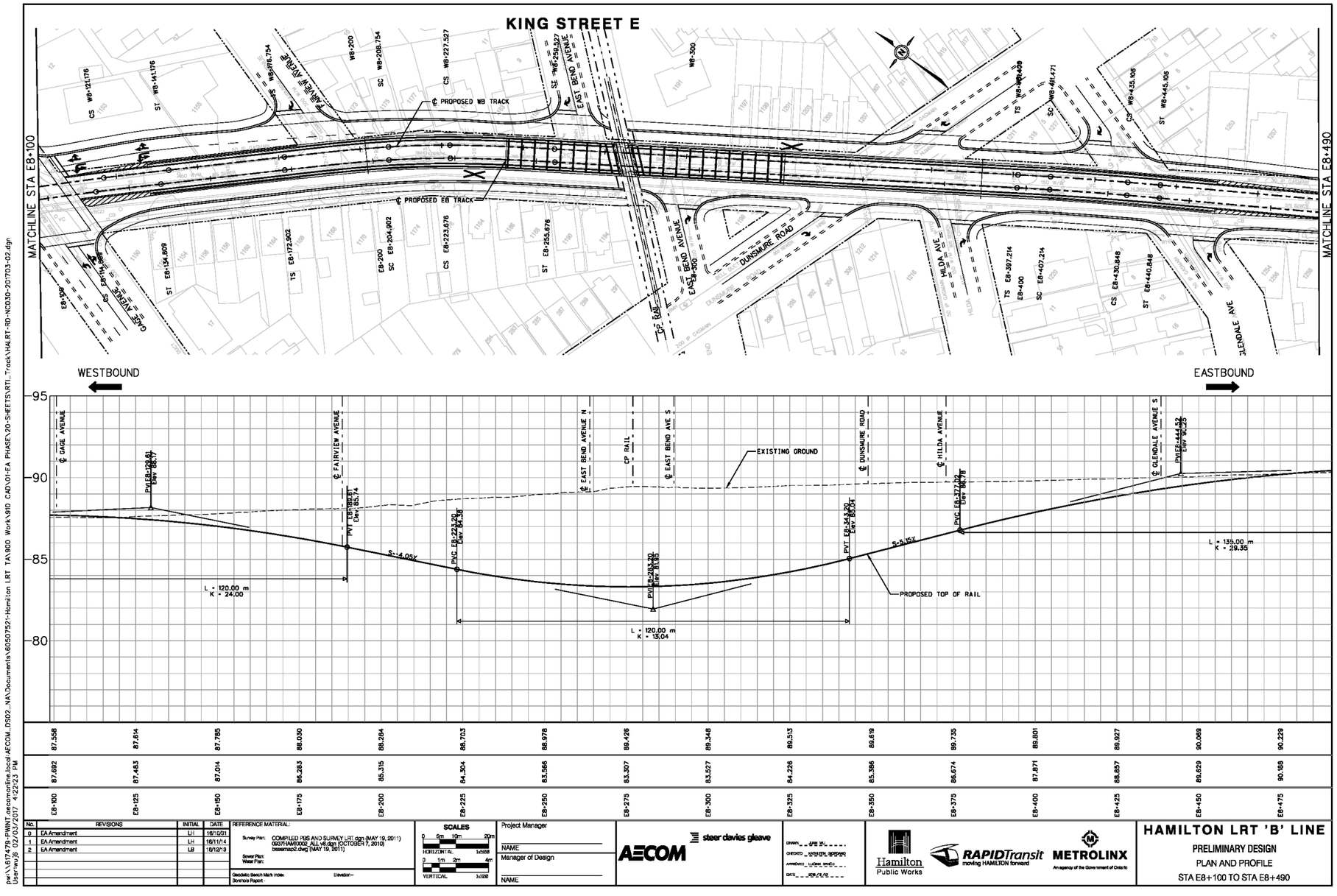


Figure 2-2: CP Rail Crossing Plan and Profile



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2.7. Operations, Maintenance and Storage Facility (OMSF)

The requirements for the OMSF were developed during the Hamilton Rapid Transit Preliminary Design and Feasibility Study and subsequent reviews, and documented in the following:

- Maintenance and Storage Facility Requirements and Locations, v1.1, February 2011 (MSF Report);
- Maintenance Facility Sites Review, City of Hamilton, September 2012; and
- Hamilton LRT Spurline MSF Memo and associated Concept Design Options, Hatch Mott MacDonald, October 2012 - March 2013.

However, no preferred OMSF site was identified during these stages.

Following a review of a number of possible sites (those considered previously and new locations), a preferred location was identified in the vicinity of Chatham Street and Frid Street, east of Longwood Road South.

LRV access to the site will be via shared running tracks on Frid Street and Longwood Road from Main Street West. Functional requirements for the site include:

- Development of connecting tracks from the LRT mainline to the storage yard tracks;
- Maintenance carhouse;
- Daily service area;
- Maintenance-of-way facilities, traction power substation, and repair shop/facility building. These facilities could be implemented either as stand-alone facilities or integrated in the maintenance carhouse;
- Stabling area;
- Administration facilities and parking;
- Accommodation for up to 40 LRVs;
- Traction power substation; and
- Stormwater management facility.

2.8. Frid Street Extension

The extension of Frid Street to connect the east and west portions of the existing Frid Street was the subject of an Environmental Assessment (EA) Study in 2008.

To accommodate the OMSF site development, it is proposed that the alignment of the Frid Street extension be shifted to the northern boundary of the OMSF property, to create a more contiguous area for the OMSF (see Figure 2-3).

Figure 2-4 shows the original preferred alignment for Frid Street. Details of the revised design are included in Section 4. The revised alignment of the Frid Street extension is being addressed through this EPR Addendum. Impacts and recommendations are identified in subsequent Sections 4 and 6.

2.9. High-Order Pedestrian Connection to Hamilton GO Centre

A High-Order Pedestrian Connection, connecting the Hamilton GO Centre on Hunter Street to the B-Line, was included as part of the project funding announcement. Concept designs for the High-Order Pedestrian Connection have been developed, with the connection using Hughson Street from the Hamilton GO Centre to King Street East and Gore Park. Hughson Street is closed at King Street (south) except for service vehicles, which will be permitted to exit via the south leg of King Street to James Street South.

The selection of Hughson Street and the concept development for the pedestrian connection was designed to achieve the following objectives:

- **Design Excellence:** Shape an attractive, functional design for the streetscape connection that is grounded in best practices. A design that inspires greater pedestrian use and enjoyment;
- **Convenient:** Plan for seamless and efficient pedestrian connections between the Hamilton GO Centre and LRT, as well as other destinations in the Downtown Core;
- **Comfortable**: Provide amenities such as lighting, weather protection, plantings and seating, to improve the pedestrian experience;
- **Safe and Secure:** Support clearly defined, well-lit, safe pedestrian routes, crossings, and related components of the public realm; and
- **Intuitive:** Support intuitive wayfinding between transit destinations.

Based on these objectives, several design criteria were developed, and Hughson Street was selected as the preferred corridor (over James Street and MacNab Street), following an evaluation against these criteria:

- Short Walking Distance from the LRT to the Hamilton GO Centre: As measured from the westbound LRT platform, to the Station building entrance at Hughson Street and Hunter Street;
- Naked Street Approach: Hughson Street provides an excellent opportunity to develop a street profile accommodating cars, pedestrians, cyclists and other road users in a common street profile;
- Wide Pedestrian Walking Zone: Average width of clear sidewalk as measured along the journey between the LRT platform and Hamilton GO Centre entrance;
- Safe Pedestrian Crossings: Hughson Street provides a safe walking environment, with relatively few crossings of busy roads, relative to other parallel streets in the area;
- Few Unsignalized Crossings: Major intersections along Hughson Street are signalized, which supports greater pedestrian safety, relative to unsignalized crossings;
- Development/Frontage Potential: Measured as the linear length of vacant blocks along the route, where future development may occur;
- Plantings and Furnishings Zone: Areas where there are existing trees and/or furnishings, and where it is reasonable to accommodate them in future, without unduly impacting the available walking area;
- Intuitive Wayfinding: Without the aid of signage, this route provides clear view corridors that allow pedestrians to see the transit destination, at either end of the route; and
- Minimizing Traffic Impacts: Relative to other route options, Hughson Street minimizes potential impacts to vehicle oriented traffic operations.

Figure 2-5 shows the conceptual plan for the High-Order Pedestrian Connection.

Figure 2-3: OMSF Site and Concept, showing re-aligned Frid Street Extension

Figure 2-4: Class EA Preferred Alternative – Frid Street Extension between Chatham Street and Longwood Road

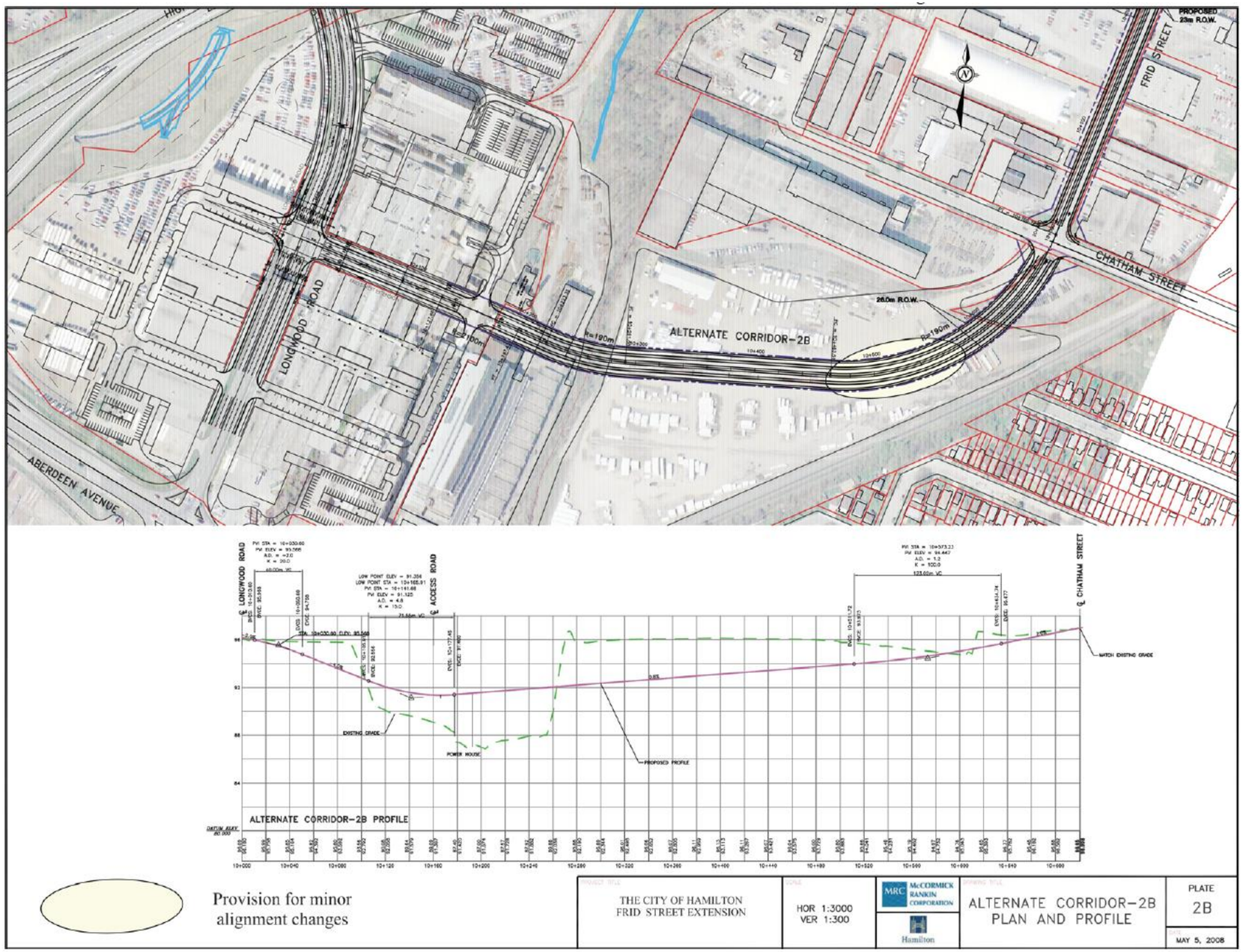


Figure 2-5: Conceptual Design Plan for the High-Order Pedestrian Connection

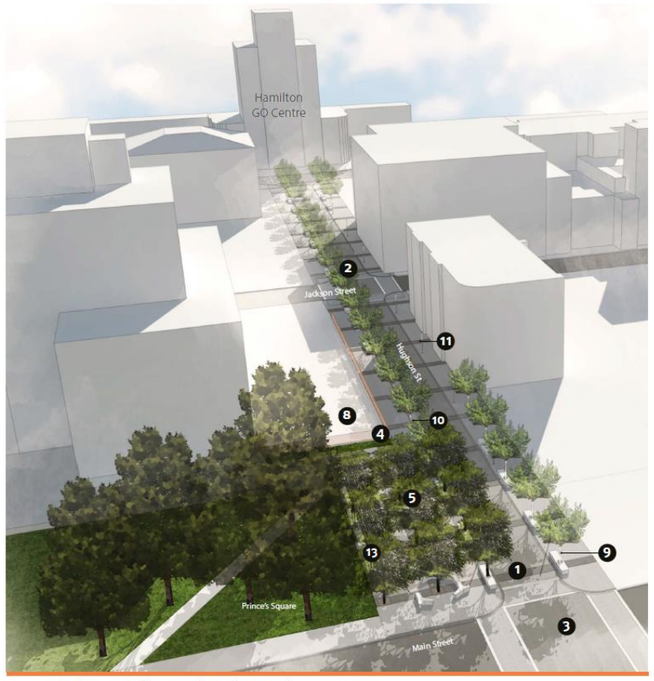
GO High Order Pedestrian Connection

Streetscape Design Approach

Design Concept:

The streetscape concept illustrated on this panel has been designed to establish a high-quality civic corridor, prioritizing pedestrians and supporting safe, convenient and comfortable connections between the Hamilton GO Centre and the LRT Corridor.

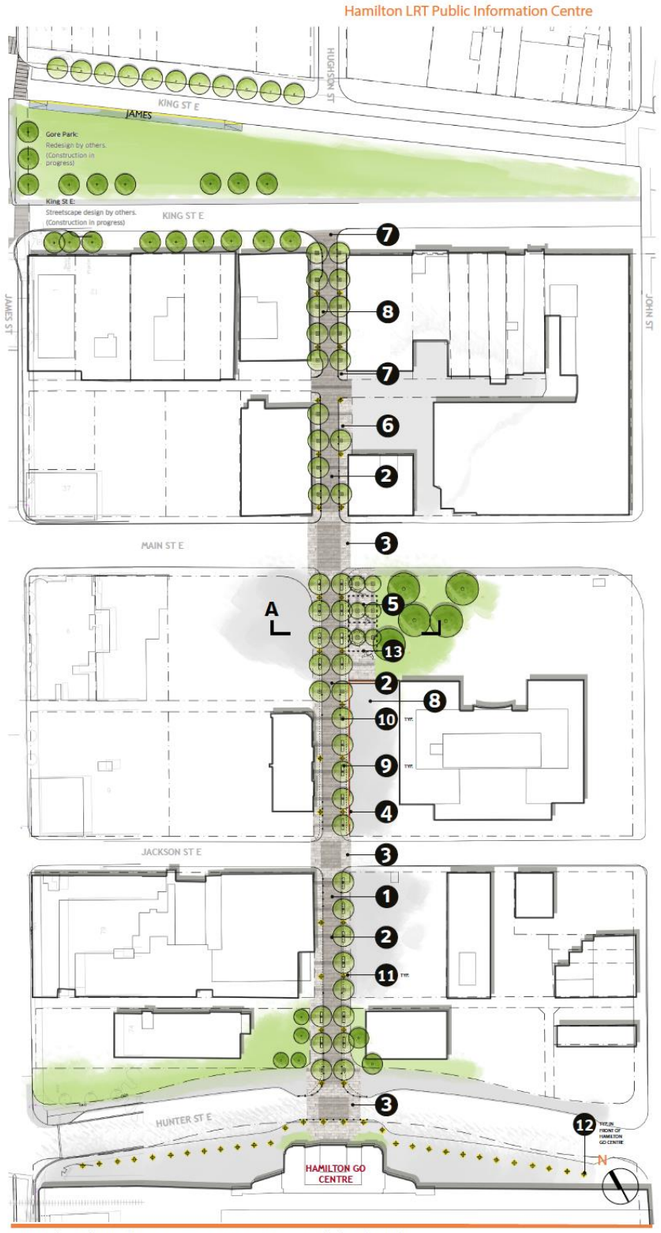
1. ENHANCED HARDSCAPE PAVING
2. TWO-WAY VEHICULAR TRAFFIC
3. DISTINCTIVE HARDSCAPE PAVING AT INTERSECTION WITH RAISED PROFILE
4. DECORATIVE SCREENING OPPORTUNITY
5. PEDESTRIAN PLAZA / BOSQUE
6. EXISTING DRIVE TO PARKADE & SURFACE PARKING TO REMAIN
7. RESTRICTED VEHICULAR ACCESS FROM KING ST E TO HUGHSON ST
8. LOADING AREA
9. TREE IN INTEGRATED BENCH / PLANTER, COMES WITH SOIL CELL (TYPICAL)
10. TREE IN GRATE, COMES WITH SOIL CELL (TYPICAL)
11. PROPOSED PEDESTRIAN LIGHT POLE (TYPICAL)
12. EXISTING PEDESTRIAN LIGHT POLE TO REMAIN (TYPICAL IN FRONT OF HAMILTON GO CENTRE)
13. PLAZA CANOPY STRUCTURE (ABOVE)



Conceptual View: Looking North to the Hamilton GO Centre

Conceptual View: Looking South to the Hamilton GO Centre

'A - A' Conceptual Hughson Street Cross Section: Looking North



GO High Order Pedestrian Connection: Conceptual Plan (1:800)

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2.10. Updated Design Standards

The Design Guidelines includes details of the updated *Design Standards* used in the development of the Hamilton LRT project and typical cross sections showing key dimensions for the LRT right of way, platform, traffic lane, and sidewalks. In addition, relevant design elements are included in this section.

2.10.1. Light Rail Vehicle (LRV) Type

The design is based on the use of modern low floor Light Rail Vehicles (LRVs), approximately 30m long and 2.65m wide, capable of operation in both directions and with multiple passenger doorways on both sides, as well as operating singly or in coupled pairs. The Bombardier Flexity Freedom vehicle, selected by Metrolinx for other GTHA LRT projects, is a typical example of this vehicle type.

Table 2-1: Proposed Stops for the LRT Corridor

	Stop Name	Stop Type
B-Line	McMaster	Central Island Platform (north side)
	Longwood	Central Island Platform (west side)
	Dundurn	Parallel Side Platforms (west side)
	Queen	Central Island Platform (west side)
	James	Far-side Side Platforms
	Mary	Parallel Side Platforms (west side)
	Wellington	Parallel Side Platforms (east side)
	Wentworth	Central Island Platform (east side)
	Sherman	Central Island Platform (east side)
	Scott Park	Central Island Platform
	Gage Park	Central Island Platform
	Ottawa	Central Island Platform (west side)
	Kenilworth	Central Island Platform (west side)
	Queenston	Parallel Side Platforms (off-street)

2.10.2. Platform Length

B-Line platform lengths have been increased to 65m to accommodate two- (2) car Light Rail Vehicles (LRVs).

2.10.3. Platform Width

The standard platform width is set at 3.5m for side or parallel platforms, and 4.5m for central Island platforms to maintain right-of-way requirements. When required, platform widths will be increased based on ridership assessments; and where necessary, to reduce property impacts, platform widths may be reduced to 2.5m (the minimum width to maintain AODA compliance).

2.10.4. Platform Height

The platforms will be approximately 300mm high above rail level, allowing level boarding onto the vehicles, to provide easy access for all passengers.

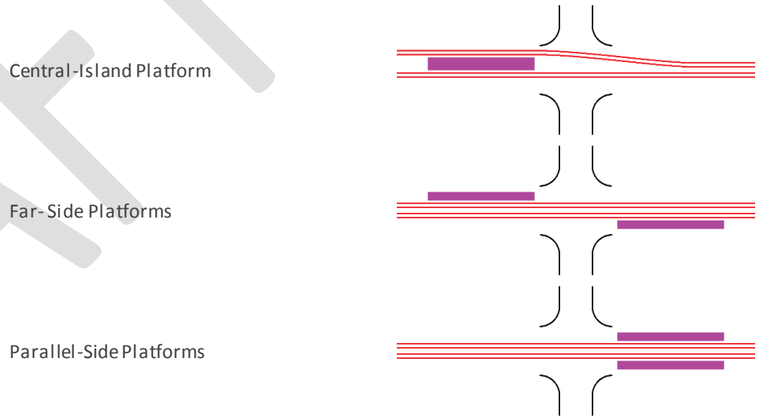
2.10.5. Platform Ramps

Access ramps to the platforms are designed with a 1:20 slope to meet the exterior paths of travel requirements under the *Design of Public Spaces Standards (Accessibility Standards for the Built Environment - Part IV.1 of Ontario Regulation 191/11: Integrated Accessibility Standards, under AODA)*. Typically, ramps will only be available at the intersection end of the platform, to facilitate and control access to the signalized crosswalk, and reduce interaction with LRVs. Where appropriate, to meet passenger demands and dictated by intersection design, ramps at opposite ends may also be provided.

2.10.6. Platform Configuration

B-Line platforms are designed as a mix of Central-Island platforms, Far-Side platforms, and Parallel-Side platforms, depending on space constraints. Far-Side platforms are preferred from an LRT operations perspective, so that advance notice of LRV arrival can be provided to the traffic signal controllers, maximizing the opportunity for LRT priority through the signals. This layout is also preferred from an accessibility standpoint, as it allows passengers to exit the platform behind the LRV, enhancing safety and reducing LRV delays. However, the objective of minimizing property requirements resulted in the majority of platforms being Central-Island or Parallel Side platforms, both being common configurations. Central-Island platforms have the advantage of increased passenger convenience and ease of wayfinding.

Figure 2-6: Platform Configuration Types



2.10.7. LRT Guideway Separation

The centre guideway is separated from regular traffic lanes by a mountable curb. The curb (design details to be determined) is intended to restrict regular traffic access to the guideway, while permitting emergency vehicle access to cross the tracks or use the guideway in emergencies.

Table 2-2: Updated Design Standards

Element	Original Specification	Revised Specification	Comments
Light Rail Vehicle Type	30m long 2.65m wide low floor LRV, double ended, multiple passenger doors on both sides Alignment provision for future vehicle lengthening to approximately 40m	30m long 2.65m wide low floor LRV, double ended, multiple passenger doors on both sides, capable of operating singly or in coupled pairs	Initially planning for single vehicle operations, with expansion to two-(2) vehicle operation as ridership warrants
Alignment Configuration	Mix of Centre and Side running	Centre running	Can be adjusted to meet property requirements
Platform Length	40m	65m	
Platform Configuration	Mix of side/facing and island platforms	Mix of parallel, split far-side and island platforms	Can be adjusted to meet property requirements
Platform Width	Side: 3.5m Central: 4.0m Terminal: 6.0m	Desired: Side/Parallel: 3.5m Central Island: 4.5m Minimum: Side 2.5m (all subject to AODA requirements)	Reduce platform under constrained conditions (subject to AODA requirements)
Platform Ramps	Both ends – 1:20	Intersection end only – 1:20	Ramps/crossings at both ends of platforms to be reviewed as part of wider Stop Area Plans
Guideway Separation	N/A	Mountable Rolled Curb (detailed profiles to be determined)	Mountable curb where emergency access required
Traffic Lane Width	Desirable: 3.5m Minimum 3.3m	Desirable: 4.0m (single lane); 3.5m (multiple lanes) Minimum: 3.5m (single lane); 3.3m (multiple lanes)	Reduce lane width if necessary under constrained conditions
Design Vehicle ▪ Truck routes ▪ HSR routes ▪ Other intersections ▪ U-turns	Various, as marked on Plan and profile drawings	WB-20, I-Bus, B-12 Bus (as proxy for garbage truck and EMS vehicles), LSU	
Minimum Sidewalk Width	Desirable: 2.5m Minimum 1.5m	Desirable: 2.5m Minimum 1.5m	Minimum clearance at obstructions only
Property Requirements	Minimize Property Requirements	Minimize Property requirements	Action Priorities: ▪ Alignment adjustments ▪ Platform configuration changes ▪ Reduced lane width, multiple lanes ▪ Reduced sidewalk width, but not less than AODA minimum requirements ▪ Reduced lane width, one lane ▪ Reduced platform width

2.10.8. Traffic Lane Width

The centre-running design includes a single traffic lane in each direction on either side of the guideway. This single lane has a desirable width of 4.0m to permit traffic to make right turns into and out of side streets without encroaching on the guideway, and to provide space for other vehicles to pass cyclists.

Where necessary, to reduce property impacts, lanes may be reduced to 3.5m, with a minimum of 3.3m if multiple lanes are present.

2.10.9. Designing for Different Road Vehicles Types

Intersections are designed to accommodate the swept path of the variety of vehicles expected on the streets along the LRT routes. This includes:

- WB-20: Large tractor and semi-trailer, at truck route intersections;
- B-12: standard single unit bus/truck: for U-turns;
- I-bus: for HSR bus routes; and
- B-12: standard single unit truck for all other intersections.

Where necessary, to reduce property impacts, the swept path is permitted to occupy all of adjacent side street when turning from LRT corridor to side street.

2.10.10. Minimum Sidewalk Width

Desirable sidewalk widths are 2.5m with a minimum 1.5m at obstruction points. To comply with AODA requirements, minimum 1.5m clearances must be maintained at all times, and are permissible only at locations of obstructions and not for significant distances. These minimums will also apply to platform clearances when placing benches, signs, shelters, poles, ticket vending machines, and any other platform features.

2.10.11. Property Requirements

It is an objective of the project to minimize property impacts while maintaining the integrity of the "Rapid, Reliable and Safe" design. Where possible, the design has been amended to reduce property impacts with the following measures, in priority order, subject to prescribed minimums:

- Alignment adjustments;
- Platform configuration changes;
- Reduced lane width, if multiple lanes;
- Reduced sidewalk width, but not below AODA minimum requirements;
- Reduced lane width, if single lane; and
- Reduced platform width.

2.10.12. Typical Cross-Sections

Figure 2-7 through Figure 2-11 show typical cross sections and key design dimensions along the route. Note that the depiction of the overhead contact system is conceptual and will be confirmed through future project design phases. Additional detailed cross-sections are included in Appendix B.

Figure 2-7: Side-Running Cross-Section: Main Street West with 2 WB Traffic Lanes 3 EB Traffic Lanes

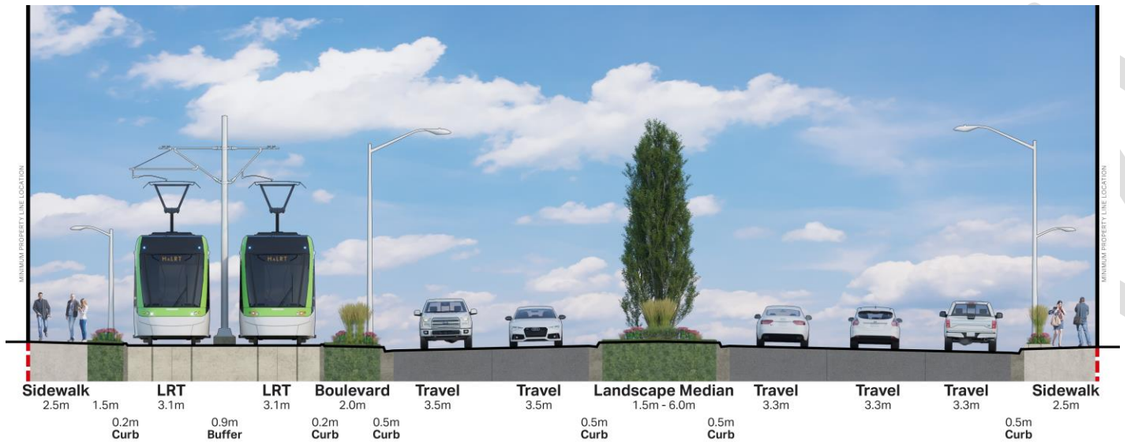


Figure 2-8: Centre-Running Cross-Section: Main Street West with 2 WB Traffic Lanes 3 EB Traffic Lanes

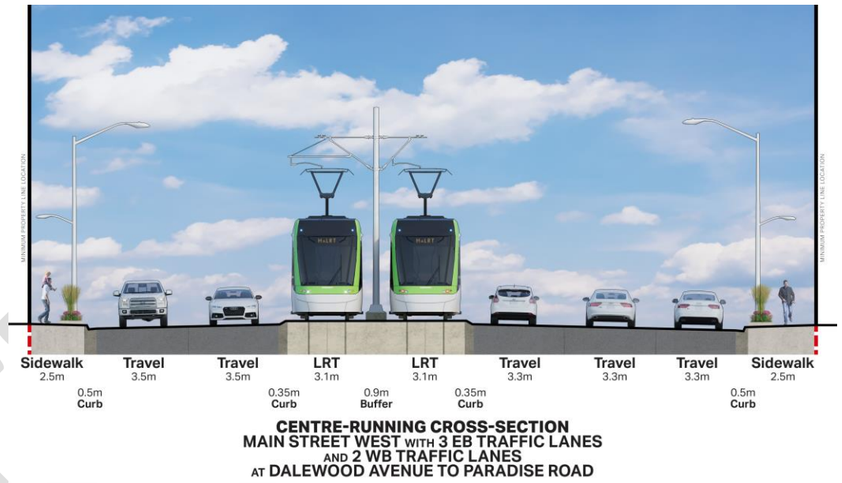


Figure 2-9: Centre-Running Cross-Section: King Street East and Main Street East with 1 EB and 1 WB Traffic Lane

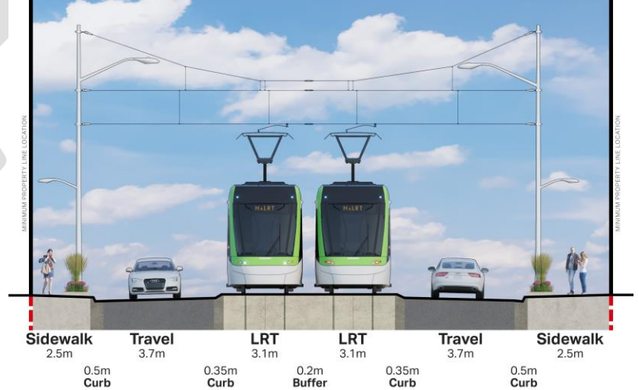


Figure 2-10: Side-Running Cross-Section: International Village

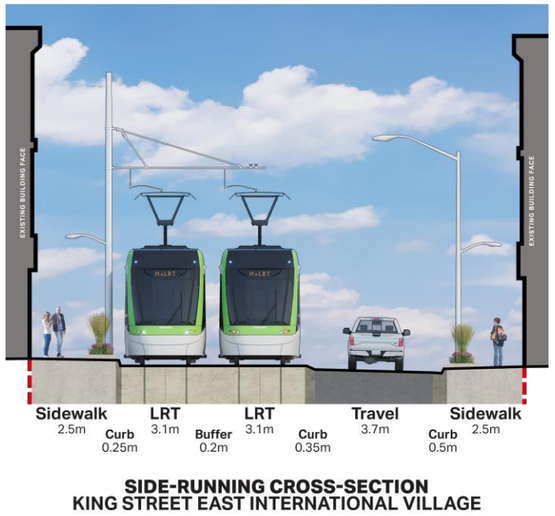
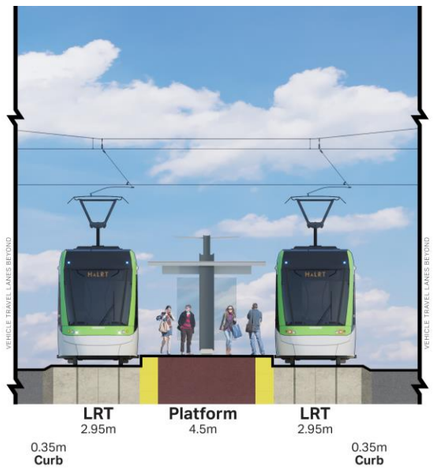


Figure 2-11: Typical Centre Stop Platform



2.11. LRT Operations

For the TPAP-approved project, the LRT operations and the complementary changes to bus transit operations were set out in the Integrated Systems Operations Plan (ITSOP).

The LRT operations were updated to reflect the changes to the LRT route, including:

- The new eastern terminus of the B-Line located at Queenston;
- The new centre running alignment and "Rapid, Reliable and Safe" principles for the B-Line; and
- The proposed OMSF location.

The B-Line service is designed to operate at 6-minute headways, providing a capacity of 1,300 on-board passengers at the peak point in the peak direction during the peak hour. For coupled LRV units, this capacity increases to 2,600 passengers.

During off-peak hours, headways may be longer in accordance with demand.

2.11.1. Changes to Bus Transit Services

Amended bus routes and services were developed by the City of Hamilton to complement the LRT service. These include:

- Withdrawing bus services replaced by LRT on the B-line;
- Changes to bus routings arising from the changes to road layouts;
- Use of the new bus terminals at McMaster University and Queenston; and
- Increased service levels to reflect growth over time.

Details are included in subsequent sections of this report. Proposed changes to accommodate LRT are generally consistent with the original approved plan.

2.12. Traffic Circulation

There are three principal changes to traffic circulation along the route corridor:

- The conversion of King Street from one-way westbound to two-way traffic over most of the length between Dundurn Street and The Delta (noting that some sections remain one-way westbound or become one-way eastbound);
- Main Street East from the Delta to Queenston reduced to one-lane in each direction, and
- The prohibition of left turns at many of the side street intersections along the route, thus becoming right-in/right-out only.

The removal of left turns and introduction of right turn only intersections are mitigated by the provision of left turn and U-turn lanes at the main road intersections where all movements are permitted.

EXISTING CONDITIONS

Table of Contents

List of Figures

List of Tables

3. EXISTING CONDITIONS

This chapter of the EPR Addendum describes the project study area in the context of the transportation infrastructure and the natural, socio-economic and cultural environments, and provides the baseline, including approved infrastructure and land use plans, against which the effects of the project have been measured.

The existing environmental conditions described in the Hamilton LRT 2011 EPR were reviewed for applicability to conditions at the time of this Addendum (2016) and were largely unchanged except as specifically stated in the following sections.

The sections that follow provide a summary of the existing conditions in the study area, which are considered to be part of the EPR Addendum scope of work. Information on the following components is presented in this section of the report and further elaborated upon with detailed technical reports appended to the EPR Addendum within Appendix C.

3.1. Natural Environment

The purpose of this section of the report is to examine and document existing conditions for:

- Hydrogeology;
- Contamination;
- Vegetation and Vegetation Communities;
- Wildlife and Wildlife Habitat;
- Designated Natural Areas and Parks;
- Surface Water;
- Fish and Fish Habitat;
- Air Quality;
- Stormwater; and
- Geotechnical.

3.1.1. Hydrogeology[1]

PHYSICAL SETTINGS

The overall physical assessment remains largely the same as described in the previous hydrogeological reports (see Appendix A: City of Hamilton 2011 B-Line Light Rail Transit Environmental Project Report). The local physical setting within the project study area (i.e. 500m radius from the site) are referenced mainly from the *Hamilton Groundwater Resources Characterization* and *Wellhead Protection Partnership Study* (Charlesworth & Associates and SNC-Lavalin, 2006); and *Vulnerability Assessment and Scoring of Wellhead Protection Areas* (Earthfx, 2010).

Topography

The topography within the study area is typically flat, sloping gently towards Hamilton Harbour and Lake Ontario. The majority of the study area is heavily urbanized with significant building structures along the central corridors. Main surface water features present in the study area include Chedoke Creek, Burlington Bay (including Cootes Paradise) and Hamilton Harbour.

- The Chedoke Creek sub-watershed comprises a broad area above the escarpment, and tapers down to a very narrow valley where the creek discharges directly to Cootes Paradise.
- Hamilton Harbour is located at the most western end of Lake Ontario. Breached sand bars separate the bay from the lake and Cootes Paradise. Hamilton Harbour is approximately 21.5 square kilometres (21.5km^2) in size.
- Cootes Paradise is an 840-hectares wildlife sanctuary located at the western end of Burlington Bay. Tributaries of the North Cootes Paradise, Spencer Creek, and Chedoke Creek watersheds discharge to Cootes Paradise. It contains a shallow, freshwater coastal marsh that is 250ha in size. Cootes Paradise marsh is an important waterfowl staging habitat and the largest nursery habitat for fish in the Hamilton region. It is designated as a *Provincially Significant Class 1 Wetland*, and an *Area of Natural and Scientific Interest*. It is also listed as an *Environmentally Sensitive Area* by the City of Hamilton.

Physiography

The study area is located within the Iroquois Plain, which consists of mainly the lacustrine deposits and lake-bottom sediments. The width of this plain varies, but is usually about 3km wide within the City of Hamilton area. Between Lake Ontario and the Niagara Escarpment, the plain is cut by a number of creeks that historically had lagoons or marshes at their outlet to the Lake.

Geology

- Quaternary Deposits
  - The majority of the amended LRT corridor lies within the glaciolacustrine deposits of the Iroquois Plain, consisting of glaciolacustrine sand and silt, and some gravel. Towards the east end of the B Line, Paleozoic bedrock (shale and dolomite) and Halton Till (silty to clayey till) are present. Some localized modern alluvial deposits are located near Chedoke Creek. Overburden thickness across the project alignment varies, ranging from a few metres to approximately 30m.
- Bedrock
  - Bedrock in the project study area consists of the Queenston Formation (from Upper Ordovician age), which is predominantly red shale with green siltstone bands. The formation thickness is estimated to be 300m as a minimum, with the upper surface of the formation described as weathered. The bedrock elevations are relatively flat, between approximately 76m above mean sea level (amsl) and 91m-amsl, except in the Chedoke Creek area. The entire study area is noted to be below and hydrogeologically downgradient of the Niagara escarpment.

Hydrogeology

- Regional Aquifers
  - There are two (2) types of regional aquifers in the Hamilton area: overburden aquifers and bedrock aquifers. The *overburden aquifers* consist of granular deposits within the shallow overburden, and the thicker overburden along bedrock valleys (i.e. the Dundas Valley). A sand and gravel aquifer overburden aquifer is located west of Highway 403 in the Chedoke Creek and Cootes Paradise areas. It underlies the western portion of the B-Line near the terminus at McMaster University, and also underlies the OMSF site. There are no *bedrock aquifers* that underlie the proposed alignment. Both the Salina, and Guelph Amabel and Lockport Formation aquifers, are south or west of the current alignment limits. No other regional aquifers are identified in the study area.
- Groundwater Conditions
  - Groundwater levels range from approximately 2m below ground surface (bgs) to 16m-bgs to the west of the Highway 403 corridor, and from 2m-bgs to 9m-bgs east of Highway 403 in the project study area. Groundwater levels are expected to be slightly shallower towards the Hamilton Harbour. Groundwater flow directions are generally from the southern highlands toward Hamilton Harbour and Lake Ontario. Where infrastructure is present below the groundwater table (i.e. watermains, storm and sanitary sewers, tunnels and/or other linear corridors), they may result in preferential pathways that have localized and limited impacts on groundwater flows.
- Recharge Areas
  - Regionally, there is a small linear feature in the southwestern extent of the Dundas Valley (below the escarpment) and the central area of Spencer Creek (in the area of the Norfolk Sand Plain and the Flamborough Plain). This feature is above the escarpment, and has been identified as being significant to recharge. Small portions of the Stoney Creek and Red Hill Creek watersheds are also deemed as significant groundwater recharge areas.

[1] Source: Hamilton LRT – Environmental Project Report Addendum, Hydrogeological Update, prepared by SNC-Lavalin, February 24, 2017.

- There are no significant groundwater recharge areas identified in the study area, with most of the alignment being located along an area mapped as a discharge zone. Some low potential recharge zones are located along York Boulevard (Dundurn Park and Hamilton Cemetery areas), between Highway 403 and Hamilton Harbour, as well as near the shoreline of the Harbour. However, these are either outside of the alignment impact areas or in highly developed areas of the City, and are unlikely to have permeable surfaces that would allow recharge to occur.

Groundwater Vulnerability

Groundwater vulnerability (intrinsic susceptibility) is generally defined as the likelihood of groundwater contamination due to the introduction of a pollutant at the ground surface. The key attributes are the depth to the water table or aquifer, and the hydraulic conductivity of the geological material in the unsaturated zone. Based on the above assessment criteria, groundwater vulnerability is considered to be *high* in the middle portion of B-Line; *medium* for the remaining portions of the corridors, except near the west end of B-Line in the Dundas Valley, where it is considered *low*.

Information related to source water protection is referenced from the Assessment Report for the *Hamilton Region Source Protection Area (Halton-Hamilton Source Protection Committee, 2015)*, including:

- Well Head Protection Areas
  - No Wellhead Protection Areas (WHPAs) are identified within or near the study area boundaries. The closest WHPA (Greensville well field) is located approximately 5km northwest of the western portion of B-Line.
- Intake Protection Zones
  - The Woodward Municipal Supply system is the only drinking water system that draws water from Lake Ontario located within the *Hamilton Region Source Protection Area*. It has three intake pipes (although only one is currently in use).
  - To protect the quality of the Lake Ontario water, the nearshore environment in the vicinity of the surface water intake was assessed and delineated. The delineated areas could offer protection to the water supply through the implementation of policies. These delineated areas are called intake protection zones (IPZ). Three zones (IPZ-1, IPZ-2 and IPZ-3) have been delineated for the Woodward drinking water intake system.

Existing Groundwater Users

The proposed LRT corridors are located in heavily urbanized areas that utilize a municipal drinking water supply system; no private groundwater users/wells are expected within the project study area.

3.1.2. Contamination[2]

A *Contamination Overview Study* (COS) was conducted to identify actual or potential sources of contamination. Assessments included a site inspection and historical review. The site inspections were undertaken on July 8 and September 9, 2016. EcoLog ERIS specializes in providing environmental and historical information compiled from government and private source records.

An EcoLog ERIS database search was commissioned for the OMSF site, and potential contamination sources are outlined below.

Dillon Report (2009)

A number of potential contaminated sites were identified along the B-Line through the review of a variety of geotechnical and environmental reports. As a result, it is likely that contaminated soil and groundwater will be encountered during the construction of the project. The site locations identified by Dillon as having actual or potential contamination are summarized in Table 3-1.

Table 3-1: Potential Contaminated Sites (Dillon 2009)

Nearest Major Intersection	Geotechnical Report Number	Report Reference Information	Actual/Potential Contamination Investigation and/or Type
King Street & Gage Avenue	517[1]	Sitest Engineering, 1989. Geotechnical Investigation, Proposed Sanitary Sewers, King Street (Gage to Glendale), Hamilton, Ontario. File No. 8903.	Gasoline
King Street & Ottawa Street	646[1]	Mountainview Geotechnical Ltd., 1992. Geotechnical Investigation, Proposed Sewer Installations, City of Hamilton. Project No. S0220.	Petroleum hydrocarbons
Main Street West & Cootes Drive	684[1]	Trow Consulting Engineers Ltd., 1993. Phase I Geo-Environmental Assessment, Cootes Drive Rail Lands, Hamilton Ontario. Project: H02917-E.	Phase I Investigation
Main Street West & Cootes Drive	693[1]	Trow Consulting Engineers Ltd., 1993. Follow-up Environmental Testing, CP Rail Right-of-Way Adjacent to Cootes Drive, Hamilton Ontario. Project: H02917-E.	Follow-up to Phase I (684[1]), to investigation potential PAH impacts in soil and groundwater.
Main Street, King Street & Highway 403	695[1]	Peto MacCallum Ltd., 1993. Geotechnical Investigation King/Main Street Storage Tank, Hamilton, Ontario. Job No. 93HF100	Refuse fill (historical landfill)
Main Street East & Sherman Avenue	ESA1_29[1]	Jacques Whitford, 2008. Soil Analytical Results – Northern and Western Property Lines, Former Sunoco Retail Outlet No. 5995. 790 Main Street East, Hamilton, Ontario. Project No. 102865	Petroleum hydrocarbons
Main Street West & Cootes Drive	ESA1_33[1]	WESA, 2008. Phase I Environmental Site Assessment of City of Hamilton Rail Trail Corridor, Hamilton, Ontario. File: W-B5247-00.	Phase I Investigation
Main Street East & Gage Avenue	ESA1_34[1]	AMEC Earth & Environmental, 2007. Phase I Environmental Site Assessment, Commercial Property, 979 Main Street East & 56 East Bend Avenue South, Hamilton, Ontario. TB71002.	Phase I Investigation
Main Street East & Gage Avenue	ESA2_13[1]	Peto MacCallum Ltd., 2008. Phase II Environmental Site Assessment 979 Main Street East and 56 East Bend Road South, Hamilton, Ontario. PML Ref.: 08HX011	Phase II Investigation – includes petroleum hydrocarbons

Source: Dillon Consulting Limited (Dillon), 2009. City of Hamilton Rapid Transit Initiative Hydrogeology Report – Final, Report to City of Hamilton, March, 2009.

SNC-Lavalin Report (2011)

In 2011, SNC-Lavalin reviewed additional available information from City of Hamilton databases, and completed a field visit to further identify potential contamination sources in the vicinity of the site (along B-Line). Based on the review and site visit, the following additional sites were identified that may have potentially contaminating activities.

[2] Source: Hamilton LRT – Environmental Project Report Addendum, Contamination Overview Study, prepared by SNC-Lavalin February 24, 2017.

Table 3-2: Sites with Potentially Contaminating Activities (SNC-Lavalin 2011)

Location	Potentially Contaminating Activity	Potential Contaminant	Reference
Queenston Road & Parkdale Avenue S.	Auto repair shop	Petroleum hydrocarbons, metals and VOCs	Hamilton report ID # 997
			Field observation
King Street E. & Gage Avenue N.	Auto battery shop and Auto sales shop	Petroleum hydrocarbons, metals and VOCs	Field observation
Main Street E. & Ottawa Street N.	Auto tire and repair shop	Petroleum hydrocarbons, metals and VOCs	Field observation
	Auto repair shop		Hamilton report ID # 969
Main Street E. & Kenilworth Avenue N.	3 auto repair shops, dry cleaning depot	Petroleum hydrocarbons, metals and VOCs	Field observation
	Auto garage - oil and lube services; Auto glass and gas station		Hamilton reports ID # 990 and # 984
Queenston Road & Parkdale Avenue S.	Auto repair shop	Petroleum hydrocarbons, metals and VOCs	Field observation

Source: SNC-Lavalin Inc., 2011. Technical Report, Hamilton LRT – B-Line, Updated Hydrogeological Report; Report to City of Hamilton, October 2011.

SNC-Lavalin Update Report (2016)

Based on a review of aerial photography, the proposed OMSF site has been used as an industrial facility since at least 1934. Various companies have occupied the property including registered waste generators such as Hamilton Metal Trading Inc., CTK Railcar Service Inc., and Elko Industrial Trading. These companies were listed as generators of hazardous wastes from 1986 to 2011. During a field inspection, the following potentially contaminating activities were noted at the proposed OMSF site:

- Scrap metals and stains were noted in the warehouse building;
- The building floor consists of old wood tiles;
- An old spur line is still present north of the building;
- A train tanker of unknown content was noted north of the building; and
- Scrap metal was noted in the northern portion of the site.

The following concerns were noted on the surrounding properties:

- A steel manufacturer, Republic Steel, is present on the adjacent property to the north and east of the site;
- Two above ground storage tanks (ASTs) were observed on the adjacent property to the east of the site;
- One auto repair shop is located approximately 150m east of the site;
- Storage tanks on the CP property are located approximately 50m east of the site; and
- Fill of unknown origin and quality was present on an adjacent property west of the site.

3.1.3. Vegetation and Vegetation Communities[3]

Background Information and Existing Conditions

To date, a number of environmental studies have been conducted covering the proposed B-Line alignment. These include:

- Terrestrial and Avian Ecology Report (Dillon, 2009); and
- Hamilton Rapid Transit B-Line Preliminary Design and Feasibility Environmental Conditions Report (Steer Davies Gleave, 2011)[4].

As part of the Ecological Update, these previously assessed areas were considered in the context of the new LRT alignment. The reach of Chedoke Creek and Gage Park are not impacted by any changes to the current layout. These areas were not reassessed in detail; though general surveys were conducted in these areas to confirm previous characterizations. Investigations also included Cathedral Park, although there were no significant alignment alterations, and on the new OMSF site.

Ecological Land Classification

The vegetation survey program completed as part of this study was conducted to update works completed for the B Line where applicable, and to include new survey information regarding the OMSF. The Vegetation study areas were surveyed to confirm or to update and characterize the vegetation community types present, and to assess potential impacts related to the proposed development. Vegetation communities were assessed using the Ecological Land Classification (ELC) Protocol for Southern Ontario (Lee et al. 1998). These units were delineated based on a review of available aerial photography, and refined through site investigation. Plant species were documented as they were encountered during the field surveys. A complete list of the vascular plant species found is presented in the Ecology Technical report found in Appendix C. For example:

- B-Line
  - Existing vegetation communities along the portion of the B-Line proposed (including remnant natural communities near Cathedral Park, and Gage Park), have not changed from those presented in Appendix A: City of Hamilton 2011 B-Line Light Rail Transit Environmental Project Report.
- OMSF Site
  - The new OMSF site is located in the vicinity of Chatham and Frid Street, east of Longwood Road South. This site is a heavily altered historic industrial site with remnant woodlots, thickets, and meadow associations; intermixed with disturbed areas (see Figure 3-1). One remnant woodlot of some quality remains extending to the north along the Chedoke Creek valley system. This unit is not impacted by the proposed development, and no future development is planned at this time. Some of the vegetation that is present at the OMSF site are *cultural units* and *forest units*.

Cultural Units

The majority of the eastern portion of the OMSF site is occupied by remnant or regenerating culturally impacted communities resulting from previous site disturbance. Portions of the OMSF area are still in active use as storage for tree removal/wood chipping waste. Much of this area was previously cleared and covered with gravel for previous use.

Many of these areas have been left unused and vegetation has begun to repopulate. Other portions, along fence lines and former access roads, consist of remnant vegetation or regrowth from initial disturbance to woodland or thicket type communities, typical of disturbed areas.

[3] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, October February 24, 2017.

[4] Steer Davies Gleave, SNC-Lavalin Inc. and Dialog. 2011. Hamilton Rapid Transit Preliminary Design and Feasibility Study. B-Line Environmental Conditions Report.

- CUM1-1 (Dry Moist Old Field Cultural Meadow)
    - This community is found in the gravel portions of the site not currently in use, as well as along the margins of former access roads and parking areas where cover is typically denser. These communities include grass species such as Smooth Brome (Bromus inermis), Orchard Grass (Dactylis glomerata), Red Top (Agrostis gigantea), Kentucky Blue Grass (Poa pratensis), and Timothy (Phleum pretense). Other broadleaved vegetation is typical of disturbed areas, and includes Dandelion (Taraxacum officinale), Birdsfoot Trefoil (Lotus corniculatus), Chicory (Chichorium intybus), Canada Thistle (Cirsium arvense), Garlic Mustard (Alliaria petiolata), Sweet White Clover (Meliotus alba), Queen Ann's Lace (Daucus carota), as well as perennial asters and goldenrods. Depressions and low lying areas within this portion of the site are dominated by Common Reed (Phragmites australis).
- CUT1-1 (Sumac Cultural Thicket)
    - Found along the western edge of the gravel/cultural meadow portion of the site, this community occupies a berm that is likely a remnant of original site grading. Tree cover is sparse in most places with higher concentrations along the fenceline with Manitoba Maple (Acer negundo), Siberian Elm (Ulmus pumila), and Black Locust (Robinia pseudo-acacia) the most common species. Staghorn Sumac (Rhus typhinia) dominates most areas of the community, with other sub-canopy species including small Manitoba Maple and Siberian Elm. Understorey and ground cover is composed of small Staghorn Sumac, Riverbank Grape (Vitis riparia) as well as species found in the adjacent cultural meadow community.
- CUW (Cultural Woodlot)
    - This community type is found around many of the fencelines and margins of the site where vegetation was not maintained as closely for previous site operations. Manitoba Maple is the predominant tree species with other common contributors being Siberian Elm, Black Locust, Black Walnut (Juglans nigra), Tree of Heaven (Ailanthus altissima), Balsam Poplar (Populus balsimifera), and Eastern Cottonwood (Populus deltoides). Shrub and understorey vegetation consists of Common Buckthorn (Rhamnus cathartica), Staghorn Sumac, Slender Willow (Salix petiolaris), and Tartarian Honeysuckle (Lonicera tatarica). Herbaceous ground cover consists of similar species to those found in the adjacent cultural meadow communities.

Forest Units

The below communities are principally associated with the remnant forest surrounding the Chedoke Creek valley. Some of these communities have been impacted by adjacent developments, especially on their margins, while some are more reflective of natural remnant communities.

- FOD 4 (Dry Fresh Deciduous Forest)
    - This community is found in several locations, adjacent to an old parking area south of Chatham Street, and along margins of the scrap metal facility (Elko Industrial Trading Corporation) and the west bank of Chedoke Creek. This community is characterized by the same tree community as the CUW units, reflecting past disturbance from adjacent land uses. Black Walnut is a larger contributor than in the CUW units, and Manitoba Maple is less frequent. Hawthorn species (Crategus sp.) are common at the south limit near Aberdeen Avenue, and near the northern end of the Elko scrap metal facility. There are several larger Red Oak (Quercus rubra) and Basswood (Tilia americana). Shrubs in this community typically consist of Common Buckthorn, Tartarian Honeysuckle, Choke Cherry (Prunus virginiana), and Red Raspberry (Rubus idaeus). Herbaceous vegetation is dominated by goldenrod species (Solidago sp.), Virginia Creeper (Parthenocissus quinquefolia), and Garlic Mustard (Alliaria petiolata).
- FOD 5-3 (Dry Fresh Sugar Maple - Oak Deciduous Forest)
    - This community occupies most of the eastern Chedoke Creek valley slope. The canopy and subcanopy are mainly Sugar Maple (Acer saccharum) with smaller contributions from a variety of other hardwood species including Red Oak, American Beech (Fagus grandfolia), Basswood, Green Ash, Ironwood (Ostrya virginiana), Blue Beech (Carpinus carolinia) and Black Cherry (Prunus serotina). Butternut was also found within this unit. Shrubs in this community are predominantly Choke Cherry, with occasional Witch-hazel (Hamamelis virginiana), and Common Buckthorn. Herbaceous vegetation was fairly sparse and consisted mainly of grass and goldenrod species.
- FOD 7-2 (Moist Ash Lowland Deciduous Forest Type)
    - This is lowland forest community associated with the Chedoke Creek valley bottomlands at the north end of the study area. The canopy layer is well developed and is predominantly Green Ash (Fraxinus pennsylvanica). Evidence of emerald ash borer activity was noted in many of the ash within the unit. Other canopy species include Manitoba Maple, Basswood, Tree of Heaven and Willow (Salix sp.). Butternut (Juglans cinerea) was also noted in this unit. The subcanopy layer is consists of Green Ash and Manitoba Maple. The shrub layer is dominated by Common Buckthorn with smaller contributions from Alternate-leaved Dogwood (Cornus alternifolia) choke cherry, Purple Flowering Raspberry (Rubus odoratus), Virginia Creeper, Garden Red Current (Ribes rubrum), Red Raspberry and Tartarian Honeysuckle. Notable ground cover species include Rough Avens (Geum laciniatum) and Coltsfoot (Tussilago farfara).

Vegetation Species at Risk[5]

A total of 73 species were recorded during the field program, which are included in an annotated species list in Appendix C. Of these, 33 (45%) are non-native species, most of which are typical of culturally impacted environments, and which have experienced some degradation over time due to anthropogenic pressures from historic development and encroachment. It should be noted that the species list, though relatively comprehensive, is not a complete list of the plants of the area.

Nomenclature is primarily in accordance with Newmaster (1998), and secondarily with NHIC (2016). The majority of the species observed (67) are listed as '*secure*, *common* and *widespread*' in Ontario (S5, SE5), and the remainder (6) are listed as '*apparently secure*, and *uncommon but not rare*' in Ontario (S4, SE4).

A search of the NHIC element occurrence data for the area listed 27 historic species reports within the 1km blocks covering the proposed project. Twenty of the species' reports were greater than 40 years old and included several species now considered extirpated by NHIC. Table 3-3 lists the species' occurrences from the last 40 years, none of which were observed during the field surveys.

Table 3-3: NHIC Occurrence Data – Vegetation

Scientific Name	Common Name	Rank	Last Observation	COSSARO	COSEWIC
BLOCK COVERING SITE					
Castanea dentata	American Chestnut	S2	1993-08-09	END	END
Uvularia perfoliata	Perfoliate Bellwort	S1	2001-05-11	No status	No status
Shenopholis nitida	Shiny Wedge Grass	S1	1988	No status	No status
Crataegus brainerdii	Brainerd's Hawthorn	S2	1981-09-07	No status	No status
Crataegus pruinosa var dissona	Northern Hawthorn	S3	1981-09-05	No status	No status
Mertensia virginica	Virginia Bluebells	S3	1999-05-20	No status	No status
Carix albicans var. albicans	White-tinged Sedge	S3	1980-05-17	No status	No status

Note: All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species.

[5] Source: City of Hamilton LRT Project – Tree Inventory Report; prepared by AECOM, January 10, 2017.

One Species at Risk (SAR) vegetation species was observed during the field survey performed by SNC-Lavalin (see Appendix C-5). Butternut trees (Juglans cinerea) were found in the Chedokee Creek valley system within the deciduous forest units, north of the OMSF footprint during ELC and general vegetation survey activities. Butternut is listed as an Endangered Species both federally and provincially. Given that the scope of the current surveys was focused on vegetation classification and general vegetation survey, there is a potential for more butternut to be found in this area. A focused butternut/health assessment survey was later conducted as part of the tree inventory by AECOM.

A total of twenty (20) Butternut trees (Juglans cinerea) were found within the proposed OMSF property. The location of each Butternut is illustrated on Figure 3-2 along with the general habitat boundaries for each tree. The description of each Butternut general habitat boundary category is as follows:

- Category 1 habitat: A Butternut individual and suitable areas within a 25m radius around the individual will be considered to have the lowest tolerance to alteration. This area provides tree specific protection (this is a no-touch zone).
- Category 2 habitat: Suitable areas between 25m – 50m from a tree will be considered to have a moderate tolerance to alteration. This area is considered necessary habitat for seed dispersal and species recruitment (portions of these area may be affected depending on amount and type of activity).

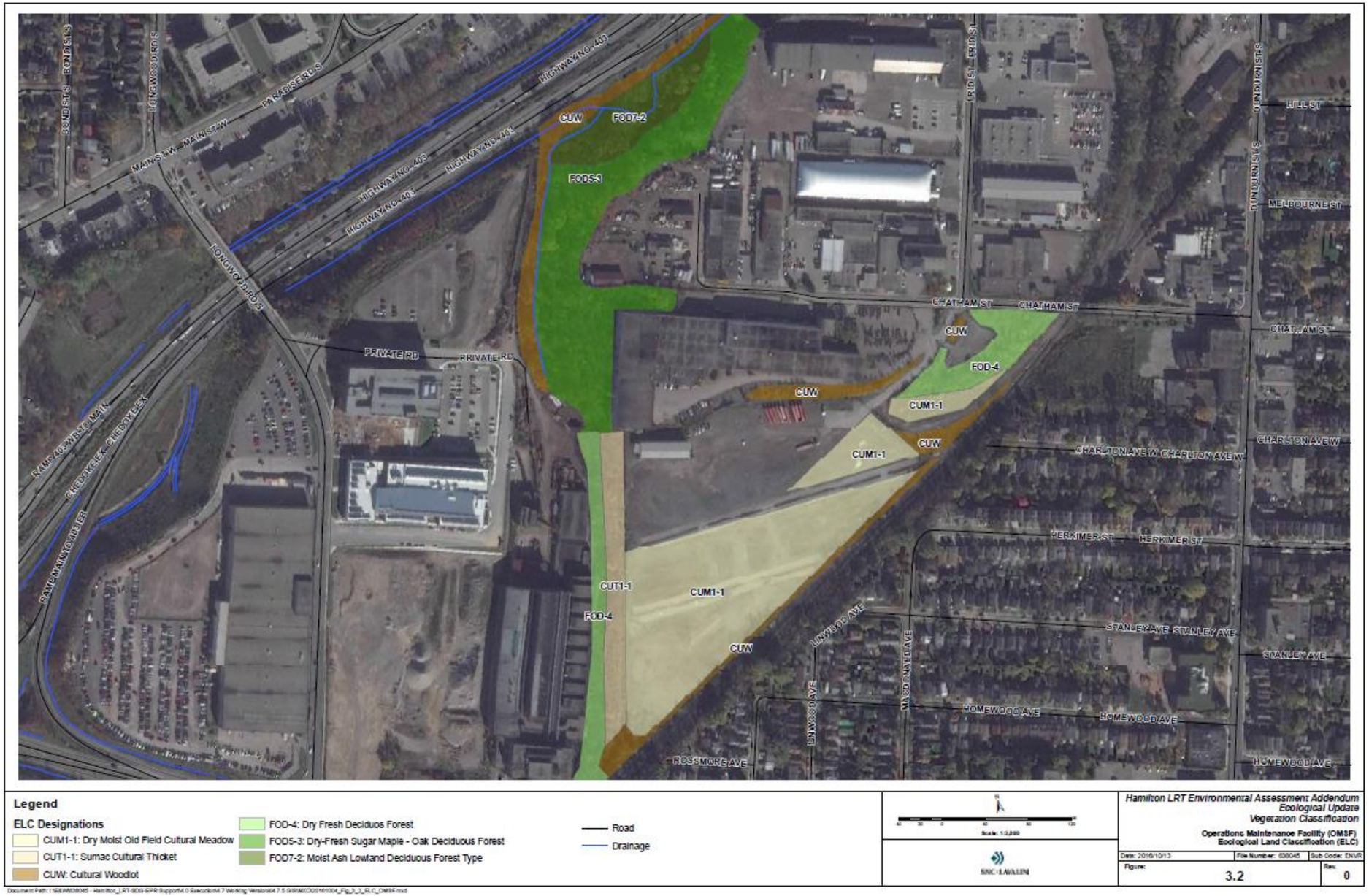
This species is designated as 'Endangered' under the ESA 2007. Requirements for removal are dependent on tree health and whether the tree is a hybrid (hybrids are not protected). As such, a health assessment is required to be completed by a Qualified Butternut Health Assessor. The Butternut health assessment must be completed before any activity can commence. The assessment will determine any permitting requirements should the removal of Butternut trees be required. The Butternut trees were inventoried and assessed and can be found in Table 3-2.

*Table 3-2: Provincially Endangered Butternut Trees**

Tree No.	Species	DBH cm**	Significance
TR8	Butternut (Juglans cinerea)	TBD	Endangered
TR43	Butternut (Juglans cinerea)	13	Endangered
TR90	Butternut (Juglans cinerea)	TBD	Endangered
TR91	Butternut (Juglans cinerea)	10.5	Endangered
TR92	Butternut (Juglans cinerea)	21.5	Endangered
TR93	Butternut (Juglans cinerea)	5	Endangered
TR94	Butternut (Juglans cinerea)	15	Endangered
TR95	Butternut (Juglans cinerea)	22	Endangered
TR96	Butternut (Juglans cinerea)	45	Endangered
TR97	Butternut (Juglans cinerea)	28	Endangered
TR98	Butternut (Juglans cinerea)	27	Endangered
TR99	Butternut (Juglans cinerea)	38	Endangered
TR100	Butternut (Juglans cinerea)	38	Endangered
TR101	Butternut (Juglans cinerea)	19	Endangered
TR102	Butternut (Juglans cinerea)	18	Endangered
TR103	Butternut (Juglans cinerea)	13.5	Endangered
TR104	Butternut (Juglans cinerea)	32	Endangered
TR105	Butternut (Juglans cinerea)	14.5	Endangered
TR150	Butternut (Juglans cinerea)	25	Endangered
TR151	Butternut (Juglans cinerea)	21	Endangered

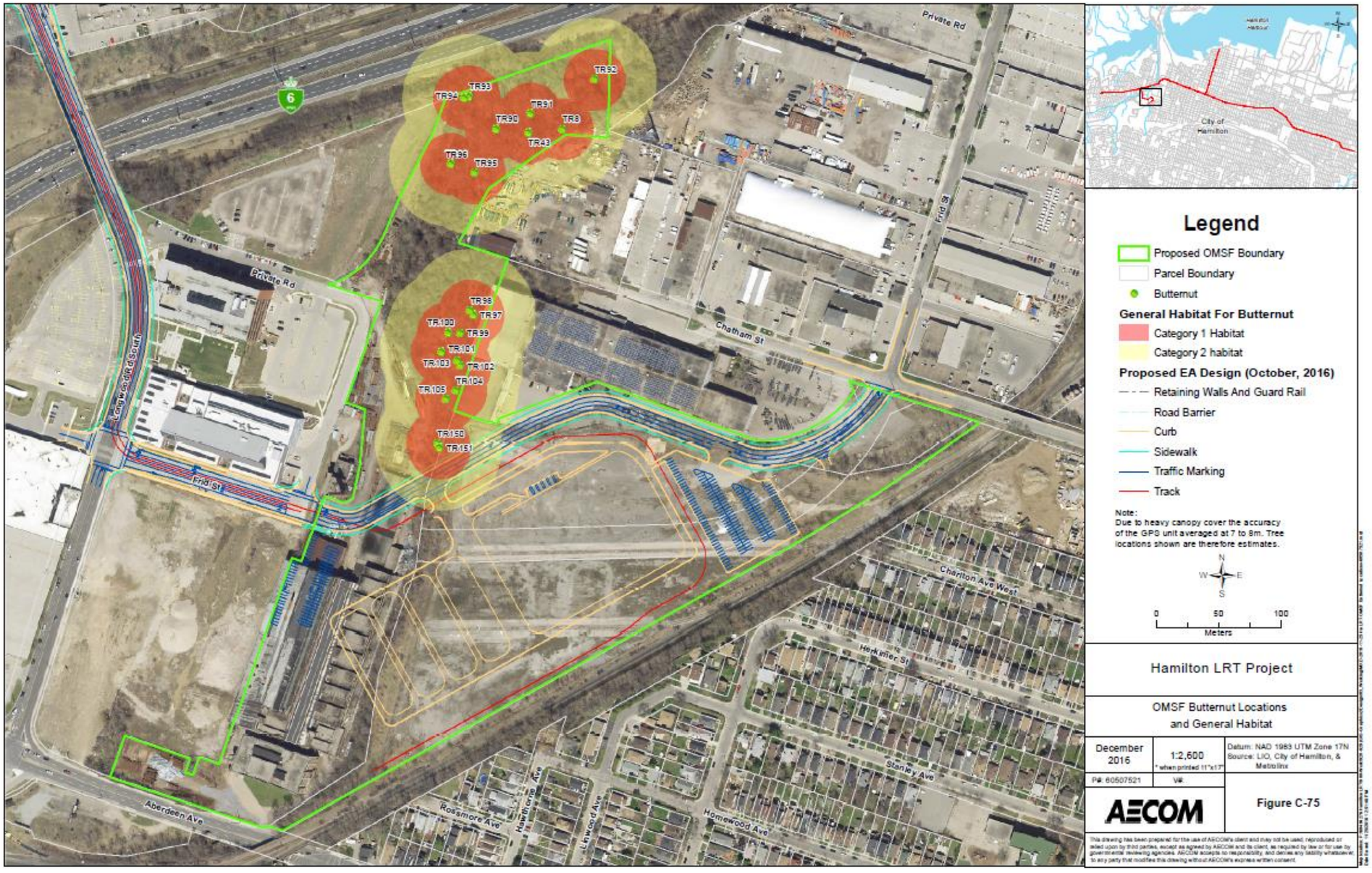
**The condition rating (Excellent, Good, Fair, Very Poor, Poor, or Dead) could not be accurately assessed for all Butternut trees due to lack of foliage and timing of the field investigations. A separate health assessment will be conducted to confirm the health condition of Butternut trees.*
***DBH was not recorded for all Butternut trees because DBH measurement was not included as part of the tree tally. DBH will be recorded during the Butternut health assessment.*

Figure 3-1: Vegetation Classification



Source: Modified from original; Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, February 24, 2017; p.10.

Figure 3-2: Butternut locations



Note: The OMSF site configuration was updated subsequent to the tree inventory. The most current OMSF site configuration is reflected within Figure 2-11.

Source: City of Hamilton LRT Project – Tree Inventory Report - Appendix A, Figure C-75; prepared by AECOM, January 10, 2017.

Arborist Assessment[6]

A certified arborist conducted a site assessment of the proposed Hamilton LRT B-Line route, on August 29 2016, to determine whether the proposed Hamilton LRT route would conflict with any tree species protected under the *Canada's Species at Risk Act* (2002) or the *Ontario Endangered Species Act* (2007). The following species, identified under the *Species at Risk in Ontario List*, have been found within, or adjacent to, the limits of municipality of Hamilton: Butternut (*Juglans cinerea*) and American chestnut (*Castanea dentate*).

Trees located within the municipal right of way within the B-Line municipal right-of-way were included in the assessment. The outcome of the site assessment was that no butternut or American chestnut trees were identified in the municipal right-of-way for the B-Line route.

3.1.4. Wildlife and Wildlife Habitat[7]

Wildlife Habitat and Communities - Surveys

Potential habitat identified within the OMSF study area was completed through agency consultation, review of background information (aerial photography, databases, existing reports), and field surveys. The study area included remnant natural features, watercourses, and woodlands. The survey methodologies applied to assess wildlife habitat and presence/absence of wildlife include:

- Amphibians – Frog Calling
  - A breeding amphibian survey was not completed, as there is no suitable habitat within the study area.
- Breeding Bird Survey
  - Breeding bird survey protocols were designed and completed based on recommendations given by the Forest Bird Monitoring Protocol (FBMP), and the Ontario Breeding Bird Atlas (OBBA). The Forest Bird Monitoring Protocol recommends completing standardized point counts to survey an area for breeding birds. These point counts are required to be at least 250m apart and at least 100m from the edge of a habitat type. Breeding Bird surveys were focused on the new OMSF site, found in the vicinity of Chatham and Frid Street, east of Longwood Road South, and shared running track will extend from the intersection of Longwood and Main Street, across Longwood Bridge over Highway 403, and via Frid Street to the north end of the site.
  - Due to the small size of the OMSF, point counts would be ineffective and impractical since only one or two point counts could be completed in the study area. Therefore, an active search was determined to be the most accurate and efficient way to sample the breeding bird species within the OMSF. This involved looking and listening for birds while moving between the different habitat types in the OMSF.
  - The purpose of these surveys was to categorize the resident breeding bird population. A qualified ornithologist conducted breeding bird surveys in June and July 2016, closely following the survey protocol developed by Bird Studies Canada. Biologists with experience in bird identification by sight and sound conducted the breeding bird surveys:
    - Three formal visits were made to the OMSF for breeding bird surveys on June 16, 23 and July 8, 2016. Visits were separated by more than 6 days.
    - Breeding bird surveys took place during suitable weather conditions (i.e. clear, sunny, with very little wind).
    - Surveys were conducted from 30 minutes before sunrise (approximately 4:45am in June) to no later than 10:00am.
    - Due to the small size of the study area, it was traversed systematically on foot to record both breeding and non-breeding birds. SNC-Lavalin biologists did not use any invasive monitoring techniques (i.e. nest searches, call-playback surveys).
  - Breeding evidence was noted for each species observed in the study area. Breeding evidence is divided into four categories: confirmed (CONF), probable (PROB), possible (POSS), and none (NONE).
    - Confirmed breeding evidence includes: observations involving young birds or eggs; observations of adult birds carrying food, nesting material, and/or a fecal sac; observations of adult birds involved in a distraction display; and/or observations of adult birds exhibiting physiological evidence of a brood patch.
    - Probable breeding evidence includes observations of a bird occupying territory for at least seven (7) days, visiting a nest site, and/or exhibiting territorial behavior; observations of a pair in appropriate habitat; and/or observations of a pair copulating.
    - Possible breeding evidence includes observations of a singing male and/or observations of a bird in suitable breeding habitat.
    - Migrant or vagrant birds are considered to have no breeding evidence.
- Mammals
  - Mammal surveys were conducted to enable the delineation of habitat and completion of wildlife inventory. Visual observations of area wildlife (including mammals and insects were recorded during the site investigation at the OMSF, as well as during the site walk along the B Line, including:
    - Den sites, nesting, breeding, migratory stopover, overwintering areas, and all areas that are recognized as Significant Wildlife Habitat (per the Technical Guide, MNRF, 2000 in compliance with the Provincial Policy Statement);
    - Comprehensive list of all wildlife observed in the project area, with their respective rank identified (i.e. local, provincial, national ranking);
    - Opportunistic sightings or sign of mammal presence during field activities was also recorded.
    - Mammals were also documented according to incidental sightings including sight, smell, scat, trails, tracks, roadkill or other evidence of presence within the project area. Mammal surveys were conducted in concert with breeding bird surveys.
- Species at Risk
  - As approved by the Ministry of Natural Resources and Forestry (MNRF), the Provincial Policy Statement (PPS) defines the significant habitat of *endangered* (END) or *threatened* (THR) species as the habitat that is necessary for the maintenance, survival and/or the recovery of a naturally occurring or reintroduced population of *endangered* or *threatened* species, and where those areas of occurrences are occupied (or habitually occupied) by the species during all or part(s) of their life cycle. The MNRF is mandated to ensure accurate database information for the identification, listing, and conduction of ongoing assessments for significant *endangered* species and their related habitats.
  - To determine presence/absence of Species at Risk (SAR) within the study area, background data was collected and reviewed from various published and non-published sources.

Wildlife Habitat and Communities - Results

The following subsections provide a brief description of wildlife habitat and communities, documented as a result of background review and field efforts to determine species' presence/absence and habitat features. These include:

- Birds
  - During the 2016 field season, SNC-Lavalin biologists conducted three breeding bird surveys at the OMSF. A total of thirty-eight (38) species were observed over the course of the breeding bird surveys, which are detailed in the

[6] Source: Appendix C-5. Arborist review of proposed Hamilton LRT route with respect to the presence/absence of endangered tree species, August 30, 2016.

[7] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, February 24, 2017.

Ecology Report within Appendix C. It is suspected that all species observed were either breeding on site or in close proximity to the site, as most species were observed on site during both surveys. A total of one hundred and twenty-two (122) bird species were documented in the larger area though a review of the Breeding Bird Atlas square summary sheets, which are included in Appendix C.

- Barn Swallows (Hirundo rustica) (Migratory, SARA listing: *threatened*; ESA listing: *threatened*) were observed flying in and out of the Canadian Drawn Steel Company buildings, which are located immediately adjacent to the OMSF. The Barn Swallows appear to be nesting inside the buildings, and utilizing the OMSF lands as foraging habitat. Barn Swallow fledglings were observed perched on wires within the OMSF and being fed by adults.
- Of species documented in the subject properties of the detailed-design project area by SNC-Lavalin in 2016:
  - Two are regulated under the Fish and Wildlife Conservation Act as Game or Protected species; and
  - 25 are regulated under the *Migratory Birds Convention Act*.
- Ontario Partners in Flight (PIF) and the Ontario Landbird Conservation Plan identified bird species of conservation concern in the Lower Great Lakes/St. Lawrence Region (Bird Conservation Region 13 or BCR 13). The purpose of the Ontario Landbird Conservation Plan is to "guide landbird conservation efforts in order to sustain the distribution, diversity, and abundance of birds in this settled landscape" (Ontario Partners in Flight, 2008). The Landbird Conservation Plan has identified area sensitive bird species, and these habitats typically coincide with interior habitat 100m in from forest edges. Area sensitive species, as designated by Bird Studies Canada (Courturier, 1999), that were observed in the OMSF include: Northern Mockingbird (Mimus polyglottos), Savannah Sparrow (Passerculus sandwichensis), American Goldfinch (Spinus tristis), Barn Swallow, Brown-headed Cowbird (Molothrus ater), Eastern Kingbird (Tyrannus tyrannus), Field Sparrow (Spizella pusilla), Eastern Towhee (Pipilo erythrophthalmus), Scarlet Tanager (Piranga olivacea), and Turkey Vulture (Cathartes aura).

- Mammals
  - Incidental wildlife observations for the OMSF/B-Line included White-tailed Deer (Odocoileus virginianus), Eastern Grey Squirrel (Sciurus carolinensis), Eastern Coyote (Canis latrans) and Raccoon (Procyon lotor).
  - All of these mammals are common and secure in Ontario, and include species that are tolerant of human presence and disturbance, commonly found in urban and urbanizing landscapes.
  - No mammal Species at Risk (SAR) or potential habitat were documented in the project area.
  - No reptiles were observed and the only amphibian observed/heard was Grey Tree Frog (*Hyla versicolor*)

Species at Risk - Screening Summary

A comprehensive list of all Species at Risk (SAR), with ranges overlapping the study area, is available in Appendix C, "Table 3-2: Species of Conservation Concern Habitat Potential Assessment". The table lists provincial and federal species designations, describes preferred habitat of SAR, and includes determination of presence/absence of suitable habitat for SAR within the study area.

As part of the desktop review, a search of the MNRF NHIC database (2010) was conducted to determine the existence and approximate location of recorded occurrences of SAR in the OMSF area. One 1 square kilometre (1km^2) quadrats (17NH8989) encompassing the study area was checked to ensure potential SAR were accounted for during field surveys. Since the area surrounding the OMSF is highly urbanized, and habitats have been highly altered and/or degraded over the years, searching adjacent squares was deemed unnecessary. The search yielded thirty-six (36) element occurrences, of which four (4) are listed as *endangered* (END), one (1) *threatened* (THR), and one (1) *special concern* (SC) on both the Committee on the Status of Species at Risk in Ontario (COSSARO) (Ontario, 2013) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) lists (Government of Canada, 2010). None of the element occurrences that are listed by COSSARO or COSEWIC are considered to reasonably be found within the study area, as the occurrences are very old, the habitat in the area has been altered extensively since the occurrence record, and that previous habitat is no longer available on site.

For the complete NHIC records for these species, please refer to Appendix C. In addition to a search of the NHIC database, the Ontario Breeding Bird Atlas (OBBA) (Bird Studies Canada et. al, 2006), the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2011), and the Atlas of Mammals (Dobbyn, 1994) were consulted to determine if there were any *threatened* species known to be present within the study area. The OBBA uses 100km by 100km blocks, further subdivided into 10km by 10km quares to compartmentalize geographical areas. The study area lies within the 10km by 10km squares identified as 17NH98 and 17NH88. A review of the Ontario Reptile and Amphibian Atlas suggests that the provincially *threatened* or *endangered* species with potential to be in the area is Jefferson Salamander (Ambystoma jeffersonianum), Massasauga rattlesnake (Sistrurus catenatus) and Eastern Musk Turtle (Sternotherus odoratus).

The MNRF and Hamilton Conservation Authority (HCA) were contacted for information pertaining to Species at Risk in the general area. MNRF recognizes the presence of 60 Species at Risk within the City of Hamilton (refer to Appendix C for the full list. The MNRF also has records for the following species within the vicinity of the study area including: Chimney Swift, Blanding's Turtle (Emydoidea blandingii), Spiny Softshell (Apalone spinifera), Snapping Turtle (Chelydra serpentina), Northern Map Turtle (Graptemys geographica), Peregrine Falcon and Barn Swallow. The MNRF noted that all the turtle species are associated with Cootes Paradise/Hamilton Harbour.

From the species listed, SNC-Lavalin has further refined the data to present a summary of the SAR that may be present, or may have suitable habitat, within the project area. These species are discussed below under the appropriate taxa headings.

For this desktop exercise, the species at risk has been divided in to five (5) taxa: Birds, Herpetofauna, Mammals, Arthropods, and Vegetation.

- Birds
  - Peregrine Falcons are known to nest at the Sheraton Hamilton Hotel (HCCP, 2016), that is located on King Street along the B-Line. In urban centres, Peregrine Falcons select ledges on tall buildings for nesting purposes and have strong nest-site fidelity. While the Project Works fall within the nesting territory of the Peregrine Falcons on the Sheraton Hamilton Hotel, it is unlikely that the scale of the works will impact the pair.
  - In addition to the records above, SNC-Lavalin has identified three (3) additional SAR with suitable habitat present within the study area: Barn Swallow, Chimney Swift, and Common Nighthawk.
  - Barn Swallows are known to nest in artificial structures in urban areas, including barns, garages, houses, bridges, and culverts. Barn Swallows have been observed flying in and out of the Canadian Drawn Steel Company buildings which are located immediately adjacent to the OMSF. The Barn Swallows appear to be nesting inside the buildings and utilizing the OMSF lands as foraging habitat. Barn Swallow fledglings were observed perched on wires within the OMSF and being fed by adults.
  - Chimney Swifts are commonly found in urban areas near buildings and will nest in hollow trees and, more often, chimneys. The B-Line is situated within an older section of the City of Hamilton with suitable nesting structures for this species. A survey of the chimneys associated with the buildings that have been identified as potentially being required as part of the LRT stops was conducted in early June 2016. The B Line was walked and the buildings that are currently scheduled for demolition for the LRT stops were assessed for suitable chimneys for Chimney Swift nesting and roosting. The survey identified suitable chimneys. On the evening of July 5, 2016 a single Chimney Swift was observed entering a chimney at 75 Queenston Road. A full Chimney Swift nesting survey was not conducted as part of this study and will need to be conducted by a qualified avian biologist prior to any building removals.
  - Common Nighthawks are highly adapted to urban settings and are known to roost and/or nest along railways and gravel rooftops. There is likely suitable habitat for this SAR available within the study area. Notably, the Common Nighthawk is listed as Special Concern under the ESA; therefore, its habitat is not protected on provincial or private lands. Note that it is also illegal to disrupt the bird or its nest during its breeding period per the *Migratory Bird Convention Act*.
  - The remaining avian species listed in the Ecology Report (Appendix C of this Hamilton LRT 2017 EPR Addendum, under Appendix B.5 within the Ecology Report) are dependent on forest, field, and marsh habitats. As these habitat types are not present within the study area, it is unlikely that any of the birds are using this area.

- Herpetofauna
    - Records from the MNRF exist for Blanding's Turtle, Spiny Softshell and Snapping Turtle for the Hamilton area associated with Cootes Paradise and Hamilton Harbour. These species are highly dependent on large rivers, lakes and/or wetlands: habitats that are not present within the study area. These species will not be affected by the Project works.
    - Timber Rattlesnake historic records are identified for the area on NHIC. Timber Rattlesnakes are considered extirpated in Ontario, having not been recorded in the region since 1941. This species preferentially inhabits forested areas with rocky outcrops – habitat that is not present within the study area.
    - The majority of the herptiles are dependent on the proximity of lacustrine, riverine, and ephemeral habitat. Of these, the Milksnake is the only species that may be detected within the study area, owing to its diverse set of habitat preferences. Although it prefers fields and rocky outcrops, it has been known to hibernate in the foundations of older buildings. Notably, as it is listed as Special Concern under the ESA, no habitat protection is afforded to the Milksnake; it is, however, a Specially Protected Reptile under the *Fish and Wildlife Act*.
- Mammals
    - In Ontario, the Woodland Vole is a rodent that occupies a variety of habitats, though it is often associated with dry deciduous forests. The Biodiversity Explorer reveals a record of a Woodland Vole within 1 km of the study area; however, this record pre-dates 1955, and Woodland Voles have not been detected in the Hamilton area since. There is no suitable habitat for this species within the study area.
    - There are four species of bats now listed on the ESA as Endangered including: Eastern Small-footed Myotis (Myotis leibii), Little Brown Myotis (Myotis lucifugus), Northern Myotis (Myotis septentrionalis) and Tri-coloured Bat (Perimyotis subflavus).
    - Some of the buildings that have been identified for removal along the B Line may provide suitable habitat for the Little Brown Myotis.
    - Little Brown Myotis is a cavity-roosting species and stays wherever it is warm. It roosts in natural cavities under loose bark and in crevices, and in buildings where it can be found in attics, behind shutters or siding, or under shingles (Kurta 1995). Communal roosting occurs only on cooler nights. Nursing females do not use these night roosts but prefer to roost separately in maternity colonies, which can get quite large (Naughton 2012). Maternity roosts are usually in or around buildings such as barns, houses and churches, or more natural sites like tree cavities, exfoliating bark, crevices in cliffs, and small caves. A female is site loyal and will return to her maternity roost every year (Kurta 1995).
    - Bat surveys that followed the MNRF Bat Survey Methodology were not conducted. One evening of active acoustic surveys was conducted at the OMSF on July 5, 2016 and only a single Eastern Red Bat (Lasiurus borealis) was detected.
- Arthropods
    - Both arthropods are lepidopterans (butterflies) (Monarch and West Virginia White) listed as Special Concern under provincial legislation. To this effect, their habitat is not protected under the ESA. The Monarch prefers habitat with Milkweed (Asclepius spp.), and fields with other wildflowers. It is possible that Monarchs forage within the OMSF however none were observed during the field investigations. The West Virginia White, however, is a butterfly of moist woodlands; it is unlikely that this species would be encountered within the study area.

Significant Wildlife Habitat

Wildlife habitat is defined as areas where plants, animals, and other organisms live and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory or non-migratory species (OMMAH, 2014).

Wildlife habitat is referred to as significant if it is ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System (OMMAH, 2014).

Guidelines and criteria for the identification of significant wildlife are detailed in the Significant Wildlife Habitat Technical Guide (OMNR, 2000), Draft Ecoregion 7E Significant Wildlife Habitat Criterion Schedule (MNRF, 2012), and the Natural Heritage Reference Manual (OMNR, 2009). Significant wildlife habitat is described under four main categories:

- Seasonal Concentrations of Animals
    - Areas of seasonal concentrations of animals are defined as "areas where animals occur in relatively high densities at specific periods in their life cycle and/or particular seasons." At these times, species are vulnerable to ecological interferences or weather impacts. Areas of seasonal concentration are typically small in comparison to the larger habitat areas used by species at other times of the year. Examples include migrant stopover areas for birds, winter deer yards, bird breeding colonies, amphibian concentration areas, and hibernacula for snakes or bats. The identification of habitats associated with seasonal concentrations of species is typically based on known occurrences (MNRF, 2009).
    - An assessment was carried out to determine the potential for wildlife concentration areas on the OMSF Site. Resources and protocols outlined in the OMNR Significant Wildlife Habitat Technical Guide (2000) and Draft Ecoregion 7E Significant Wildlife Habitat Criterion Schedule (MNRF, 2012) were utilized to evaluate the potential for species concentration area occurrence.
- Rare Vegetation Communities/Specialized Habitats for Wildlife
    - Rare or specialized habitats include rare vegetation communities or concentrations of rare plant species. These specialized areas may also support rare animal species. The majority of tree cover on the OMSF tablelands consists of common species such as Manitoba Maple and Siberian Elm with typical meadow species found in previously disturbed areas such as grasses and Common Reed while the forest of the Chedoke Creek valley consists of Sugar Maple, Basswood, Green Ash, Manitoba Maple and a variety of shrubs and herbaceous vegetation. Further, the study area lacked significant old growth forest features which, if present, might provide specialized habitats and food sources for other species dependent on these features. None of the vegetation communities identified on the Site are designated as rare or threatened in this region.
    - Other specialized habitats include Waterfowl Nesting Areas, Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat, Woodland Raptor Nesting Habitat, Turtle Nesting Areas, Seeps and Springs, and Amphibian Breeding Habitats. The study area does not fit the criteria for any of the above specialized habitats.
- Animal Movement Corridors
    - Animal Movement Corridors are used by wildlife to move from one habitat to another, and are important to ensure genetic diversity in populations, to allow seasonal migration of animals, and to allow animals to move throughout their home range from feeding areas to cover areas. Animal movement corridors can occur at various scales; from deer moving between summer and winter grounds across a landscape, to amphibians moving between breeding habitat and feeding areas within a single vegetation unit.
    - Animal Movement Corridors are considered where confirmed or candidate Significant Wildlife Habitat has been identified by MNRF or the planning authority based on documented evidence of a habitat identified within the criterion schedules or the Significant Wildlife Habitat Technical Guide (2000). Given that no Significant Wildlife Habitat has been identified within the study area, and given that no large scale animal movement corridors for deer have been identified through a review of background documentation, consultation with MNRF, or field work conducted to date, a corridor analysis is not presented here. The Chedoke Creek valley is located within the OMSF lands and may serve to concentrate animal movement and this valley will not be disturbed during construction at the OMSF.

- Habitats of Species of Conservation Concern
    - Species of Conservation Concern generally include the groups listed below:
        - Species defined as Special Concern in Ontario;
        - Species that are listed as rare or historical in Ontario based on records kept by the NHIC;
        - Species whose populations are known to be experiencing significant declines in Ontario; and Species that have a high percentage of their global population in Ontario and are rare or uncommon in the subject area.

A geographical search for rare or special concern species presence and associated habitat was conducted using the NHIC database (OMNR, 2011). Of the thirty-six (36) element occurrences recorded for the area searched, only one (1) is a species of conservation concern (Woodland Vole (Microtus pinetorum) and it does appear on the SARO. NHIC records for all 36 element occurrences are provided in Appendix C, but are not discussed further within this report.

A review of aerial photographs, available habitat types within the general area, the Ontario Breeding Bird Atlas (OBBA) (Cadman et al, 2007), the Ontario Reptile and Amphibian Atlas (Ontario Nature, 2011), and the Atlas of Mammals (Dobbyn, 1994) were completed to determine potential for species of Conservation Concern. In addition to the endangered species, an assessment of the habitat potential for the species of conservation concern on the Site is provided in Appendix C.

The Common Nighthawk was the only species of conservation concern, both ESA and SARA, where habitat potential was observed. The species was not observed. However suitable habitat is located on the OMSF lands as field observation showed preferred habitat of open land with some rocky, gravelly soils.

3.1.5. Designated Natural Areas and Parks[8]

A review of NHIC, HCA, and City of Hamilton resources confirm the findings of the previous studies that there are no designated environmentally sensitive areas within 120m of the proposed LRT alignment and associated facilities.

The NHIC database was searched for the presence of ANSIs near the OMSF and B Line. No ANSIs were identified within 120m of the study area. There were three Natural Areas located close to the study area that were identified during the NHIC search. The Dundas Valley and Dundas Marsh are an Important Bird Area (IBA) and the Niagara Escarpment Biosphere Reserve is an International Biosphere Reserve. Both of these areas are located outside of the study area.

The Cootes Paradise Drowned Valley is a life science Area of Natural and Scientific Interest (ANSI), and a Provincially Significant Wetland (PSW), as defined by MNRF. It is also designated as a Core Area under Schedule B, and an ESA in schedule B-6 of the Urban Hamilton Official Plan (City of Hamilton, 2009). A portion of the lands designated as ESA, and Core Area are found approximately 130m to the north of the proposed LRT B-Line.

3.1.6. Surface Water[9]

There is one watercourse within the study area, which is Chedoke Creek. This watercourse is located within the western study area limits generally following the alignment of Highway 403 and flows in a general southeasterly direction. The Creek is not impacted by the development of the B-Line that will run over a channelized section along Main Street before veering north to King Street through Cathedral Park. The western portion of the OMSF is the only other section were development encroaches on the creek system, but in this reach the creek flows underground through the entire study area.

3.1.7. Fish and Fish Habitat[10]

To confirm background conditions and the sensitivity of fish and fish habitat reported by others, a field investigation was conducted on June 16, 2016 to fully characterize and assess habitat features present within Chedoke Creek and included:

- Documented information on stream type, substrate, morphology, bank stability; and
- In-stream cover, near shore cover vegetation, migratory obstructions and presence of any critical habitat (i.e., spawning, nursery or over-wintering habitat).

The field investigation study area for the watercourse crossings included the proposed B-Line corridor, plus 50m upstream and 200m downstream of the assumed right-of-way of the corridor.

Fish community sampling and inventory was not completed as background data was deemed sufficient for the assessment of the fish community present at the watercourses in the study area. Information reported on fish species present is primarily from MNRF historical fish collection records available and the Hamilton Harbour and Watershed Fisheries Management Plan (MNRF/HRCA, 2009). The timing of the field investigations in the spring was considered appropriate to confirm and assess existing physical (e.g., flow regime, temperature) and biotic (e.g., aquatic vegetation) habitat conditions, and specific fish use of interest.

The fish habitat assessment was conducted utilizing the methods outlined in the MNRF Ontario Stream Assessment Protocol (Les Stanfield, 2013). Information recorded includes:

- Watercourse size, flow (permanent/intermittent) and thermal regime (coldwater/warmwater);
- Physical channel dimensions and characteristics – width, depth (including bankfull and wetted widths and depths), substrate type, bank stability/erosion, channel morphology and evidence of any groundwater seepage or upwelling areas;
- In-stream/overhead cover opportunities (e.g., woody debris, undercut banks, vegetation);
- Riparian vegetation;
- Physical barriers to fish movement in the vicinity of the crossings;
- Identification of potential critical or specialized habitat areas or features (i.e. potential spawning, nursery or over-wintering habitat); and
- Observations of habitat alterations/land use (i.e. channel modification, potential pollutant sources).

Information from the review of background data sources and field investigation will be utilized to characterize the habitat in the study area and, more specifically, functions and attributes of the watercourse reach to be affected by the proposed development. Attributes to be used for assessing the sensitivity of fish and fish habitat will include: species sensitivity; species dependence on habitat; rarity; and habitat resiliency.

Biophysical Characteristics of Chedoke Creek

Chedoke Creek is a warmwater permanent watercourse that originates south of the proposed B-Line corridor and is conveyed through a large concrete channel within the study area. Chedoke Creek continues to flow north into Cootes Paradise, which is in close proximity to the project study area.

The Hamilton Harbour and Watershed Fisheries Management Plan (2009) has classified Chedoke Creek as a small warmwater riverine system. The fisheries management objective for this system is to maintain the capacity for native coolwater and warmwater fish (e.g., minnows and darters). However, if it is possible to lower the stream temperatures, through stormwater management and habitat restoration initiatives, to convert a warmwater stream to a coldwater stream, then priority should be given to cool/cold water species, such as Brook trout (Salvelinus fontinalis), where the physical habitat determines.

Chedoke Creek is a highly urbanized and degraded watercourse with respect to habitat and water quality. Much of its length has been straightened and channelized and a significant length of stream is conveyed underground beneath Aberdeen Avenue and again under Main Street, King Street West and Highway 403. Chedoke Creek is also conveyed underground through the OMSF via two culverts: a concrete culvert and a short CSP culvert. The stream daylights downstream at the metal recycling facility that is located on Frid Street. The culvert outlet is perched approximately 0.4m and represents a barrier to the upstream passage of fish. Downstream of this culvert, to the north of the OMSF, the stream is approximately 2.5m to 3m in width with water depths of approximately 0.2m and there is another barrier to fish passage downstream of the culvert outlet in the form of a natural bedrock ledge.

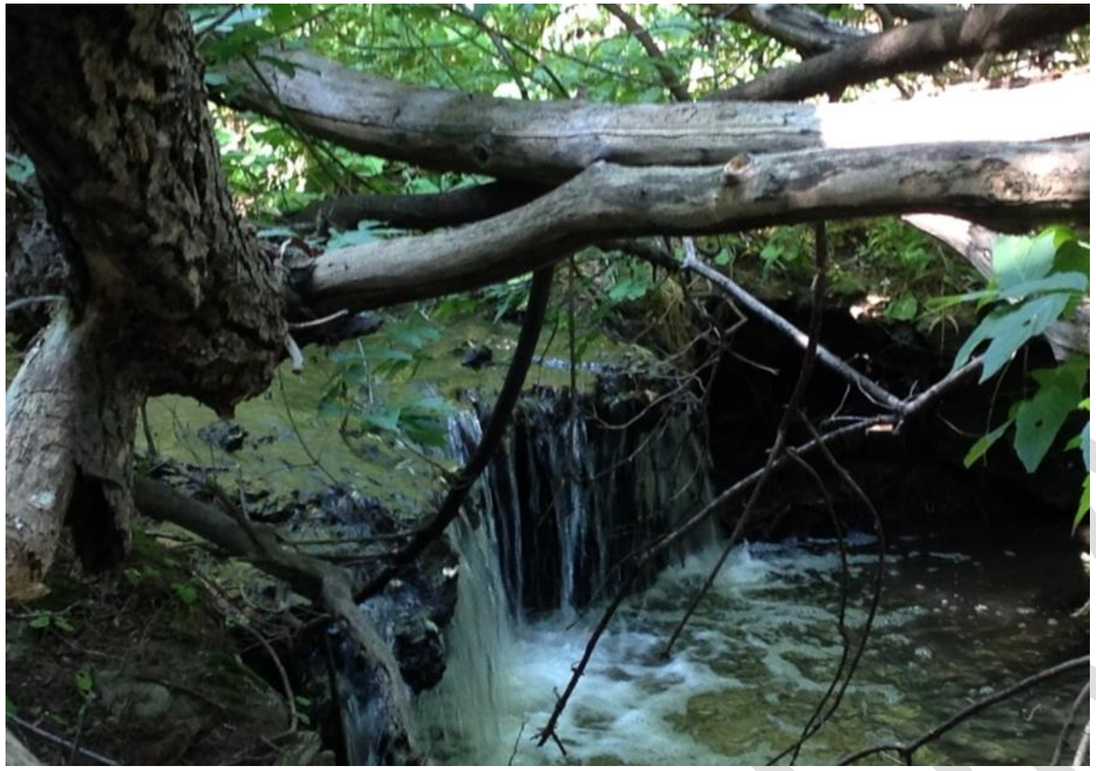
[8] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, February 24, 2017.

[9] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, February 24, 2017.

[10] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, February 24, 2017.

Chedoke Creek is characterized as having permanent flow. The stream morphology consists of flats (60%), riffles (20%) and pools (20%) with substrate consisting of cobble, gravel, sand and silt. Fish habitat features include riffle-pool sequences, scattered small boulders, in-stream woody debris, undercut banks and over-hanging vegetation.

Figure 3-3: Chedoke Creek and natural bedrock ledge



The riparian zone is well shaded by trees and herbaceous vegetation consisting of: Sugar Maple, Red Oak, American Beech, Basswood, Green Ash, Ironwood and Black Cherry. Shrubs in this community are predominantly Choke Cherry, with occasional Witch-hazel and Common Buckthorn. Herbaceous vegetation was fairly sparse and consisted mainly of grass and goldenrod species.

Fish Community

Chedoke Creek is located within the Spencer Creek watershed. The fish community of the Spencer Creek watershed is very diverse, with 44 species of fish recorded. However, the fish community of Chedoke Creek is very limited due to the altered and degraded nature of the habitat conditions. According to the Hamilton Harbour and Watershed Fisheries Management Plan (2009) the fish community of Chedoke Creek is comprised of the following warmwater species: Creek Chub (Semotilus atromaculatus), Brook Stickleback (Culaea inconstans) and Pumpkinseed (Lepomis gibbosus).

The reach within the OMSF does not contribute directly to the fish habitat potential of the system, but does provide indirect fish habitat in terms of allochthonous (food) matter inputs to downstream habitats. Downstream reaches are connected directly to Cootes Paradise and likely provide overall general habitat for feeding, rearing and over-wintering.

Aquatic Species at Risk

The designation of species of national significance is given by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The designation of species of Provincial significance is made by the MNRF and is based on recommendations made by the Committee on the Status of Species at Risk in Ontario (COSSARO).

From the review of the federal Department of Fisheries and Oceans Canada (DFO) "Distribution of Aquatic Species at Risk" mapping for the study area, there is two designated aquatic Species at Risk (Redside Dace and American Eel) that have historically been known to occur in Chedoke Creek within the B-Line corridor. Reside dace (Clinostomus elongates) is designated nationally "Endangered" by the COSEWIC, and was recently (February 2009) up-listed provincially to "Endangered" by the COSSARO. Under the federal *Species at Risk Act* (SARA), Redside dace is considered to be of "Special Concern" (Schedule 3), and this species is listed as "Endangered" under the *Ontario Endangered Species Act* (2007). American Eel (Anguilla rostrata) is listed as "Endangered" provincially by COSSARO. American Eel is not listed on the federal *Species at Risk Act* (SARA).

Although Redside Dace and American Eel have been historically present in Chedoke Creek, and are currently identified on DFO's Aquatic Species at Risk mapping for the creek, fish community surveys and current habitat conditions at the B-Line crossing indicate that these two species are no longer considered present in Chedoke Creek. The MNRF has prepared a recovery strategy for Reside Dace and American Eel and is responsible for their protection under the *Endangered Species Act*. As part of this study, Hamilton Conservation Authority confirmed that Redside Dace is not considered to be present in Chedoke Creek (Shari Faulkenham, HCA Ecologist, pers comm 2010).

Critical Fish Habitat

The study limits were reviewed for the potential presence of critical habitat (i.e. spawning areas, groundwater discharge, nursery habitat, seasonal refugia). There is no evidence of critical fish habitat within this reach of Chedoke Creek.

Thermal Regime

Chedoke Creek supports a poor quality warmwater fish community. The DFO Ontario restricted activity timing windows for the protection of fish and fish habitat states that in-water works are prohibited from March 15 to July 15.

Sensitivity/Significance

As part of the aquatic habitat assessment for the project, a determination of fish and fish habitat sensitivity for Chedoke Creek was completed. This categorization of sensitivity encompassed both fish species and fish habitat, and their inter-relationships and dependencies. While an understanding of the component species and habitat requirements is important to assessing sensitivity, the interactions at the fish community and overall aquatic ecosystem level must be integrated in the analysis.

The attributes used for assessing the sensitivity of fish and fish habitat included (see Table 3-4):

- Species Sensitivity;
- Species' Dependence on Habitat;
- Rarity; and
- Habitat Resiliency.

The above attributes and process for determining fish habitat sensitivity are consistent with approach documented in the Practitioners Guide to the Risk Management Framework for DFO Habitat Management Staff (DFO, 2013).

Within the study area, Chedoke Creek supports a non-diverse warmwater fish community. Chedoke Creek has also experienced impacts from urbanization and historical agriculture which has resulted in channelization of long reaches of the stream, portions of the stream have been piped underground and the downstream reaches of Chedoke Creek have been lined with concrete.

From the SNC-Lavalin assessment and above approach for determining sensitivity, Chedoke Creek is considered to support fish/fish habitat of "Low Sensitivity". Key factors in this determination include presence of resilient warmwater species/community (e.g., Creek Chub), they are resilient to change and perturbation, the habitat and species assemblage is

prevalent in the system; the watercourse is warmwater and high habitat resiliency or ability to tolerate or recover from changes in environmental conditions, such as flow and thermal regime.

Table 3-4: Attributes for determining the Sensitivity of Fish and Fish Habitat

Attribute	Description
Species Sensitivity	The fish community present can adjust to changing conditions in the environment.
Species' Dependence on Habitat	No migratory fish present; feeding and rearing habitat.
Rarity	No Species at Risk.
Habitat Resiliency	Warmwater thermal regime suitable for cyprinids. The system is stable and resilient to change. The flow regime is permanent.

3.1.8. Air Quality[11]

Current air quality conditions were determined by looking at historical air pollutant monitoring data from stations throughout the Hamilton area. This data is available from a variety of sources, including:

- Ontario Ministry of the Environment and Climate Change (MOECC) stations;
- Hamilton Air Monitoring Network (HAMN) stations; and,
- National Air Pollutant Surveillance Network (NAPS) stations.

Where monitoring results for a specific contaminant were not available from the Hamilton area monitoring stations, data from the most representative available stations in Southern Ontario were used as surrogates. The air pollutant monitoring data was used as a representation of present-day outdoor concentrations of the contaminants of concern (CACs, VOCs, and PAHs) in the Hamilton area. These are referred to as background concentrations. Background concentrations can vary widely from day-to-day, depending on the weather conditions, and also vary from place-to-place.

B-Line and OMSF Background Air Quality Conditions

The section of B-Line currently under study runs in a general east-west direction, from Queenston Road to McMaster University. The proposed Operations, Maintenance and Servicing Facility (OMSF) is located in the vicinity of Chatham and Frid Street, east of Longwood Road South. Table 3-5 summarizes the air quality monitoring stations used to determine existing air quality conditions for the B-Line and the OMSF. Based on their location, the MOECC Hamilton Downtown, the MOECC Hamilton West, NAPS Hamilton Downtown and the HAMN stations are the most representative air quality monitoring stations. Formaldehyde, acetaldehyde, and acrolein are not monitored at any of the Hamilton-area stations; therefore, ambient concentrations of these contaminants were obtained from the nearest available station, NAPS Toronto Ruskin & Perth. These data provide a general indication of aldehyde levels that can be expected in the urban area.

Table 3-5: Summary of Ambient Monitoring Stations – B-Line Study

Pollutant	Stations / Data Period
Nitrogen Dioxide (NO2)	MOECC Hamilton Downtown: 2010-2014 MOECC Hamilton West: 2010-2014 HAMN - Station 29102: 2010-2014 HAMN - Station 29567: 2010-2014
Carbon Monoxide (CO)	MOECC Hamilton Downtown: 2010-2014
Respirable Particulate Matter (PM2.5)	MOECC Hamilton Downtown: 2010-2014 MOECC Hamilton West: 2010-2014
Inhalable Particulate Matter (PM10)	HAMN - Station 29567: 2010-2014 HAMN - Station 29113: 2010-2014 HAMN - Station 29102: 2010-2014 HAMN - Station 29168: 2010-2014 HAMN - Station 29170: 2010-2014 HAMN - Station 29565: 2010-2014 HAMN - Station 29153: 2010-2014 HAMN - Station 29154: 2010-2014
Sulphur Dioxide (SO2)	MOECC Hamilton Downtown: 2010-2014 HAMN - Station 29567: 2010-2014 HAMN - Station 29102: 2006-2009
Formaldehyde	NAPS Toronto Ruskin & Perth: 1999-2003
Acetaldehyde	NAPS Toronto Ruskin & Perth: 1999-2003
Benzene	HAMN - Station 29102: 2010-2014 HAMN - Station 29113/29180: 2010-2014 HAMN - Station 29567: 2010-2014
1,3-Butadiene	NAPS Elgin & Kelly, Hamilton Downtown: 1999-2003
Acrolein	NAPS Toronto Ruskin & Perth: 1999-2003
Benzo(a)Pyrene	HAMN - Station 29567: 2010-2014 HAMN - Station 29113/29180: 2010-2014 HAMN - Station 29547: 2010-2014

[11] Source: Hamilton LRT Addendum, Air Quality – Existing Conditions; provided by RWDI Inc., December 14, 2016.

The locations of these stations, with the exception of the NAPS Toronto Station, are shown in Figure 3-4.

The majority of the air contaminants of concern have concentrations less than their relevant air quality thresholds, indicating that the levels are within the acceptable ranges for these contaminants. The exceptions are PM10, benzene, and benzo(a)pyrene.

PM_{10} has maximum 24-hour levels at the various HAMN monitoring sites around the industrial basin that are well above the applicable AAQC for PM_{10}. The average number of days per year when the PM_{10} AAQC is exceeded is 27, or about 7% of the time.

For benzene and benzo(a)pyrene, the concentrations are well above the current AAQC's for these contaminants, for both the 24-hour and 1-year averaging periods, at all monitoring sites in the downtown and industrial basin areas.

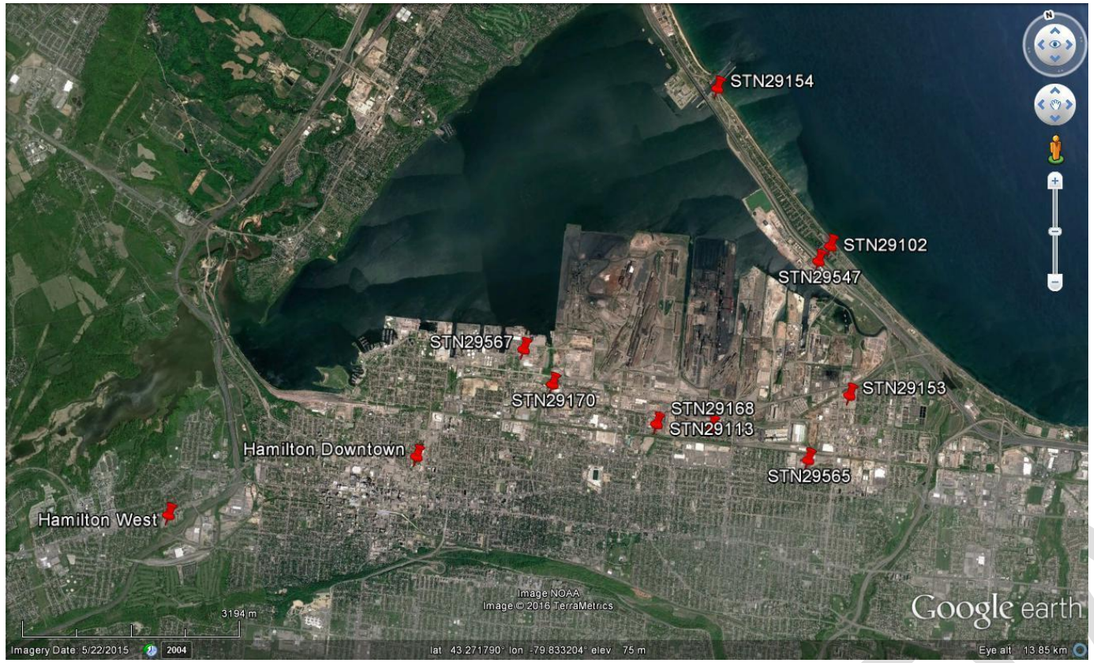
Note that the stations where PM_{10}, benzene and benzo(a)pyrene are measured are in closer proximity to the industrial basin, or more frequently downwind of it than the Downtown Hamilton, where the LRT will be located. Therefore, the measured levels of these contaminants represent somewhat of an overestimate of the actual levels in the LRT study area.

Table 3-6 presents summary statistics for the pollutants and monitoring stations. These background concentrations are applicable to the B-Line.

Table 3-6: Ambient Monitoring Results for the MOECC Hamilton Downtown, the MOECC Hamilton West, NAPS and HAMN stations

Pollutant	Statistic	Result (Over all Years and Stations)		AAQC or CAAQS
		Maximum	Average	(µg/m³)
NO_2 (µg/m³)	1-hr Max	145	116	400
	24-hr Max	93	73	200
	Annual Mean	32	26	- -
	1hr-90th Percentile	52	25	- -
	Times > 1-hr AAQC (400)	0	0	- -
	Times > 24-hr AAQC (200)	0	0	- -
CO (µg/m³)	1-hr Max	3,473	2,549	36,200
	8-hr Max	1,387	1,237	15,700
	Annual Mean	313	289	- -
	1hr-90th Percentile	506	473	- -
	Times > 1-hr AAQC (36,200)	0	0	- -
	Times > 24-hr AAQC (15,700)	0	0	- -
$PM_{2.5}$ (µg/m³)	1-hr Max	111	75	- -
	24-hr Max	46	36	28 (98th %-ile)
	Annual Mean	11	8.5	10
	1hr-90th Percentile	21	18.1	- -
	Days > 30 (28 after 2012)	5	2.4	- -
PM_{10} (µg/m³)	1-hr Max	1,000	292	- -
	24-hr Max	190	84	50
	Annual Mean	39	21	- -
	Times > 24-hr AAQC (50) *	177	27	- -
SO_2 (µg/m³)	1-hr Max	650	396	690
	24-hr Max	220	125	275
	Annual Mean	28	17	55
	1hr-90th Percentile	47	40	- -
	Times > 1-hr AAQC (690)	0	0	- -
	Times > 24-hr AAQC (275)	0	0	- -
Formaldehyde (µg/m³)	24-hr Max	11.1	7.1	65
	Annual Mean	2.8	2.7	- -
	1hr-90th Percentile	5.8	4.6	- -
Acetaldehyde (µg/m³)	24-hr Max	5.1	4.4	500
	Annual Mean	1.8	1.7	- -
	1hr-90th Percentile	3.2	2.7	- -
Benzene (µg/m³)	24-hr Max	55	11	2
	Annual Mean	4	2	0.45
1,3-Butadiene (µg/m³)	24-hr Max	0.72	0.54	10
	Annual Mean	0.15	0.13	2
	1hr-90th Percentile	0.43	0.29	- -
Acrolein (µg/m³)	24-hr Max	0.90	0.44	4.5
	Annual Mean	0.10	0.10	0.4
	1hr-90th Percentile	0.30	0.22	- -
Benzo(a)Pyrene (ng/m³)	24-hr Max	9.0	4.6	0.05
	Annual Mean	2.2	1.0	0.01

Figure 3-4: Location of Hamilton-Area Ambient Monitoring Stations – B-Line and OMSF Assessment



3.1.9. Stormwater[12]

EXISTING CONDITIONS

Existing Road Drainage

In terms of surface drainage, the Hamilton corridor receives storm runoff primarily from urban municipal drainage areas. The areas contributing to the road corridor are serviced by a combined sewer system within the road corridor representing the principle storm conveyance feature for overland flow. The conveyance function is provided via the existing combined sewer network discharging to multiple storm combined sewer overflows (CSOs), as well as overland flow along the road discharging to various watercourses and the Hamilton Harbour as described below.

The proposed Hamilton LRT alignment (approximately 10.4km) is located within the Spencer Creek and Hamilton Harbour Watersheds. Both watersheds fall under the jurisdiction of the Hamilton Conservation Authority (HCA). Spencer Creek Watershed's overall drainage pattern is from west to east, with the watershed eventually draining north into Hamilton Harbour, while the Hamilton Harbour watershed drains from south to north. As a result, there are large external drainage areas contributing flows to the proposed corridor from the east (Spencer Creek Watershed) and south with external areas on the north side mostly draining away from the proposed corridor.

From the RFP (C11-46-15 - Flooding and Drainage Master Servicing Study): "In the last decade the City has experienced a number of storms severe enough to cause basement flooding due to sewer backup—in some cases affecting thousands of residents. The City has been proactive in addressing this issue and developing resilience to severe storms via area specific flooding studies, resulting capital works and outreach programs. Lot level initiatives include a popular grant program: the Protective Plumbing Program (3P) which provides financial assistance and guidance to residential property owners for the installation of backwater valves, sump pits and pumps, private drainage system assessment and closed circuit television (CCTV) inspection, and disconnection of downspouts. The vast majority of capital projects are linear works (storm relief sewers) designed to increase the level of service in flood prone neighbourhoods to parity with adjoining neighbourhoods. Although these neighbourhood scale works provide parity in service, there is a need and desire to develop feasible flooding solutions that would provide widespread relief at a higher level of service."

City of Hamilton All-Pipes MIKE URBAN Model

The City has developed an all-pipes hydrologic / hydraulic model using the MIKE URBAN DHI software program (See Figure 3-6 that the City will use to confirm proposed sewer relocations do not have adverse downstream effects (combined sewer catchments shaded).

Watercourse Crossings

There are two watercourse crossings along the proposed Hamilton LRT alignment, which are described in the following sections.

- Chedoke Creek: Chedoke Creek is a tributary of the Longwood Channel, and flows in a south to north direction. The creek is conveyed by a long section of sewer from the Chedoke Golf Course under the CP tracks, under the proposed OMSF site and outlets just south of Hwy 403 (see Figure 3-7).
- Longwood Channel: The Longwood Channel is on City of Hamilton property and is outside of the Highway 403 area, but maintained and owned by MTO. Based on MTO and the City's maintenance records, the Longwood Channel has no history of overtopping (see Figure 3-8).

The Longwood Drainage Channel (also known as Longwood Channel) is a trapezoidal open concrete channel that carries the Chedoke Creek along Highway 403 from east of the Toronto, Hamilton and Buffalo (TH&B) Railway easterly approximately 1.6km to the Main Street West underpass crossing. The existing concrete channel was constructed in 1964. Currently, the channel has several sections subject to deterioration, cracking, vegetation intrusion and possible undermining by erosion. AECOM Canada Ltd. was retained by the Ontario Ministry of Transportation (MTO) to undertake a Class Environmental Assessment and Preliminary Design Study (G.W.P. 2054-14-00) in March 2016 to assess existing hydraulic and structural conditions and develop a preliminary design to mitigate flooding and rehabilitate the channel. Option 1 "Repair/Replacement in kind" was selected as the preferred option for further consideration. The recommended channel improvement works of Option 1 would include slab replacements, outlet structure modifications, and general repairs works such as backfill restoration, filling of scour holes and repairing eroded concrete and erosion gullies on road embankment.

At this stage, no structural alterations have been proposed for the crossings at the Longwood Channel or Chedoke Creek. To accommodate the proposed Hamilton LRT alignment, a grade separation (fly over) will be required across the Longwood Channel. The placement of the piers for this flyover will need to carefully consider the location of various drainage infrastructures such as the King Street CSO tank, numerous large sewers and the Longwood Channel box culvert. However, these piers will likely have little impact on the hydraulic functioning of the watercourse.

[12] Source: Hamilton Light Rail Transit Environmental Assessment Report, Stormwater Management, prepared by AECOM, October, 2106.

Figure 3-5: Lake Ontario Levels

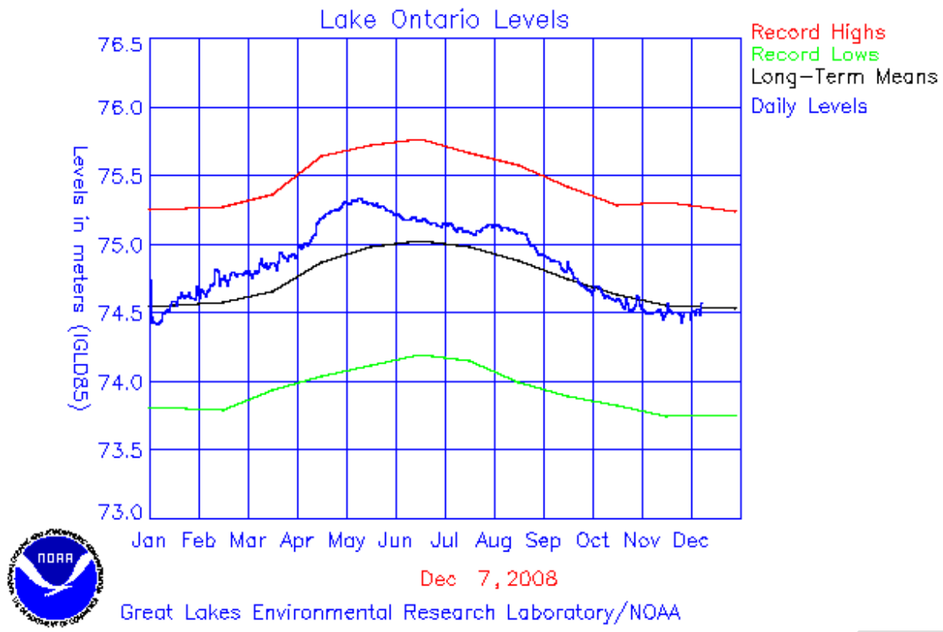
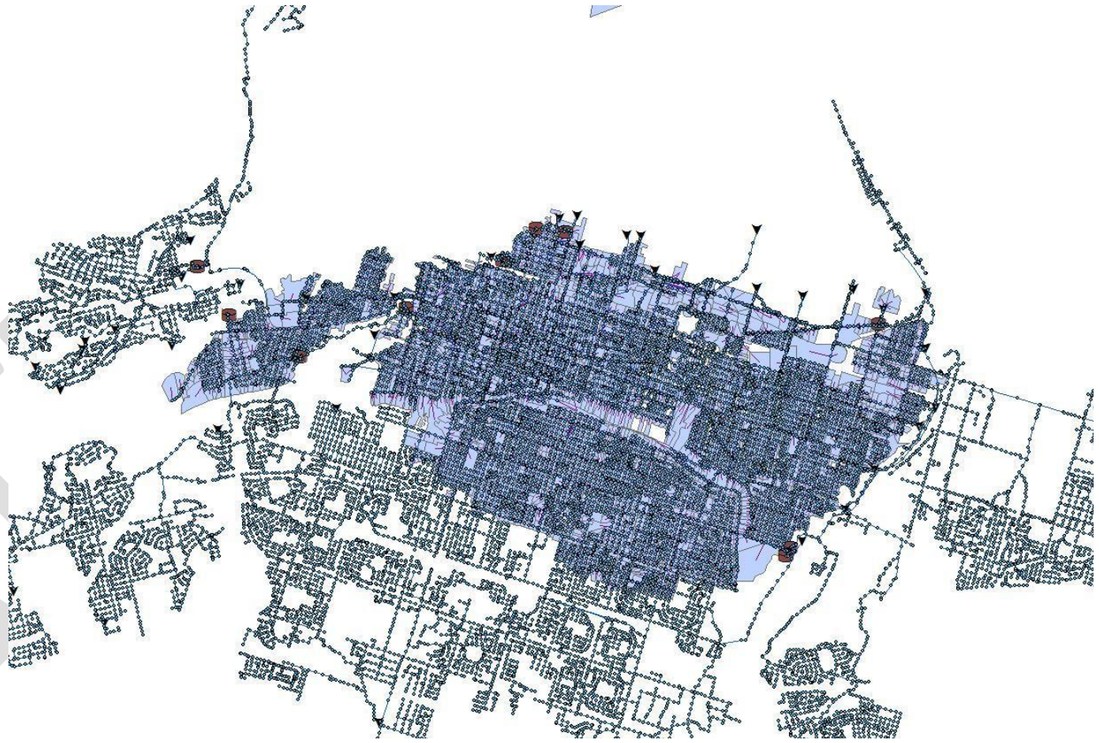


Figure 3-6: Snapshot of Hamilton's "Mike Urban" Detailed Wastewater Model



OMSF Site

The OMSF site will require site plan approval that will include a stormwater management pond. Drainage from the developed portion of the OMSF site will be directed to the proposed stormwater management pond. The requirements of the pond will likely include the mitigation of proposed development conditions peak flows to pre-development conditions.

For this study, it was anticipated that the pond flows would be directed westerly via storm sewer to the low-lying area. Flows from the OMSF developed site (stormwater management facility outflows) as well as all flows from the localized area will be captured at the low-lying area and diverted across the proposed tracks via a culvert.

A preliminary hydrologic model was set up to determine the existing condition peak flows for the site, as shown on **Error! Reference source not found.**.

Existing peak flows were calculated as it is assumed that future development will require stormwater measures to control post development flows to existing condition peak flows. The proposed culvert was sized to convey the anticipated peak flows to this low-lying area under the proposed tracks.

Based on a top of ground elevation of approximately 95m at the proposed stormwater management pond and an assumed maximum depth of 3m, a conservative storm sewer inlet elevation of 92m was used in the calculations. The low-lying area is located approximately 250m westerly of the proposed stormwater management facility, with a culvert invert elevation of 89m assumed. Based on these inverts and estimated length, a 900mm diameter storm sewer was calculated to be sufficient to convey the stormwater management pond flows to the culvert.

Figure 3-7: OMSF Existing Stormwater Conditions

Note: A revised alignment for Frid Street is shown within Appendix B. The existing conditions within the EPR Addendum have covered this updated scope.

As mentioned above, an invert of 89m was assumed for the upstream culvert invert. The maximum headwater elevation of 91.7m was assumed to be just below the proposed top of tracks at this location. The calculations indicate that a 1350mm diameter CSP pipe, or a 1250mm diameter concrete pipe are both sufficient to convey the flows under the tracks.

Major Overland Flow Paths and Depression Areas

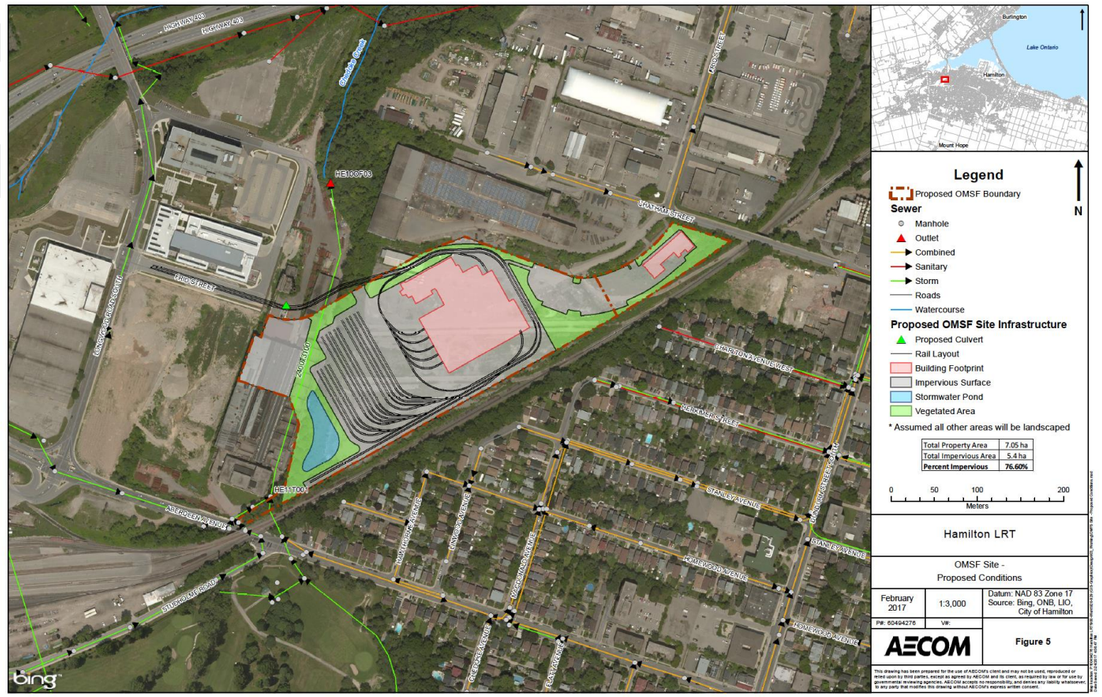
The proposed horizontal and vertical profiles for the Hamilton LRT will closely follow the existing road/ground surface, except at the two grades separation locations. Under proposed conditions, the existing/relocated storm and combined sewers will continue to discharge to the current watercourses, CSO tanks and trunk sewer systems, thereby maintaining the existing general flow direction and pattern. If any changes to vertical alignment are proposed during the design phases of the project, the impact on overland plow paths and depression areas should be carefully assessed.

Grade Separations

The proposed design will include grade separations at the following locations: a new flyover of Highway 403 which will connect the alignment from Main Street West to King Street West, and at King Street just east of Gage Avenue where the LRT tracks will go under the CP tracks.

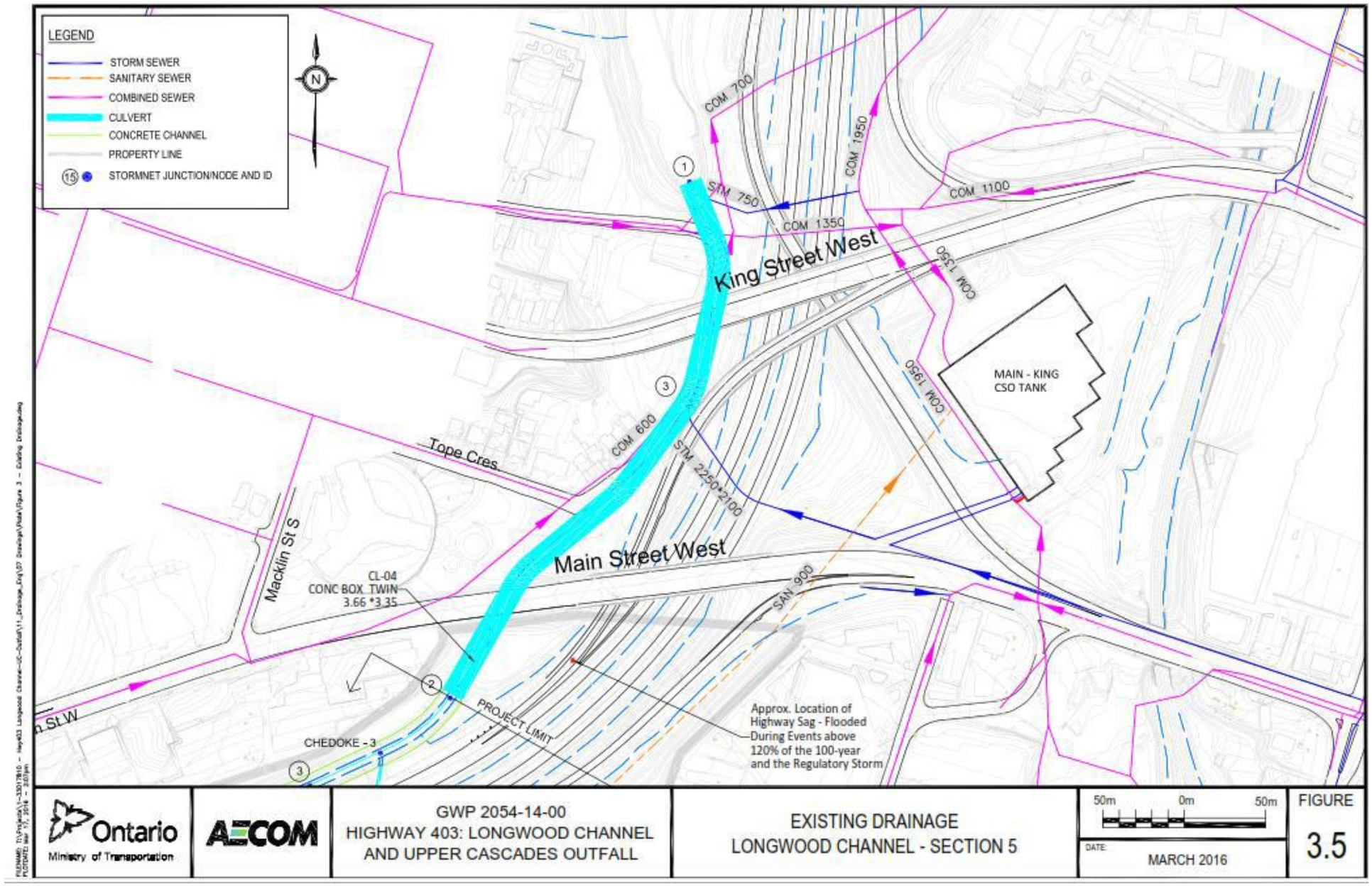
- Highway 403 Flyover
    - The Highway 403 Flyover is intended to link the tracks on Main Street West and King Street West. Since this structure will likely be built on piles it will have little effect on the watercourse (Longwood Channel) hydraulics below.
- Gage Avenue Grade Separation
    - The second grade separation location is at King Street just east of Gage Avenue where the LRT tracks will go under the CP tracks. The new LRT corridor will run along the centre of the road, which will be lowered under the existing freight track, while the road lanes on either side of the LRT track will remain at grade.
    - This grade separation should be designed with the City's MIKE URBAN model (or similar software) with overland flow routes added as required where the model indicates the water levels would surcharge to the ground surface within the catchment. The design criteria will need to be confirmed with the City, but will typically include:
    - Storage of run-off volumes should be designed based on pump failure condition.
    - Release rate from the sag shall be controlled to the lesser of the 2-year pre-development flow rate or the available residual capacity of the receiving storm sewer.
    - An adequate inlet system shall be designed to capture the peak flows and run-off volumes which will keep the sag dry in all storm events up to 100 years and including the regional event.; and
    - Assessment of tailwater conditions (such as downstream sewer issues or lake levels as presented on Figure 3-5 to confirm any impacts on performance.

Figure 3-8: Catchment Areas



METROLINX
HAMILTON LRT LIGHT RAIL TRANSIT
Hamilton

Figure 3-9: Longwood Drainage Channel



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HAMILTON LRT LIGHT RAIL TRANSIT
Hamilton

3.1.10. Geotechnical [13]

This section summarizes the anticipated subsurface conditions, based on the review of available geotechnical and hydrogeological information (excluding geo-environmental information). The Geotechnical Report within Appendix C-7 provides preliminary recommendations on the geotechnical aspects of the design of the track bed, LRT stop structures, and other associated facilities.

The City of Hamilton and McMaster University have provided records of previous Geotechnical Investigation and Phase II Environmental Site Assessments in the vicinity of the OMSF location.

Based on the review of the provided geotechnical data, general descriptions of the subsurface conditions were presented in the subsections below. The general descriptions are intended for preliminary planning purposes and feasibility assessments. They are not considered sufficient for detailed design. It should be noted that the available borehole information only represents the subsurface conditions at the borehole locations at the time of the investigation. The subsurface conditions may vary between and beyond the borehole locations. Further geotechnical investigations shall be carried out to assess the subsurface conditions at the locations of the planned structures and their associated facilities.

For the OMSF, the assessment was based on the review of three existing Geotechnical Investigation Reports and four existing Phase II Environmental Site Assessments.

Since the proposed LRT alignment is not changed, the previous geotechnical EA findings on the subsurface and groundwater conditions are still applicable. Eight (8) additional boreholes close to the proposed B-Line corridor were found in a review of the City of Hamilton's geotechnical database, but there is no significant impact on the provided subsurface and groundwater conditions in the 2011 geotechnical EA report.

3.2. Socio-Economic Environment [14]

The description of the socio-economic environment is based on the City of Hamilton's B-Line Land Use Opportunities and Challenges Study1, which provides existing land use and demographic profiles of the corridor, and on field investigations pertaining to both sectional and site-specific sensitivities and constraints.

The purpose of this section of the report is to examine and document existing:

- Noise and Vibration;
- Urban Structures and Land Use Policy Directions;
- Existing Land Use/ Community Features; and
- Corridor Wide Population and Employment.

3.2.1. Noise and Vibration [15]

The noise and vibration impact assessment criteria used to evaluate the effects of the Hamilton LRT are based on a set of draft protocols developed through the combined efforts of the Ministry of the Environment and Climate Change (MOECC) and the Toronto Transit Commission (TTC). These protocols are used in the absence of any existing province-wide protocols for transit projects, specifically relating to light rail transit. The protocol that most directly relates to this project is the MOECC/TTC Draft Protocol for Noise and Vibration Assessment for the Proposed Waterfront West Light Rail Transit Line (November 11, 1993). This protocol is similar to many of the other protocols developed by the TTC and the MOECC for other rapid transit projects within Ontario.

Definition of Sensitive Receptors

As per the MOECC/TTC protocol, sensitive receptors are identified as existing or municipally-approved residential developments, nursing homes, group homes, hospitals, and other such institutional land uses where people reside. Residential receptors dominate the sensitive receptors along the proposed routes. Henceforth, any reference to sensitive receptors will be in reference to residential receptors unless otherwise noted.

Noise Impact Criteria

The first and most common component in transit projects is the noise impact as a result of changes to the roadway sound levels at the receptors. Essentially, this is a comparison of sound levels with and without the project's implementation using a typical horizon year of at least 10 years after the project's completion. For this analysis, sound levels without the LRT in 2031 are compared to the sound levels with the LRT in 2031. The horizon year used to project the traffic volumes on the affected streets is 2030 to allow for the project and its surrounding roadways to reach a mature level of use. The comparison is based on a daytime (0700-2300 hours) and night-time (2300-0700 hours) equivalent sound level comparison, which is appropriate for non-highway projects. In some cases, the future sound levels are relatively low. In such conditions, minimum exclusion criteria of 55 dBA Leq during the daytime and 50 dBA Leq during the night-time are used instead of the lower actual ambient sound levels. Where the sound levels with the project exceed the sound levels without the project by at least 5 dB, noise control needs to be considered where it would be technologically, economically and administratively feasible. While existing sound levels do not play a role in the assessment, they have been calculated to provide an indication of the overall change from today's sound levels.

The addendum to the original EPR will not include a re-assessment of the operational noise impacts of the LRT operating at the surface. The existing conditions reported for the original EPR are still applicable, as traffic has not changed sufficiently to alter the findings. Volume increases of 20 percent are needed to create a 1 dB change in the sound levels.

The second set of noise criteria applies to ancillary facilities. The ancillary facilities analyzed as part of this project include a new LRT Operations, Maintenance, and Storage Facility (OMSF) as well as three new or modified bus terminals. These facilities are treated as stationary noise sources and are evaluated based on the Ministry of the Environment and Climate Change's NPC-300 Publication "Environmental Noise Guidelines". The hourly equivalent (1hr Leq) sound level from stationary sources is compared to the 1hr Leq of the ambient sound or the minimum exclusion criteria (50 dB daytime, 47 dB evening, 45 dB night-time), whichever is greater. The ambient sound level is comprised of the noise generated from roadway sources and excludes sources such as lightly used railways and aircraft. Heavily used railways with at least 40 trains per day can be included in the ambient, after a -10 dB adjustment.

Typically, the quietest ambient sound level period is used as an evaluation of the worst-case situation. If the facility's sound level can remain below the quietest ambient sound level during that period, then the facility is likely to meet the guidelines during all periods of the day. Where the facility exceeds the guidelines by any measurable amount, noise control needs to be implemented, as per NPC-300. The inclusion of the OMSF and the bus terminals are the most significant change from the original EPR. As a result, the focus of the existing conditions report is to document the noise and vibration conditions surrounding these four facilities.

Vibration Impact Criteria

Rail transit projects generally create both ground-borne vibration and ground vibration-induced noise. Ground-borne vibration refers to physically perceptible vibration sensed by touch. Vibration-induced noise results when vibration enters the structure of a building from the ground and the moving surfaces generate noise (the "rumbling" noise).

As per the MOECC/TTC protocol, the limit for ground-borne vibration is 0.10 mm/s RMS in sensitive receptors. There are no specific criteria in Ontario that set limits for the sound resulting from vibration (vibration-induced sound). The relatively lower limit of 0.1mm/s instead of 0.14mm/s (suitable for hospital vibration levels) attempts to address this issue to some extent. The possibility for a noise impact as a result of vibration still exists. It is dependent on the frequency spectrum of the vibration as well as the levels. Based on the United States' Federal Transit Administration's Transit Noise and Vibration Impact Assessment document (2006), a guideline level of 35 dBA is used in this report for residential rooms and other rooms (e.g. hospitals) where people generally sleep, for cases where the ground-borne, vibration-generated noise dominates the impression of the pass-by.

[13] Source: Hamilton LRT – A-Line and OMSF Geotechnical EA Report, provided by AECOM, October, 2016.

[14] Source: B-Line Light Rail Transit Environmental Project Report, prepared by SNC-Lavalin, October, 2011.

[15] Source: Draft -Existing Noise and Vibration Conditions, Hamilton LRT Project Update and Addendum; provided by J.E. Coulter Associates Limited December 22, 2016.

The points of reception for each of the sensitive receptors are generally the closest façade or point of a building. The exception would be for development types where bedrooms may be shielded from the roadway's airborne noise but not the ground vibration-induced sound.

Description of Sensitive Receptors

For the purposes of this preliminary review, baseline noise measurements have been taken at receptors near each of the four new facilities proposed as part of the EPR addendum. Figure 3-10 through Figure 3-11 below show the locations of the baseline measurements taken.

Figure 3-10: Measurement Location (McMaster Bus Terminal)

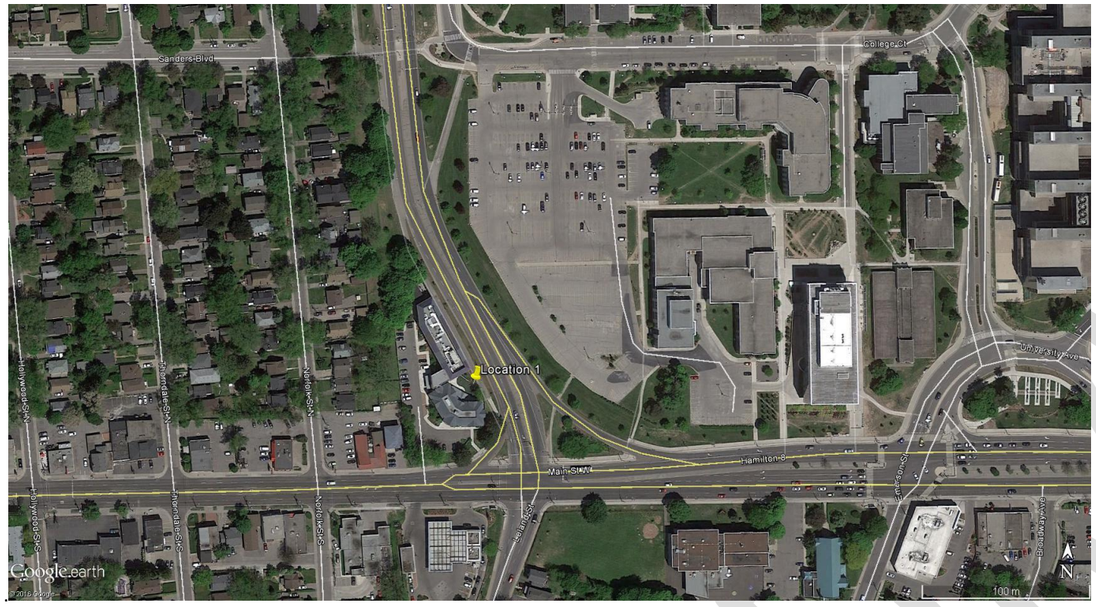


Figure 3-11: Receptor Locations (Queenston Bus Terminal)

Measured Existing Sound Levels

In lieu of calculating the ambient sound levels, sound level monitors were set up at the four locations noted. Table 3-7 summarizes the measurement locations and nature of land uses in the area.

Table 3-7: Description of Measurement Areas

Measurement Location	Noise Source Evaluated	Nearby Land Uses
1	McMaster Bus Terminal	Residential to the west, institutional to the north, east, and south
2	Operations, Maintenance, and Storage Facility	Commercial, industrial, institutional to the north, east, and west, and residential to the south and east
3	MacNab Bus Terminal	Commercial to the north and west, residential high-rise to the south and east
4	Queenston Bus Terminal	Commercial to the south, residential to the north, east, and west

Figure 3-12 to Figure 3-15 provide the hourly equivalent sound levels measured during the monitoring period.

Figure 3-12: Location 1 (McMaster Bus Terminal) Measurement Results

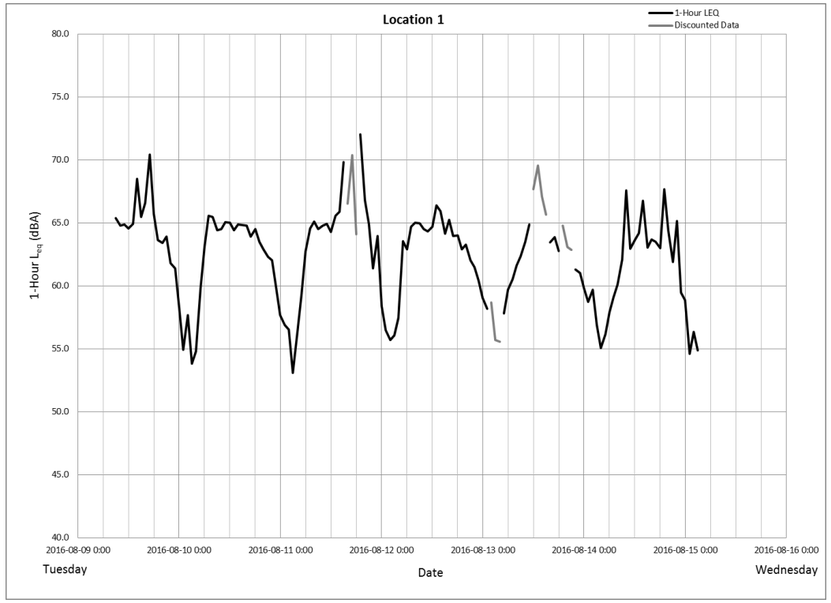


Figure 3-13: Location 2 (OMSF) Measurement Results

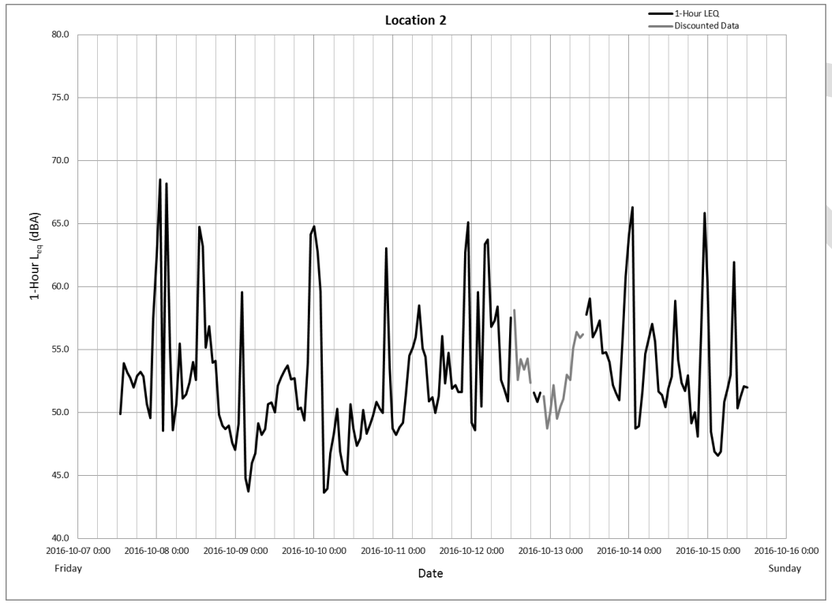


Figure 3-14: Location 3 (MacNab Bus Terminal) Measurement Results

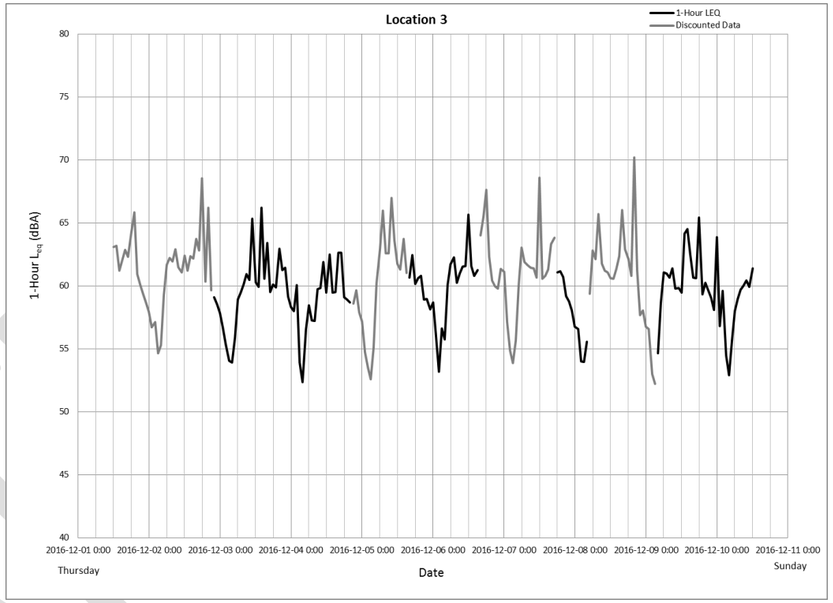
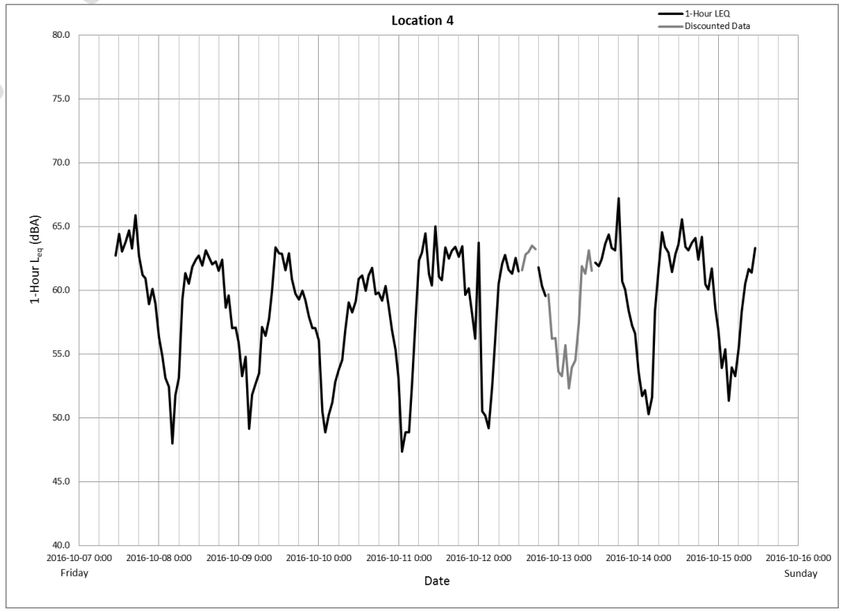


Figure 3-15: Location 4 (Queenston Bus Terminal) Measurement Results



Stationary noise sources are evaluated on the basis of the predictable worst-case. This means that the sources should be evaluated during times when their noise output is the greatest while the ambient noise is the lowest. As a result, the lowest hourly equivalent sound level for each period of the day has been determined based on the above measurement data.

Table 3-8 summarizes the lowest hourly sound levels at each measurement location. Note that the quietest hourly sound level for a given period may not always have occurred on the same day.

Table 3-8: Hourly Equivalent Sound Levels at Measurement Locations

Hourly Period	Hourly Equivalent Sound Level (dBA, $L_{eq,1hr}$)			
	Location 1	Location 2	Location 3	Location 4
12 - 1 AM	58	47	57	53
1 - 2 AM	55	48	56	47
2 - 3 AM	56	47	53	49
3 - 4 AM	53	44	54	49
4 - 5 AM	55	44	52	48
5 - 6 AM	56	46	56	52
6 - 7 AM	58	47	58	53
7 - 8 AM	59	49	57	55
8 - 9 AM	60	47	57	56
9 - 10 AM	62	45	60	58
10 - 11 AM	63	45	60	58
11 - 12 PM	63	50	60	59
12 - 1 PM	64	49	59	61
1 - 2 PM	64	47	60	61
2 - 3 PM	65	48	59	60
3 - 4 PM	64	50	59	61
4 - 5 PM	63	48	61	61
5 - 6 PM	64	49	59	60
6 - 7 PM	63	50	59	59
7 - 8 PM	63	49	59	59
8 - 9 PM	63	49	59	59
9 - 10 PM	62	48	59	58
10 -11 PM	61	49	59	57
11 PM - 12 AM	60	48	58	55

The above table provides the limits against which noise from the bus terminals and OMSF will be evaluated.

Vibration Sensitive Receptors

Whereas the noise assessment considers discrete receptors to provide an idea of the effects of the LRT, a vibration assessment takes into consideration all of the sensitive receptors immediately adjacent to the proposed route(s). As mentioned, the goal of the vibration assessment is to identify areas where the vibration from the LRT will exceed 0.10mm/s RMS (ground-borne vibration) or 35 dBA (vibration-induced noise). Where these criterion levels are exceeded, appropriate control measures have been recommended.

Two receptors sensitive to vibration have come forward during the course of the 2011 EPR and Addendum studies. McMaster University houses several pieces of sensitive equipment throughout their campus. The sensitivity of the campus' buildings and equipment was acknowledged in the Hamilton LRT 2011 EPR and identified as an area where more detailed study was required.

During the selection of sites for the OMSF, CanMET was identified as another institution sensitive to vibration from the operations of the LRT. CanMET is a facility operated by the National Research Council of Canada and focuses on the testing of various materials. It is located at 183 Longwood Road, adjacent to the run in track that the LRVs will use to access the OMSF from the main route along Main Street. CanMET contains several pieces of equipment that have the potential to be affected by very low levels of vibration.

For CanMET, the nearest source of existing vibration is traffic on the railway corridor almost 250m away. Given the lack of nearby vibration sources, baseline vibration measurements were not taken at the area of the facility. Existing vibration measurements are not critical for the purposes of the Transit Project Assessment Process and it is recommended that such measurements be completed during Detailed Design.

3.2.2. Urban Structure and Land Use Policy Directions

Hamilton's Corridors have been recognized, described and identified prominently in various planning initiatives of the past and present. The directions that have shaped civic thinking on the Main-King-Queenston Corridor are synthesized in several key documents from the past several years.

City of Hamilton Urban Official Plan (adopted 2009)

Further expanding on the description of the preferred future growth concept identified through GRIDS. the adopted Urban Official Plan presents the policy direction for future development of nodes and corridors.

The B-Line corridor includes several high intensity nodes and activity areas identified in the Urban Hamilton Official Plan (UHOP) (Minister Approved. March 2011), including:

- The McMaster Major Activity Centre;
- The Downtown Urban Growth Centre; and
- The Eastgate Sub-Regional Service Node.

The Downtown and Eastgate stop areas are intended to be two of the highest intensity areas of the City.

The Main-King-Queenston Corridor is identified as an Urban Corridor in the Plan as part of the greater future Urban Structure (refer to Hamilton LRT 2011 EPR, Figure 3-4). The Plan describes and sets policy for developing an urban structure based on a system of urban nodes and corridors. Urban Corridors, along with Urban Nodes, are intended to be:

- The focus for re-urbanization activities (population growth, private and public redevelopment and infrastructure investment);
- Focal points of activity for neighbourhoods and communities;
- Vibrant pedestrian environments, facilitating active transportation; and
- Interconnected and served by various transportation modes, including higher order transit.

The Urban Official Plan recognizes that urban corridors are integral parts of adjoining neighbourhoods, providing physical and social focal points for those adjacent neighbourhoods. The intent of the Plan is to maintain and enhance the mixed-use nature

of the corridors, while recognizing that segments of individual corridors will differ in character and function and will evolve over time.

The policies of the Plan set a future direction for development of the corridors by describing the function, scale and design for the corridors.

- **Function:** The corridors are to function as retail spines, with local commercial uses to serve adjacent neighbourhoods. Given the diversity of the corridors, the Plan recognizes that some retail areas along the corridors will have a broader community or regional draw. Corridors are also to be the focus for residential intensification through the neighbourhoods that they traverse.
- **Scale:** Built form along the corridor is to be low to mid-rise, with higher densities and built forms in some areas, where appropriate. Higher densities are more likely to be closer to the nodes along the corridor, with the scale for specific sections of the corridor to be determined through secondary planning and corridor studies.
- **Design:** The main design direction for corridors focuses on the pedestrian and the creation of a comfortable and attractive pedestrian environment. Connectivity of the corridor to the neighbourhood is essential to facilitate and promote active transportation and transit use. In addition, design along the corridor must respect the existing built form of the neighbourhood.

Building on the foregoing policy directions, the B-Line Opportunities and Challenges Study identified the following set of principles that summarize the vision for development of the Main-King-Queenston Corridor:

- The Corridor is a focus of community activity through the neighbourhoods;
- Development reflects the character of the adjoining neighbourhoods, creating unique places and spaces along the extent of the Corridor;
- Development of the Corridor creates and maintains a high-quality pedestrian and public realm;
- Corridor development respects natural and cultural heritage resources;
- Multiple modes of transportation are accommodated within the corridor, and development along the corridor supports transit and active transportation through form and density;
- The Corridor is a location for a variety of housing forms and tenures. Development within the corridor protects existing rental housing stock and expands the supply of rental housing; and
- The Corridor increases the connection between nodes and the Downtown according to the urban structure.

B-Line Opportunities and Challenges Study. City of Hamilton, Spring 2010.

This study helped to define and inform broader corridor planning activities that including corridor design plans, secondary planning, transportation initiatives and implementation activities.

The evaluation of the growth options resulted in a choice of a node and corridor urban structure for the focus of future growth. GRIDS identified the corridors as a key area for intensification in the chosen growth concept and described future development of the corridors as containing a broad mix of uses, including higher-density residential, retail, institutional and recreational uses. The study also identified corridors for the location of higher order bus transit services, linking the nodes and facilitating movement of people from place to place. The Main-King-Queenston Road Corridor is an identified corridor in GRIDS.

Transit Oriented Corridor Zones

The intent of the TOC Zones is to implement the policies of the UHOP for higher order transit and to support and facilitate development and investment within the City and foster growth in business and employment as a key initiative within the City's Open for Business mandate to remove regulatory barriers for new investment and/or redevelopment opportunities. The TOC Zones aim to achieve a balance between these two goals.

Amendments to the UHOP were passed as By-laws 16-264 and 16-265 in October 2016.

- Mixed Use Zone
- This zone is found along collector and arterial roads that function as higher order transit corridors. The Zone provides for a mixture service commercial, retail and residential uses in stand-alone or mixed use buildings. The intent of the built form requirements is to create complete streets that are transit supportive and will provide for active, and pedestrian oriented streets.
- Transit Oriented Corridor – Local Commercial (TOC2) Zone
- This zone is found along collector and arterial roads which function as higher order transit corridors. The intent of the TOC2 Zone is to maintain areas of the corridor for uses that provide the daily and weekly services required for the local residents and surrounding community. The TOC2 Zone permits a mix of commercial and residential uses, however focuses on the service commercial and retail needs of the community.
- Transit Oriented Corridor – Residential (TOC3) Zone
- This zone is found along collector and arterial roads that function as higher order transit corridors. The Zone recognizes the residential nature of sections of the corridor and the need to maintain these areas for residential purposes in the future. The built form requirements allow for medium-density development, however recognizes the existing built form.

Kirkendall Neighbourhood Traffic Management Plan

The Kirkendall Neighbourhood Traffic Management Plan was completed in 2006, fulfilling the requirements a Class EA for Schedule B projects. The Kirkendall area includes the two neighbourhoods of Kirkendall North (Highway 403 to Queen Street and from Aberdeen Avenue to Main Street) and Kirkendall South, from Aberdeen Avenue to the Mountain Brow, from Chedoke Golf Course to to Beckett Drive.

The study examined a number of issues and opportunities, including two-way street conversions, parking, pedestrian and cycling, traffic circulation, transit, and impacts of area development, including the McMaster Innovation Park and West Hamilton Innovation District.

The study recommended changes to parking by-laws to address area parking concerns, transit improvements related to development in the MIP and WHID, improved cycle network signing, improved traffic signage and intersection improvements. Specific larger-scale projects were recommended including:

- Longwood Road Bridge improvements (short-term)
- Traffic roundabout at the intersecti0on of Aberdeen Avenue and Longwood Road
- Longwood Bridge improvements (long-term) including accommodation for cycling and pedestrians
- Frid Street Extension
- Improved Highway 403 Access

Subsequent to the Traffic Management Plan, a Class C Environmental Assessment for the Frid Street Extension was completed.

Ainslie Wood Westdale Secondary Plan

The Ainslie wood Westdale Secondary Plan establishes policies for the planning area generally bounded by Highway 403, McMaster University and Cootes Paradise. The secondary plan establishes several land use designations in and adjacent the LRT corridor, including:

- Low-density residential (existing residential areas)
- Local Commercial, including mixed use and medium density development
- High density residential – near Longwood Road and near Main West at Hwy 403
- Institutional - particularly McMaster University

In the Westdale neighbourhood, the plan establishes mixed-use and medium density areas along Ling Street West, protecting the existing character of the area and maintaining the basis for local transit service in the area.

The secondary plan also eliminated heavy industrial designations in the area, in favour of more transit friendly light industrial and medium density uses.

Transportation policies in the Secondary Plan include:

- Continued support for the development of the cycling network in the area
- Multi-use path designations are retained and developed
- Brantford Rail Trail development (south of LRT corridor) is established as a priority
- Pedestrian safety and continued ease of access for all modes to McMaster University are promoted

Strathcona Secondary Plan

The Strathcona Secondary Plan establishes policies for the planning are generally bounded by Highway 403 to Queen Street and from Main Street West to York Street. Its six guiding principles are: historic, vibrant, green, livable, urban and connected.

Active transportation, transit and transportation policies in the Secondary Plan include:

- Enhancing corridors for all users;
- Supporting the LRT corridor, to decrease reliance on the automobile;
- Creating a safe, attractive and efficient network; and
- Creating an integrated, well-connected network.

Land Use policies are designed to

- Support and strengthen the Dundurn Node;
- Create stable residential neighbourhoods;
- Establish King West as a pedestrian corridor with a community and cultural focus; creating a "pedestrian-predominant" street and tailoring development to support the LRT project; and
- Promote intensification in the corridor.

Note that he Strathcona area has LRT stops at each of its boundaries on King Street West – at Dundurn Street and at Queen Street, supporting the policies of the plan.

The Strathcona Secondary Plan is also supported by the Strathcona Transportation Master Plan (TMP), which establishes King at Dundurn as a primary mode for transit, supported by the LRT stop planned for this intersection and a new north-south transit route on Dundurn.

The STMP also calls for the location of transit stops to maximize access and transit use, and for development to follow patterns of medium and high density to support transit service levels.

The STMP's policies on active transportation include enhancing walkability and the promotion of a comprehensive cycling network.

McMaster Innovation Park Master Plan

The McMaster Innovation Park (MIP) Master Plan develops a long-term phased implementation for the development of the research park in the area bounded by Aberdeen and Hwy 403 from west of Longwood Road to the proposed OMSF site.

The MIP Master Plan focusses on the development of Longwood Road as its "Main Street', including substantial plans for streetscaping, transit and cycling facilities and pedestrian circulation. The accompanying local street network is planned to provide porous connection through the area, with access to buildings and accommodating local traffic, parking access and a connected cycling and pedestrian network.

The proposed connection of Frid Street through the planned OMSF property is consistent with the Master Plan. Though the phasing plans do not specifically show this connection (since the area is outside the Master Plan boundary), the Master Plan specifically anticipates a connection to the West Hamilton Industrial Ares east of the MIP.

The MIP Master Plan supports and encourages cycling though the area, recommending bike lanes on Longwood Road (including across the Longwood bridge) and on Frid Street. Pedestrian networks are supported by sidewalks on both sides of Frid Street with linkages to the internal pedestrian network.

West Hamilton Innovation District Secondary Plan

The West Hamilton Innovation District (WHID) includes the MIP lands, the proposed OMSF site and the existing industrial lands in the West Hamilton Industrial area. The purpose of the West Hamilton Innovation District Secondary Plan is to establish new Official Plan policies that will encourage the redevelopment of this area as a prestige research and development district that will function as a centre of innovation for corporate, academic and government research primarily in the science and technology fields. The Innovation District will be enhanced by supportive commercial and educational uses which will contribute to the transformation of the area into an integrated research community.

The Secondary plan establishes two land use designations – the McMaster Innovation Park lands and an M1 research and development zone, in addition to the lands adjacent Chedoke Creek regulated by the Hamilton Conservation Authority.

The proposed OMSF site falls within the designated M1 zone in the Secondary Plan, which permits a variety of employment related uses, including research, commercial, medical, manufacturing, warehousing, and other uses; and prohibiting major manufacturing uses such as chemical processing and manufacturing, smelting, stamping and the like. The proposed OMSF site is consistent with this designation.

The Secondary Plan includes the proposed extension of Frid Street, establishing Frid Street, Chatham Street and Longwood Road as the principal transportation routes for the District. Consistent with the Kirkendall Neighbourhood Traffic Management Study and Streetscape Master Plan, the Secondary Plan calls for:

- Wide sidewalks with decorative banding; street furniture and lighting;
- Tree planting to create a landscaped canopy along the boulevards;
- Bicycle lanes;
- Pedestrian crossings to access publicly accessible amenity spaces;
- Identifiable entrance features south of the Longwood Road Bridge and at Aberdeen Avenue; and
- Transit features.

Other elements of the transportation policies include:

- Limiting the width of the Frid Street ROW to 23m, consistent with the existing ROW;
- Cycling lanes; and
- Transit access, including street furniture and transit shelters and connecting walkways.

Downtown Secondary Plan, "Putting People First: The New Land Use Plan for Downtown Hamilton

The Downtown Hamilton Secondary Plan establishes principles, land uses, development standards, as well as provisions regarding urban design, heritage and transportation, to guide the development or redevelopment of lands located in the Downtown Hamilton Secondary Plan area. The Downtown Secondary Plan area is bounded by Cannon Street East to the north, Wellington Street North to the East, Hunter Street East to the south and Queen Street North to the west.

The original plan was approved in 2001 and is currently under review. Public consultations have been held as recently as February 2017.

The Downtown Hamilton Transportation Master Plan, 2008 (TMP) provides detailed direction for future transportation planning through the Secondary Plan Area. The draft updated Secondary Plan includes policies to encourage and promote active transportation (walking and biking) as well as public transit.

Key points include:

- Importance placed on developing complete streets and providing opportunities to enhance active transportation;
- Transportation improvements will be consistent with the recommendations of the TMP and City Guidelines;
- Street Master Plans shall be completed for all Mobility and Traditional Streets within the Downtown within the context of an overall urban design and public realm enhancement perspective;
- Mobility Streets: Bay Street, Cannon Street, Hunter Street, James Street, John Street, King Street, Main Street, Queen Street, Wellington Street, York Street, Victoria Street; and
- Traditional Streets: Caroline Street, Catharine Street, Ferguson Street, George Street, Hess Street, Hughson Street, Jackson Street, King William Street.

Corridor Planning Principles and Design Guidelines

The purpose of the City-Wide Corridor Planning Principles and Design Guidelines is to provide planning & design directions for Corridors in the City of Hamilton. Primary and secondary Corridors are identified by the Urban Hamilton Official Plan. These principles and guidelines have direct bearing on the streetscape plan being developed to support the LRT corridor as well as the High-Order Pedestrian Connection.

The following principles, along with Official Plan policies are the basis for the Design Guidelines and provide a guide to other planning initiatives: Corridors should be planned and developed to:

- Support and facilitate development and investment that contributes to the economic and social vitality of the Corridor and adjacent neighbourhoods;
- Promote and support development which enhances and respects the character of existing neighbourhoods where appropriate and creates vibrant, dynamic, and livable urban places through high quality urban design;
- Develop compact, mixed use urban environments that support transit and active transportation;
- Promote and support an innovative sustainable built environment that uses resources efficiently and encourages a high quality of life; and
- Identify areas of change as the locations for new development along Corridors

The guidelines are intended to guide site and building design to achieve the following goals:

- Encourage new intensification and infill development by allowing flexibility and providing alternatives to minimize constraints and provide opportunities;
- Create streetscapes that are attractive, safe and accessible for pedestrians, transit users, cyclists and drivers;
- Minimize the negative effects of shading on existing adjacent properties, streets and public spaces;
- Minimize the negative effects of changes in building scale and character on existing streetscapes and adjacent properties;
- Minimize the negative effects of overview on existing adjacent private properties; and
- Encourage a diversity of built form, neighbourhood character and development opportunities along the Corridors.

Specific polices related to the LRT project, including the streetscape design plan and the High-order Pedestrian Connection are outlined in the guidelines including:

- Minimum building heights to achieve density;
- Landscape guidelines;
- Paring and loading guidelines supporting the proposal for off-street and rear-lane parking and loading;
- Creating pedestrian focus areas (proposed around stops);
- Maintaining continuity of buildings, while avoiding long buildings;
- Establishing and effective and accessible sidewalk network; and
- Guidelines for land assembly and precinct site development.

City Policies Background Material

Planning Policy documents, pertaining to this study, are available at www.hamilton.ca, and are summarized in Table 3-9.

Table 3-9 Policy documents pertaining to the Hamilton LRT EPR Addendum

Policy Document	Date, Author
Public Art Master Plan	2016, City of Hamilton
LRT Zones: BY-LAW NO. 16-264; and By-Law No 16-265	UHOP Amendment to implement TOC Zones: By-law 16-264; Transit Oriented Corridor Zones: By-law No 16-265 – Approved September 12, 2016 – UNDER APPEAL
Hamilton Urban and Rural Official Plans and Zoning By-Law. Zoning By-law No. 05-200	Consolidated August 2016, City of Hamilton
Recreational Trails Master Plan	May 2016, Seferian
Tall Buildings Study, Draft	March 2016, SvN
Coordinated Street Furniture Guidelines	August 2015, MMM Group
Hamilton Downtown Streetscape Master Plan, Hughson Street: Charlton to Murray	December 2014
James Street North Mobility Hub Study (PED14169) (Wards 1, 2, and 3)	September 2014, City of Hamilton
Barton-Tiffany Urban Design Study	August 2014, joint work by GSP Group, Diamond-Schmitt Architects, Paradigm Transportation Solutions, MTE Consultants, HGC Engineering, and N. Barry Lyons Consultants
Rapid Ready - Expanding Mobility Choices in Hamilton	February 2013, City of Hamilton and IBI Group
Hamilton Pedestrian Mobility Plan	December 2012
Corridor Planning Principles and Design Guidelines	April 2012, City of Hamilton
Main King Queenston Corridor Strategy Study	2011, City of Hamilton
Comprehensive Outdoor Lighting Study: Sidewalk and Roadway Lighting (PW11041)	June 2011, City of Hamilton
Transit Oriented Development Guidelines City of Hamilton, Background Paper on Transit Oriented Development, Volume 1	August 2010, joint work by City of Hamilton's Planning and Economic Development Department, and Public Works

Policy Document	Date, Author
Transit Oriented Development Guidelines City of Hamilton, Volume 2,	Council Adopted August 2010
Location and Implementation of Urban Braille (PED10089)	April 2010
The Gore Master Plan - Pedestrianization Initiative, Functional Design Study (PW10009)	January 2010, City of Hamilton
McMaster Innovation Park, Master Plan Update	September 2009, Diamond and Schmitt Architects
Hamilton's Cycling Master Plan – Shifting Gears	2009, ecoplans limited
Pedestrian Mobility Plan (PW13078)	Council Rep. Aug 2008, joint work by City of Hamilton, Public Works Department, and Transportation Division
Downtown Transportation Master Plan, Five Year EA Review	August 2008, IBI Group
Transportation Master Plan	2007, City of Hamilton
Growth Related Integrated Development Strategy (GRIDS): Growth Report	May 2006, Dillon Consulting Limited
Downtown Heritage Character Zone Design Guidelines	January 2006, City of Hamilton
King Street West Streetscape Master Plan from James to Bay Streets North and Downtown Gateway Feature at Hess (PED05054)	June 2005, City of Hamilton
King William Streetscape Master Plan from James to Wellington Streets North (PD04277)	October 2004, City of Hamilton
Hamilton Site Plan Guidelines	September 2003, City of Hamilton
The Hamilton Downtown Mobility Street Master Plan: Bay, James, John, Hunter and Cannon Streets	2003, joint work by MBTW Group, Urban Strategies Inc., McCallum-Sather Architects, and O'Connor Consultants Inc
HAMILTON SECONDARY PLANS AND TRANSPORTATION PLANS	
West Hamilton Innovation District	September 2007, City of Hamilton
Strathcona Secondary Plan	Approved by council November 2013, City of Hamilton
Ainslie Wood Westdale	August 2013, City of Hamilton
Putting People First – The New Land Use Plan for Downtown Hamilton	Amended March 2004, City of Hamilton
Kirkendall Neighbourhood Traffic Management Plan	City of Hamilton / MRC 2009

3.2.3. Existing Land Use/Community Features[16]

The B-Line corridor has 14 LRT stops, and traverses several distinct sections of the City exhibiting a wide diversity in urban form, land use, function, physical features, and community connectivity. For the purposes of this overall assessment, the corridor has been divided into four sub areas: West Section (McMaster University – Dundurn Street), Downtown (Dundurn Street – Wellington Street), Middle Section (Wellington Street – Red Hill Valley Parkway), and East Section (Red Hill Valley Parkway – Eastgate Square). This is discussed in detail in the Hamilton LRT 2011 EPR, Section 3. With the revised project scope, portions of the Middle Section and all of the East Section lie beyond the LRT service corridor.

The Operations, Maintenance and Storage Facility (OMSF) is proposed in the vicinity of Chatham and Frid Street, east of Longwood Road South.

Figure 3.16: OMSF Site

The OMSF is connected to the B-Line route via shared running tracks that extend from the intersection of Longwood and Main Street, across Longwood Bridge over Highway 403, and via Frid Street to the north end of the site, which allows LRVs to enter and leave service from either direction. Hughson Street, the preferred location for the GO High Order Pedestrian Connection, is a two-lane roadway with sidewalks and some metered parking. All changes related to the new pedestrian connection are

[16] Source: Hamilton Rapid Transit Preliminary Design and Feasibility Study - B-Line Environmental Project Report (Hamilton LRT 2011 EPR), provided by Steer Davies Gleave.

proposed for within the existing Hughson Street right-of-way.

Summary

In summary, land use along the corridor is quite varied both by section of the corridor, as well as by individual stop area. The incidence of commercial uses tends to be highest between Queen Street and Wentworth Street. Residential uses are prevalent throughout the corridor, although it is the dominant land use in the middle section of the corridor. Institutional uses are spread fairly evenly through the corridor, with the largest concentration located near the McMaster stop area. Other major institutional uses include educational institutions; places of worship; retirement centres; and dental, medical and veterinary clinics.

There are few industrial uses along the corridor. 'Industrial' is a broad category which can include smaller warehouse-type uses and smaller workshops. Of the few industrial uses that exist, most are within an 800m radius and not directly adjacent to the corridor. At 800 m, much of the corridor is in close proximity to the Bayfront Industrial area. The single largest concentration of 'industrial' uses is located at the West Hamilton Innovation District, one of the City's designated business parks.

Vacant land is more varied throughout the corridor than some of the other land uses. Vacant land varies from smaller single parcels to larger blocks being used as surface parking. The largest concentrations of vacant land, which are in the Downtown and eastern sections of the corridor, are currently used for surface parking lots.

Office uses are almost entirely concentrated in the Downtown section of the corridor (with some offices located in the western and eastern sections, as well). This is reflected in the high number of jobs within 400m of the corridor between Bay Street and John Street.

Transportation and utility uses represent a small proportion of the corridor land uses and generally cross the corridor (i.e. Highway 403 in the West section; CP Rail spur lines in the West and Middle Sections; and hydro transmission corridor and natural gas pipeline in the Middle Section, at Queenston).

Finally, Open Space is located throughout the corridor and is generally located further from the stop areas, at 800m rather than directly adjacent to the corridor at 400m - 500m. The exceptions are Cathedral Park (at Highway 403) Victoria Park (between Strathcona Avenue and Locke Street), Gore Park (between James Street and John Street), Wellington Park (between Wellington Street and West Avenue), Scott Park (at Melrose Avenue), and Montgomery Park (at Queenston), which directly abut the corridor. Gage Park (between Gage Avenue and Kensington Avenue) is situated immediately adjacent to the corridor at the Main Street/King Street junction in the Delta area.

The 2012 residential assessment values were highest at the west end of the B-Line corridor, where McMaster University and Medical Centre and West Hamilton Innovation District are located (average $300,000+). Residential values are lowest in the middle section and eastern parts of the Downtown sections (average 150,000). Non-residential assessment shows a similar pattern, with the highest investment being located at the most westerly (average $7,000,000+) and easterly sections of the corridor (average $4,000,000+). The average assessment values very clearly show where the majority of investment and development interest has been in the recent past.

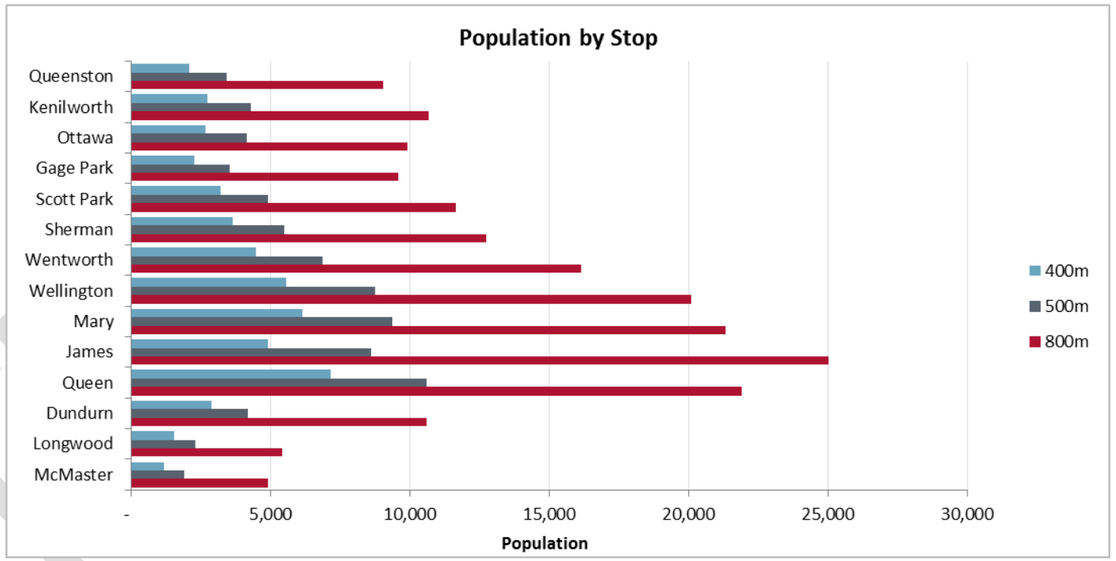
3.2.4. Corridor Wide Population and Employment

Figure 3-17 shows the population of the various stop areas at various distances from the proposed transit line. The Downtown and the middle section of the corridor have the highest concentration of population, while the end points of the corridor contain lower populations. The lower density residential areas in the eastern and western section of the corridor are in part due to the amount of non-residential land use, which has a greater focus on large format commercial or major institutional uses, and lower residential housing densities in the neighbourhoods in general.

While Queen Street has the highest population at 400m and 500m, James Street has the highest population when factoring in all population within 800m. Overall, there are almost 53,000 people living within 400m of proposed stop areas and more than 72,000 people living within 500m of proposed stops areas along the corridor.

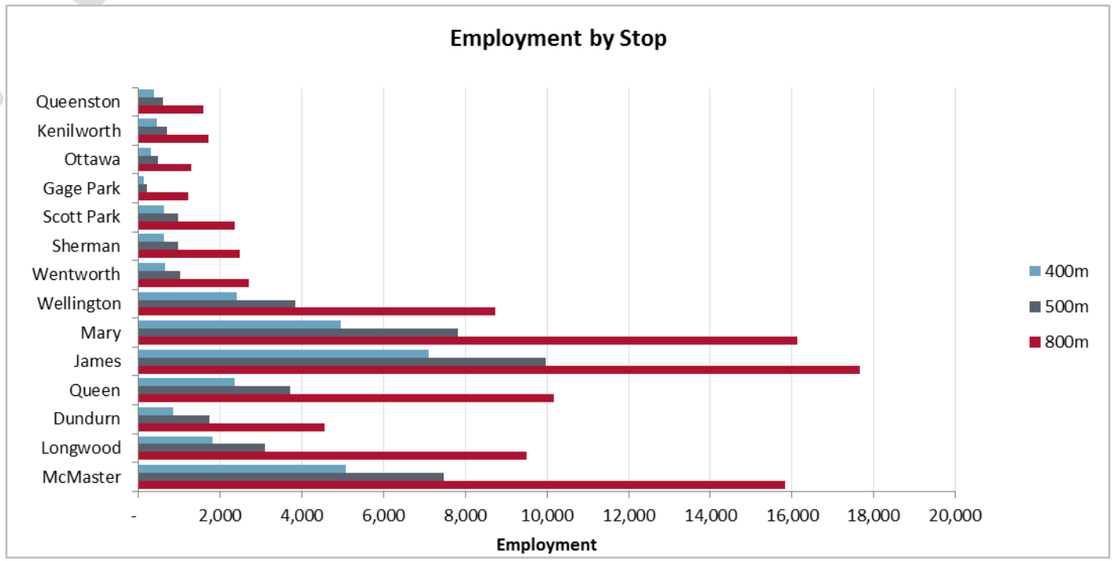
The number of jobs along the corridor also varies by stop area. Not surprisingly, the highest concentration of jobs located within 400m is in the Downtown area, as shown in Figure 3-18. A high number of jobs are also located at the western end of the corridor where McMaster University and Medical Centre and other related commercial uses are located.

Figure 3-17: 2031 Population near Proposed Rapid Transit Stops



Data source: City of Hamilton Land Use Forecasts, 2031.

Figure 3-18: 2031 Number of Jobs near Proposed Rapid Transit Stops



Data source: City of Hamilton Land Use Forecasts, 2031.

3.3. Cultural Environment

The purpose of this section of the report is to examine and document existing:

- Archaeology Resources; and
- Built Heritage and Cultural Heritage Landscapes.

3.3.1. Archaeology Resources[17]

A Stage 1 archaeological assessment was prepared for this project by Archaeological Services Inc.

- Stage 1 Archaeological Assessment Hamilton Light Rail Transit - Environmental Project Report Addendum Part of Lot 19-21, Concession 3 (Former Township of Barton) County of Wentworth City of Hamilton, Ontario, December 8, 2016.

The current Stage 1 was undertaken as an update analysis to address changes that have been made to the project design. A review of ASI's recommendations from the previous Stage 1 report for the B-Line are still applicable. This report includes,

- 2009 Stage 1 Archaeological Assessment Rapid Transit Initiative, City of Hamilton, Ontario. [P264-077-2009].

The objectives of a Stage 1 archaeological assessment are to provide information about the history, current land conditions, geography, and previous archaeological fieldwork of the Study Area, and to evaluate the archaeological potential of the Study Area; if necessary, to support recommendations for Stage 2 archaeological assessment for all or parts of the Study Area; and, to recommend appropriate strategies for Stage 2 archaeological assessment, if necessary.

Previous Archaeological Research-B Line Corridor

The following recommendations were made within the *2009 Stage 1 Archaeological Assessment Rapid Transit Initiative, City of Hamilton, Ontario*. [P264-077-2009].

- The Main, King, and James Street ROWs do not retain archaeological site potential due to previous disturbances. Additional archaeological assessment is not required within the ROWs, and those portions of the study corridor can be cleared of further archaeological concern;
- The B-line was found to have many segments that would require Stage 2. The 2009 report details all areas of archaeological potential recommended for Stage 2. A Stage 2 archaeological assessment should be conducted on lands determined to have archaeological potential, if the proposed project is to impact these lands. This work will be done in accordance with the MCL's draft *Standards and Guidelines for Consultant Archaeologists* (MCL 2006), in order to identify any archaeological remains that may be present;
- If the proposed undertaking is to impact the areas noted as "Vacant Lots" to the point of below- grade excavations, these activities should be subject to further archaeological investigation (i.e. detailed archival research) in order to document any significant archaeological features that may be present; and
- If the proposed undertaking is to impact the archaeological feature (original pipeline ca. 1858-1859) at the intersection of Main Street and Ottawa Street by deep trenching (Figure 4-19: area marked in green), Stage 4 monitoring and/or excavation will be required.

OMSF Site

Background research determined that four previously registered archaeological sites are located within 1km of the OMSF study area. A summary of the previously registered archaeological sites is provided in Table 3-10 below.

Table 3-10: List of Previously Registered Sites within 1km of the Study Area

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AhGx-28	Frederick Ashbaugh Redware Pottery	Euro-Canadian (c.1816)	House, Industrial	Michael 1985, 1986
AhGx-264	Chedoke	Euro-Canadian (1830s-1850s)	House	ASI 1989, 2010; Fisher 2014
AhGx-265	Chedoke Falls	Late - Middle Woodland, Glen Meyer	Camp	ASI 1989
AhGx-645	Victoria Park	Euro-Canadian (1860-1890)	Park	Fisher 1986; AMEC 2011

Analysis of Archaeological Potential

The OMSF Study Area meets the following criteria indicative of archaeological potential:

- Previously registered archaeological sites (AhGx-28, AhGx-264, AhGx-265, AhGx-645);
- Water sources: primary, secondary, or past water source (Chedoke Creek);
- Early historic transportation routes (Aberdeen Avenue, CP Railway); and
- Proximity to early settlements (City of Hamilton)

These criteria are indicative of potential for the identification of Indigenous and Euro-Canadian archaeological resources, depending on soil conditions and the degree to which soils have been subject to deep disturbance.

Analysis of Property Inspection Results

A property inspection was conducted for the Study Area, consisting of the proposed OMSF location and run-in track on the existing ROW on Frid Street at Longwood Road South. The inspection on September 6, 2016 determined that the Study Area has been subjected to deep and extensive soil disturbance events from construction of McMaster Innovation Park, construction of the ROW, demolition of previous structures, and decades of intensive industrial land use. These lands do not retain archaeological potential and do not require further archaeological assessment.

Conclusion

The property inspection determined the OMSF study area does not possess archaeological potential due to deep and extensive disturbance. Considering these results, the following recommendations are made:

- The OMSF study area does not require further archaeological assessment; and
- Should the proposed work extend beyond the current study area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

3.3.2. Built Heritage Resources and Cultural Heritage Landscapes[18]

Methods

Metrolinx undertakings have the potential to impact CHRs by interventions with historic railway corridors and train stations, some of which have the potential to be of provincial significance. Metrolinx undertakings, particularly projects in the Greater

[17] Source: Stage 1 Archaeological Assessment: Hamilton Light Rail Transit – Environmental Project Report Addendum, Part of Lot 19-21, Concession 3 (Former Township of Barton), County of Wentworth, City of Hamilton, provided by J. Bruin & Associates Inc. and Steer Davies Gleave, January 31, 2017.

[18] Source: Hamilton Light Rail Transit Cultural Heritage Screening Report, City of Hamilton, provided by J. Bruin & Associates Inc. and Steer Davies Gleave, October, 2016 (revised December 2016 & February 2017).

Toronto and Hamilton Area (GTHA), also have the potential to impact locally-significant CHRs where property acquisitions and/or substantial land clearance activities are required. In response to this, Metrolinx developed an internal heritage methodology to address potential impacts to CHRs. The Metrolinx Interim Cultural Heritage Management Process (2013) involves four steps:

- Step 1: Cultural Heritage Screening(CHSR);
- Step 2: Cultural Heritage Evaluation;
- Step 3: Interim Cultural Heritage Management; and
- Step 4: Review and Approval for Metrolinx Heritage Properties of Provincial Significance.

This CHSR (Appendix C-11) and a subsequent gap analysis report (Appendix C-12) fulfill Step 1 of the above process. This involves pre-screening all properties that Metrolinx owns, controls, or plans to acquire to identify properties that are 40 or more years old. All known and potential CHRs are identified during this stage using a screening checklist. In addition to the Metrolinx Interim Cultural Heritage Management Process, Metrolinx has also established a heritage committee, which includes independent third party heritage experts based on the MTCS Standards and Guidelines (2010) to administer this process and ensure that decisions affecting Cultural Heritage are made in a transparent, accountable, and responsible way.

Impacts to properties are defined as:

- Direct – where the property requirement involves demolition of the building or is sufficient to substantially interfere with the building's use
- Indirect – where the property requirement is small, and does not affect the use of the building.

An initial CHSR was completed by ASI, based on the original alignment and OMSF designs. Subsequent to this report, following further design changes, AECOM completed a gap analysis based on the new design, to identify any new properties affected and to revaluate the impacts of the revised design on the originally screened properties.

The cultural heritage screening was conducted for the Project study area, which includes the following components:

- All properties that will be directly impacted through property acquisition along the Hamilton LRT B-Line; and
- Properties that will be impacted by the proposed Operation, Maintenance and Servicing Facility Site (OMSF).

The initial CHSR prepared by ASI in December 2016[19] (see Appendix C-12) identified 230 properties in the CHSR Project study area for the B-Line and OMSF with 205 properties containing built heritage or cultural heritage landscape resources that are more than 40 years of age. These 205 properties were screened using the Screening Questions outlined in the Draft Terms of Reference for Consultants: Cultural Heritage Screening Report for Built Heritage Resources and Cultural Heritage Landscapes (Metrolinx 2014). Of the 205 properties, 140 were identified with known cultural heritage value or potential for cultural heritage value.

Of these 140 properties, it was determined that the LRT Project, based on the initial design, would not affect 86 of the properties, leaving 54 properties subject to a Cultural Heritage Evaluation Report (CHER).

Following this assessment, a further review was conducted by AECOM, February 2017[20] (see Appendix C-12) which re-evaluated the results of the initial CHSR against updated alignment designs. As a result of this process, of the 54 properties identified as requiring CHERs:

- 43 of the proposed CHERs were confirmed;
- 3 direct impacts were reduced, removing the requirement for a CHER;
- 4 CHERs were deemed unnecessary through consultation with the City of Hamilton Heritage Staff; and
- 4 were identified as indirect impacts therefore requiring the CHERs to be completed in future design phases.

Also, as a result of design changes, nine (9) previously indirectly impacted properties were determined to be directly impacted and therefore required a CHER. There was also one (1) new directly impacted property. As a result of the design changes the total number of CHERs required for directly impacted properties was confirmed as 53.

In addition to these changes, the gap analysis identified 21 indirectly impacted properties that will require CHERs is future design phases. Table 3-11provides a summary of the results of this process.

There are no properties within the Project study area that have previously been identified as a Provincial Heritage Property or Provincial Heritage Property of Provincial Significance.

Table 3-11 Cultural Heritage Screening Summary

Source	Number of Properties Identified	Properties that underwent Cultural Heritage Screening	CHERs Completed (Direct Impacts)	CHERs to be completed in future design phases (Indirect Impacts)
ASI CHSR				
Initial Assessment	230	205	54	0
AECOM Gap Analysis				
Re-assessment	N/A	N/A	43	4
New assessment	51	51	10	21
Total	**281**	**256**	**53**	**25**

CHERs were prepared according to the Metrolinx Interim Cultural Heritage Management Process and utilize the criteria in Ontario Regulation 9/06 and Ontario Regulation 10/06, as required by the Ministry of Tourism, Culture, ad Sport's (MTCS) *Standards and Guidelines for the Conservation of Provincial Heritage Properties* (2010). In addition, the CHERs were prepared according to the *Metrolinx Draft Terms of Reference for Consultants*: *Cultural Heritage Evaluation Report and Cultural Heritage Evaluation Report Recommendations*. As such the recommendations as they relate to the CHERs and the potential cultural heritage value or interest of the properties are contained in a separate Cultural Heritage Evaluation Report Recommendations document (summarized within section 4.4.2).

Findings

Table 3-12 presents information for the 256 affected properties in the Project Study Area, including 205 identified in the initial CHSR conducted by ASI and 51 from the gap analysis conducted by AECOM . Table 3-12 further identifies the properties for which CHERs were completed and the outcome of that process.

Map IDs in the table refer to the CHSR mapping in the initial CHSR, included in Appendix C-11.

CHERs were completed for the directly impacted (i.e. demolition, removal, and/or alteration) properties and a summary of the findings is provided below. The CHERs provide an evaluation of the cultural heritage value or interest of each property according to the criteria outlined in *Ontario Regulation 9/06 and 10/06*.

[19] Source: Additional Screening Sheets for Cultural Heritage Screening Report, provided by AECOM, February 23, 2017.

[20] Gap Analysis of ASI's Cultural Heritage Screening Report (December 2016) and Identification of Additional Screening Requirements, prepared by AECOM, February 23, 2017.

Table 3-12: Summary of cultural heritage existing conditions

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
McMaster to Cline Avenue								
	1 Gary Ave	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	81 Haddon Ave S	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
	88 Haddon Ave S	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
2	1117 MAIN ST W	ASI CHSR	CHL 8	Road widening	No further review	N/A	N/A	N/A
3	1107 MAIN ST W	ASI CHSR	CHL 8	Road widening	No further review	N/A	N/A	N/A
Cline Avenue to Highway 403								
4	1 DOW AVE	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
5	1057 MAIN ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
6	1033 MAIN ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
7	1003 MAIN ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
	1144 Main St W	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
	1029 Main St W	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
	87 Newton Ave	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	981 Main St W	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
	980 Main St W	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	972 Main St W	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	970 Main St W	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	85 Paisley Ave S	Gap Analysis	N/A	Building demolition, Road widening for Longwood Stop	N/A	CHER Required	Pending	Pending
9	160 BOND ST S	ASI CHSR	CHL 7	Building demolition, Road widening for Longwood LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
13	906 MAIN ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
15	25 LONGWOOD RD S	ASI CHSR	CHL 9	Road widening	CHER Required	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
16	690 MAIN ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
17	644 MAIN ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
Highway 403 to Margaret Street								

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
	651 King St W	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
	648 King St W	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
20	612 KING ST W	ASI CHSR	N/A	Building demolition, Road widening for turning lane	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
	610 King St W	Gap Analysis	N/A	Building Impact	N/A	No further review	N/A	N/A
21	621 KING ST W	ASI CHSR	BHR 4	Building demolition, Road widening for Dundurn LRT stop and turning lane	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
22	619 KING ST W	ASI CHSR	BHR 5	Building demolition, Road widening for Dundurn LRT stop and turning lane	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
23	615-611 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
24	595 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
25	554 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
Margaret Street to Caroline								
27	500 KING ST W	ASI CHSR	CHL 11	Road widening	No further review	N/A	N/A	N/A
28	547 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
30	470-476 KING ST W	ASI CHSR	CHL 12	Road widening	No further review	N/A	N/A	N/A
31	466 KING ST W	ASI CHSR	CHL 12	Road widening	No further review	N/A	N/A	N/A
32	462 KING ST W	ASI CHSR	CHL 12	Road widening	No further review	N/A	N/A	N/A
33	458 KING ST W	ASI CHSR	CHL 12	Road widening	No further review	N/A	N/A	N/A
34	440 KING ST W	ASI CHSR	CHL 12	Road widening	No further review	N/A	N/A	N/A
35	434 KING ST W	ASI CHSR	CHL 12	Road widening	No further review	N/A	N/A	N/A
36	430 KING ST W	ASI CHSR	CHL 12	Road widening	No further review	N/A	N/A	N/A
	577 & 579 King St W	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
37	426-428 KING ST W	ASI CHSR	CHL 12	Building demolition, Road widening for track/turning radius	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
38	393 KING ST W	ASI CHSR	BHR 8	Road widening	No further review	N/A	N/A	N/A
39	391 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
	378 King St W	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
40	2-4 RAY ST S	ASI CHSR	BHR 9	Road widening	No further review	N/A	N/A	N/A
42	363 KING ST W	ASI CHSR	BHR 13	Road widening	No Further Review	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
	285 King St W	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	15 Queen St S	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
43	4 QUEEN ST S	ASI CHSR	BHR 15	Road widening	CHER Required	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
45	263 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
46	216-220 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
48	213 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
Caroline Street to Catharine Street								
	193 King St W	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
49	191 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
60	2 KING ST W	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
Catharine Street to East Avenue								
66	399 KING ST E	ASI CHSR	CHL 17	Road widening	CHER Required	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	244 King St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
67	2 WEST AVE N	ASI CHSR	CHL 18	Building demolition, Road widening for Wellington LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
East Avenue to Sanford Avenue								
68	401 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wellington LRT stop	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
69	420-440 KING ST E	ASI CHSR	CHL 18	Road widening	No further review	N/A	N/A	N/A
71	499 KING ST E	ASI CHSR	CHL 18	Road widening	No further review	N/A	N/A	N/A
73	518 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
	520 King St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
74	561-563 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for track/turning radius	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
75	610 KING ST E	ASI CHSR	CHL 18	Road widening	No further review	N/A	N/A	N/A
76	614 KING ST E	ASI CHSR	CHL 18	Road widening	No further review	N/A	N/A	N/A
77	620 KING ST E	ASI CHSR	CHL 18	Road widening	No further review	N/A	N/A	N/A
78	2 GRANT AVE	ASI CHSR	CHL 18	Road widening	CHER Required	CHER is not recommended - reduced impact	N/A	N/A

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
	608 King St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
79	652-654 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
79	1 GRANT AVE (*Part of 652-654 King St E)	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	CHER Required	CHER Confirmed	Meets criteria in O. Reg. 9/06 Property is a PHP	The structure located at 1 Grant Avenue is a representative example of an early-20th century 2½ story Edwardian house. The building features intact architectural details including rusticated stone window sills; basket-arched bay windows with hood moldings, decorative labels and brackets and decorative fielded panels impressed with a rosette motif. The main entrance and window above it are plain with flat openings. The gable features scalloped shingles. It retains a high degree of design integrity. The streetscape of this portion of King Street East has remained relatively unchanged since the development of the area in the early to mid-20th century. Nearly all of the buildings in this block, including the house at 1 Grant Avenue retain the majority of their heritage attributes.
80	656 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	CHER Required	CHER Confirmed	Meets criteria in O. Reg. 9/06 Property is a PHP	The structure located at 656 King Street East is a representative example of an early-20th century 2½ story Edwardian house. The building features intact architectural details including rusticated stone window sills; basket-arched bay windows with hood moldings, decorative labels and brackets and decorative fielded panels impressed with a rosette motif. The main entrance and window above it are plain with flat openings. The gable features a Palladian window and scalloped shingles. It retains a high degree of design integrity. The streetscape of this portion of King Street East has remained relatively unchanged since the development of the area in the early to mid-20th century. Nearly all of the buildings in this block, including the house at 656 King Street East retain the majority of their heritage attributes.
81	658-660 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
82	662 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
83	666-668 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	CHER Required	CHER Confirmed	Meets criteria in O. Reg. 9/06 Property is a PHP	The property at 668 King Street East, includes a representative example of classical architecture typically used on commercial and institutional

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								buildings in the early- 20th century with modest design elements from the Beaux Arts and Art Deco styles. Although a great deal of the exterior has been covered by more recent stucco, elements including the entablature, the motifs in the frieze as well as remnants of additional covered details such as pilasters on each façade contribute to its design value. The bank property has occupied the southwest corner of the intersection of King Street East and Wentworth Street South since 1921. As a result of its frontages on both streets and its distinctive architectural form, it has played a role in defining the streetscape of this section of King Street East in Hamilton.
	665 & 667 King St E	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
87	692 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
88	696 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
89	698 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
90	700 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
91	702 KING ST E (west)	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
92	702 KING ST E (centre)	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
93	702 KING ST E (east)	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
94	30 SANFORD AVE S	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
Sanford Avenue to Barnesdale Boulevard								
96	756 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
97	758 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
98	789 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for track/turning radius	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
99	795 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
100	804 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
101	810 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
102	812 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
104	832 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for track/turning radius	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
106	850 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER not recommended after consultation with City of Hamilton	N/A	N/A

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107	859 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
108	863-865 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
109	887 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
110	867-869 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
111	871-873 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
112	877 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
114	881 KING ST E APT 9	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
115	891 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
116	893 KING ST E 1STLF	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
117	895-899 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Meets criteria in O. Reg. 9/06 Property is a PHP	The visible portions of the structure suggest that this property's residential structure may include a rare architectural form for its time. Due to the lack of visibility of this structure from the public realm, and the knowledge that its main façade is intact behind the commercial addition, its design or physical value of the property are conditional upon closer inspection.
118	901 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
119	907 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
122	3 PROCTOR BLVD 1STLB	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
124	902 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Meets criteria in O. Reg. 9/06 Property is a PHP	The proportions, balance and symmetry of the form establish its roots in the Classical tradition, which is further developed in the restrained use of features of the Tuscan order. In its return to Classical ideals of balance, order, symmetry and proportion, the house reflects a late Revival trend that arose between the wars in part to counter the new Modernism. The property plays a role in maintaining and supporting the character of its surrounding neighbourhood. Although the building on the property is visually distinct from the other properties on St. Clair Avenue, the overall design is sympathetic to the other properties on the street. As a larger corner property, it plays a role in defining the streetscape of the residential street. However, the brick addition fronting onto King Street East is vernacular in nature and does not

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
								contribute to the streetscape of King Street.
125	904 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
126	908 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
127	910 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
128	927 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
	928 King St E	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
129	929 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
130	935 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
131	937-943 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
132	924 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
133	945 KING ST E	ASI CHSR	CHL 20	Building Demolition, Road Widening for Sherman LRT stop	CHER Required	CHER not recommended after consultation with City of Hamilton	N/A	N/A
134	949 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
135	951-953 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
136	1-5 FAIRHOLT RD N	ASI CHSR	CHL 20	Road widening	CHER Required	CHER is not recommended - reduced impact	N/A	N/A
137	957 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
138	970 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
139	972 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
140	974 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
141	976 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
142	976 1/2 KING ST E	ASI CHSR	CHL 20	Road widening	No further review	N/A	N/A	N/A
143	3 BARNESDALE AVE S	ASI CHSR	CHL 20	Building demolition, Road widening for track/turning radius	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
Barnesdale Boulevard to Gage Avenue								
144	987 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
145	999 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
146	1005 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
147	996 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
148	1025 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
149	1018 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
150	1024 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
151	1026 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
153	1055 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
154	1030 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
155	1 PROSPECT ST S	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
156	1094-1098 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
157	1 BALSAM AVE S	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
	1121 King St E	Gap Analysis	N/A	Road Widening	N/A	No further review	N/A	N/A
	1123 King St E	Gap Analysis	N/A	Building Impact	N/A	No further review	N/A	N/A
158	1125-1127 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
159	3-7 CONNAUGHT AVE S	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
160	1144 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
161	1135 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER not recommended after consultation with City of Hamilton	N/A	N/A
162	1137 1/2 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
163	1139 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
164	1141-1143 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
165	1145 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
166	1149-1151 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
Gage Avenue to Ottawa Street								

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
167	1150 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
168	1153 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
169	1155 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	CHER Required	CHER not recommended after consultation with City of Hamilton	N/A	N/A
170	1173 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
171	1175 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Pending	Pending
172	1177 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
173	1179 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
174	1181 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
175	1183 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
176	1185 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Pending	Pending
177	1191 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
178	1197 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
179	1199 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
180	1201 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
181	1203 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
182	1205 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
183	1207 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
184	1220 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
185	1211-1215 KING ST E	ASI CHSR	CHL 21	Building demolition, Road	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06	Not a PHP, therefore a Statement of Cultural

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
				widening for CP grade separation			and is not a PHP.	Heritage Value or Interest and Heritage Attributes is not identified
186	1217 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	CHER Required	CHER Confirmed	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
187	2 GLENDALE AVE N	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
188	1253 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
	1254 & 1256 King St E	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
189	1257 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
190	1265 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
191	1267 KING ST E	ASI CHSR	CHL 21	Road widening	No further review	N/A	N/A	N/A
192	1273-1279 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
193	1309 KING ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
194	1119 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
195	1141 MAIN ST E	ASI CHSR	CHL 3	Road widening	No further review	N/A	N/A	N/A
196	1143 MAIN ST E	ASI CHSR	CHL 3	Road widening	No further review	N/A	N/A	N/A
197	3 BALMORAL AVE S	ASI CHSR	CHL 3	Road widening	No further review	N/A	N/A	N/A
	1268 King St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1101 Main St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1120 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	3 & 7 Grosvenor Ave S	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
198	1145-1147 MAIN ST E	ASI CHSR	CHL 3	Building demolition, Road widening for Ottawa LRT stop	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
199	1147 1/2 MAIN ST E	ASI CHSR	CHL 3	Building demolition, Road widening for Ottawa LRT stop	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
200	1149-1151 MAIN ST E	ASI CHSR	CHL 3	Building demolition, Road widening for Ottawa LRT stop	No further review	Increased property impacts - CHER recommended	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified
201	1175 MAIN ST E	ASI CHSR	CHL 3	Road widening	CHER Required	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1190 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
	2&4 Ottawa St N	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
Ottawa Street to Kenilworth Street								
202	1203 MAIN ST E	ASI CHSR	CHL 2	Road widening	No further review	N/A	N/A	N/A
203	1205 MAIN ST E	ASI CHSR	CHL 3	Road widening	No further review	N/A	N/A	N/A
204	1196 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
	1207&1209 Main St E	Gap Analysis	N/A	Road Widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1 Edgemont St S	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
205	1208 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
206	1210 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
207	1212 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
208	1217 MAIN ST E	ASI CHSR	CHL 3	Road widening	No further review	N/A	N/A	N/A
210	1230 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
211	1239 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
212	1240 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
213	1257-1261 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
214	1270 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
215	1284 MAIN ST E	ASI CHSR	N/A	Road widening	CHER Required	CHER is not recommended - reduced impact	N/A	N/A
219	1359 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
	1360 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1361 Main St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1362 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1363 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1364-1366 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1365-1367 Main St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1369-1371 Main St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
220	1375 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
221	1384 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
222	1388 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
223	1390 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
224	1392 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
226	1381-1385 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
227	1393 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
228	1395-1399 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
229	1403 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
	1407 MAIN ST E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
230	1410 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
231	1422 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
232	1424 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
233	1429 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
Kenilworth Street to Queenston								
234	1435 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
235	1437 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
236	1439 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
237	1441 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
238	1443-1449 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
239	1451 MAIN ST E (west)	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
240	1451 MAIN ST E (east)	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
	1457 MAIN ST E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1459 MAIN ST E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
241	1471-1469 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
242	1480 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
243	1485 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
244	1492 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
245	1503 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
246	1514 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
247	1511 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
248	1540 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
249	1537 MAIN ST E	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Screening Report Outcome	Gap Analysis Outcome	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential
	1570 Main St E	Gap Analysis	N/A	Road widening	N/A	Future CHER	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1619 (1621) MAIN ST E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1646 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1652 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	1654 Main St E	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
	75 Queenston Road	Gap Analysis	N/A	Road widening	N/A	No further review	N/A	N/A
251	95-101 QUEENSTON RD	ASI CHSR	N/A	Road widening	No further review	N/A	N/A	N/A
OMSF								
265	606 ABERDEEN AVE	ASI CHSR	N/A	Partial building demolition, OMSF site	CHER Required	CHER (Completed and HIA currently underway)	Meets criteria in O. Reg. 9/06 Property is a PHP	The structure is a representative example of early twentieth century architecture. 606 Aberdeen consists of a four storey head house and a steel framed pattern shop and foundry space. It was constructed for the expansion of Canadian Westinghouse in the 1920's, a major employer in the area at the time.

3.4. Transportation

3.4.1. Road Network

B-Line Considerations

The B-Line LRT route operates in a variety of road cross-sections, with 5-lane sections on Main West from McMaster to about Hwy 403 (three eastbound and two westbound), and 4-lanes on Main East, east to the Delta (two lanes in each direction). In the King Street section, between Delta in the east and Main Street West in the west, where both King Street East and King Street West generally operate as 4 lanes in a westbound only direction. Over this same length Main Street carries the eastbound traffic flow. Alternative east-west routes exist via Cannon Street or Barton Street, both located to the north of the B-Line corridor, as well as Hunter and Aberdeen in the downtown area south of the corridor.

The existing road network is show in Figure 3-19. To reflect the proposals contained within the City of Hamilton's Transportation Master Plan, it was assumed that the Council-approved two-way conversions would be completed and operational by 2021, as shown in Table 3-13.

The remainder of the road network outside of the LRT alignment corridor would remain physically unchanged.

Along the B-Line corridor there are approximately 400 on-street parking spaces, with most spaces concentrated in the Downtown and Central sections. Utilization of these spaces ranges from more than 90 percent in the downtown area to less than 50 percent in the areas furthest from Downtown. Within a 400m boundary area of the B-Line LRT corridor, there are on average about 5,270 on-street daytime vacant parking spaces around the corridor. This value represents the average number of available parking spaces during a weekday where parking was permitted.

Table 3-13: Approved One-way conversions to Two-way traffic:

Street	Year	From	To
Rebecca St	2014	Wellington St N	John St
Bold St	2016	Queen St	James St
Duke St	2016	Queen St	James St
Wentworth St	2016	King St	Delaware Ave
Wentworth St	2016	Barton St	King St
Victoria Ave	2016	Burlington St	Barton St
Hughson St	2017	Barton St	Wilson St
King William St	2017	Wellington St	John St
Caroline St	2017	York Blvd	King St
Park St	2017	Barton St	York Blvd
Hess St	2018	Barton St	York Blvd

There are approximately 510 commercial properties requiring loading and delivery access in the corridor.

Figure 3-19: City of Hamilton Existing Road Network (Arterial and Collector Roads)

Source: City of Hamilton Official Plan, Schedule C: Functional Road Classifications

High-Order Pedestrian Connections Considerations

Hughson Street is a local street which runs from its T-intersection with Hunter Street, north to its terminus as a cul-de-sac north of Murray Street. In the corridor area, it is a two-way, two-lane road, with curbside parking in some areas. From Barton Street to Wilson Avenue, the current one-way portion of Hughson Street has been approved for conversion to two-way traffic. In the proposed pedestrian connection area, curbside parking is provided on the east side of the street from Jackson St E. to Main Street East, with seven metered spaces. Between Main Street and King Street, Hughson provides access to the Hamilton Courthouse underground garage.

3.4.2. Transit Network

The B-Line is an east-west route following the major corridor of existing transit demand through Hamilton. The LRT is planned to run from McMaster University to Queenston, with possible long-term extensions westward towards Dundas, eastward from Queenston to Eastgate Square then either north to the Confederation GO Station under development at Centennial Parkway or further east to Stoney Creek.

Transit bus services on the B-Line corridor are operated by the City of Hamilton as Hamilton Street Railway (HSR). The corridor is currently served by an intensive transit service on a number of routes, which together provide 22 to 24 buses per direction per hour on the core sections. Two of these routes follow the whole length of the corridor, namely:

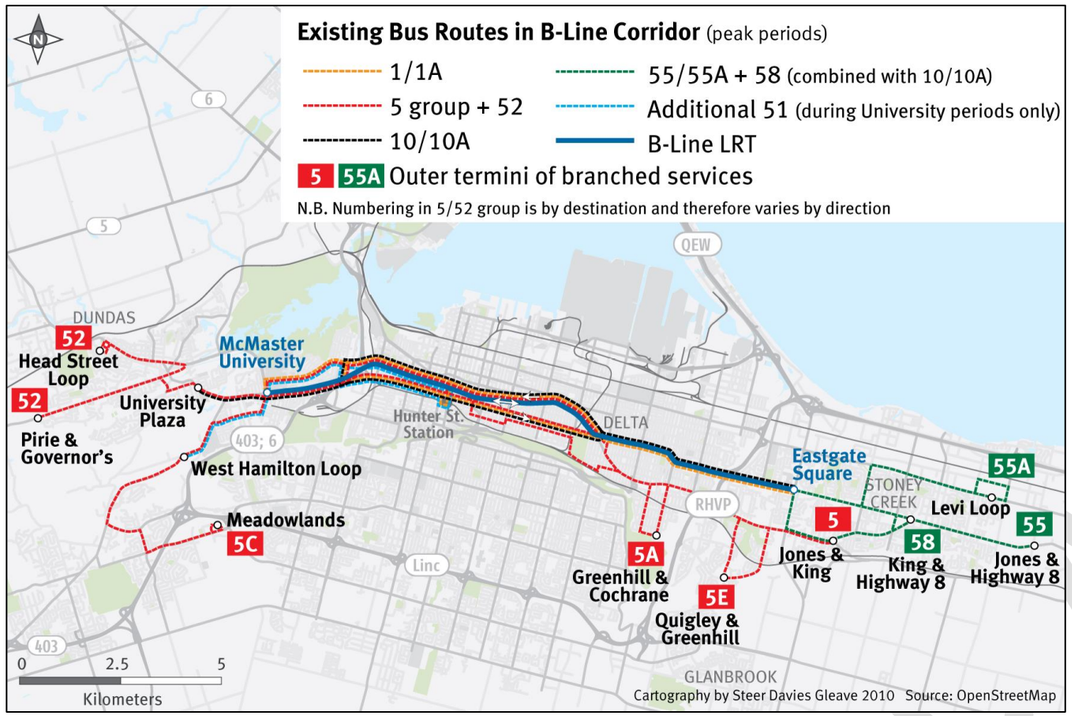
- Route 1A: University Plaza to Eastgate Square (4 buses per hour (bph) local; runs via Sterling Street); and
- Route 10/10A: University Plaza/McMaster University Medical Centre to Eastgate Square (6 bph, B-Line Express).

Several other routes serve parts of the corridor, including:

- Route 1: GO Centre to Eastgate Square, supplementing the 1A (4 bph);
- The complex 5/5A/5C/5E/52 group from Dundas (2 termini), University Plaza, West Hamilton or Meadowlands to Greenhill/Cochrane, Quigley/Greenhill or Jones/King (8 bph in total); and
- Route 51: West Hamilton to Hamilton GO Centre (4-6 bph, except summer and Christmas McMaster University vacations).

The existing pattern of these routes in peak periods is shown on a map base in Figure 3-20, with the complete network of existing routes shown schematically for clarity in Figure 3-21. The frequency of current services is illustrated on Figure 3-22.

Figure 3-20: Existing Bus Routes in B-Line Corridor



Transfers between services occur to the largest extent in the Downtown area along King Street and Main Street East and at the hubs of Eastgate Square, MacNab Transit Terminal, GO Centre and also at McMaster. Eastgate Square is a hub where local services intersect with the east-west services, and here all routes call in at the off-street terminal or at the adjacent stops on the near side of Queenston Road. Figure 3-23 illustrates transit network interfaces on the B-Line and shows the locations of the major transfer points, identified as those with a concentration of bus routes, based on the current network and smaller but nonetheless important locations (often at simple street intersections) where rapid transit lines intersect with bus routes and transfers will need to be facilitated.

Figure 3-21: Existing Network Schematic of Bus Routes in B-Line Corridor

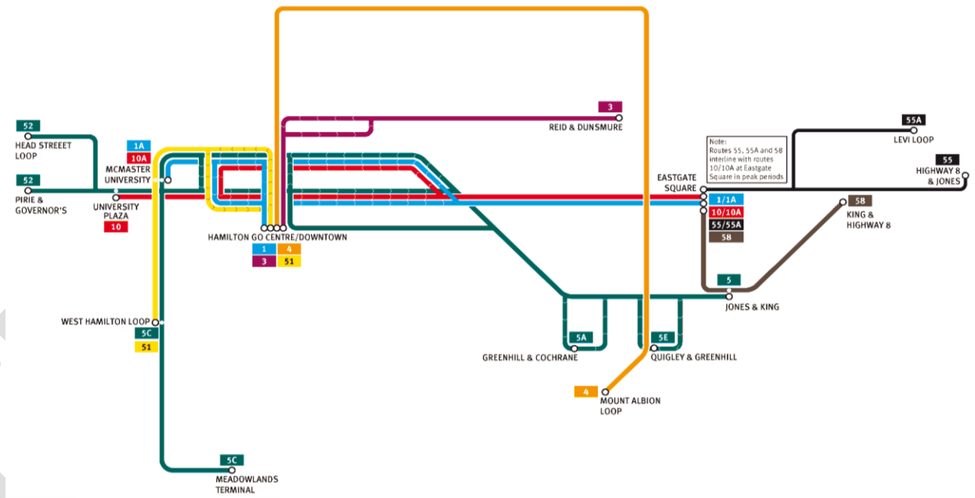


Figure 3-22: Service Frequency in B-Line Corridor

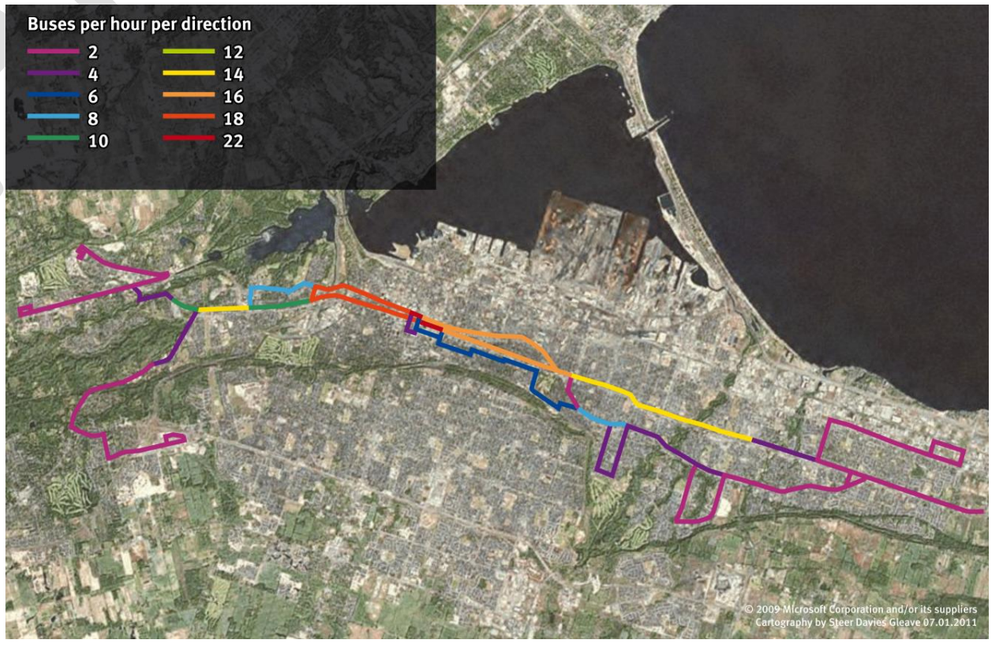


Figure 3-23: Transit Network Interfaces: B-Line

3.4.3. Commuter Rail and Bus

Commuter Rail and bus services are provided from Hamilton throughout the GTHA by GO Transit, a division of Metrolinx.

Commuter rail services operate from the Hamilton GO Centre on Hunter Street and the West Harbour GO Station on James Street North. Bus services are also operated from these terminal as well as McMaster University. Table 3-14 shows a summary of existing (2016) GO Transit bus and rail services.

Greyhound operates from the Hamilton GO Center, with a variety of departures daily. Most trips operate to and from Toronto, with a limited number of trips operating west towards London (connecting through McMaster University).

Burlington Transit also provides connections from downtown Hamilton to Burlington.

Table 3-14: Summary of GO Transit Bus and Rail Services

Route Number	Route Name	Route Description	Service
15	Brantford-Burlington	Service operates through McMaster University to and from Aldershot GO Station	30-minute peak; hourly off-peak
16	Union-Hamilton Express	Express service between Hamilton GO Centre and Union Station, Toronto	20-30 minutes peak; hourly off-peak
18 - BUS	Aldershot Train-meet	Service from Hamilton GO Centre to Aldershot	Train meet
40	Hamilton / Richmond Hill Pearson Express	Service from Hamilton GO Center to Pearson via 407 then Richmond Hill	20-30 minutes peak; hourly off-peak
47	407 West Bus	Service from Hamilton GO Centre to McMaster then 407 to Mississauga And York University	20-30 minutes peak; hourly off-peak
18-TRAIN	Lakeshore West	Lakeshore West Service from Hamilton to Union Station	4 peak trains to / from Hamilton GO Centre; 2 peak trains to / from West Harbour GO Station

3.4.4. Active Transportation Initiatives/Infrastructure

The City of Hamilton's transportation policies and infrastructure guidelines include general direction and provisions for active transportation (walking, cycling) in the context of improving mobility and quality of life, as well as connection to the proposed LRT system. The following section describes pertinent elements of this initiative.

Pedestrian

Current City policy on pedestrian mobility includes the *Step Forward: Pedestrian Mobility Master Plan* (2012), the *Recreational Trails Master Plan* and portions of the *Hamilton Downtown Mobility Streets Master Plan*, approved by Council in 2002, which focuses on urban design facilitating pedestrian usage. Also, on March 26, 2008, Council endorsed the "International Charter for Walking" developed at the *October 2006 International Walk 21 Conference*, recognizing:

- The City of Hamilton has made the pedestrian mode of travel a key component of the Transportation Master Plan;
- Reducing vehicle trips by promoting a more walkable community cuts down on air pollution and greenhouse gas emissions;
- Making a community more walkable directly addresses the community's obesity problem and promotes better public health; and
- 16 Ontario communities (including Brantford, Niagara, Toronto and Sudbury) have already signed the International Charter for Walking.

The *Step Forward: Pedestrian Mobility Master Plan* is "To create pedestrian environments throughout the City that are safe, attractive, accessible to community institutions, recreation/leisure opportunities, employment, and retail services." To facilitate this, the plan includes the following goals:

- To increase the number of people walking in the City;
- To increase public health, active transportation and pedestrian linkages; and
- To create a walkable City to attract new residents and employers.

Rapid transit, as well as transit in general is viewed as a means of fostering walkability and the number of pedestrians by calming vehicle traffic, creating land use intensification, enhancing the streetscape, and adhering to the city's Urban Design Guidelines for walkability, when possible.

The *Downtown Mobility Streets Master Plan* includes a section from Queen to Wellington on King Street that lies on the B-Line corridor. One of the four Master Plan Strategies identified as "Movement and Pedestrian Priority" that would include (but are not limited to) the following principles:

- Prioritize the Pedestrian Environment;
- Create an 'Urban' Streetscape Profile within the City Core;
- Expand the Pedestrian Realm through Targeted Lane Reduction and/or Sidewalk Widening;
- Create Safe Pedestrian Street Crossings; and
- Slow the Traffic Down.

As these principles are directly applicable to the implementation of the B-Line, they are to be addressed as part of the LRT streetscape design along the entire corridor, in addition to the section of King Street mentioned above.

Cycling

The *City's Cycling Master Plan Shifting Gears* (2009) commenced in the fall of 2008 and was finalized in early 2010. The focus of *Shifting Gears* is on commuter, utilitarian and recreational cycling, recognizing that recreational cycling is often the first step toward commuting or utilitarian use. The objectives of the cycling master plan are as follows:

- Develop a comprehensive cycling network for commuter, utilitarian and recreational cyclists through the expansion of on-street and off-street cycling facilities, including escarpment crossings;
- Provide a preferred cycling grid in the urban area based on a 2km spacing design;
- Ensure consistency in design by providing separate facilities on streets with large motor vehicle traffic volumes and high speeds and shared facilities with low motor vehicle traffic volumes; and
- Provide convenient and all-season access to all residential and employment areas and transit nodes.

HSR buses are equipped with bike racks, and Light Rail Vehicles are able to accommodate cyclists and their bicycles on board. Cyclists will be able to start their trips on bicycle, travel longer cross-city distances on the LRV and then proceed to complete their trip on bicycle. This should contribute to multi-modal connectivity extending the usefulness of both the cycling infrastructure and LRT system.

Recreational Trails

The *City of Hamilton Recreational Trails Master Plan* was adopted by Council in December 2016 and prescribes a comprehensive recreational trail system throughout the City of Hamilton. This system links both current and proposed future off-street and on-street systems into an integrated City-wide based system. The stated intent of the *Master Plan* is "to guide the development of a 'connected, comprehensive, accessible and sustainable multiuse' trails network throughout the City of Hamilton and to 'surrounding communities to improve health and wellness for' pedestrians, cyclists and trail users."

Trails in the vicinity of the B-Line LRT corridor include several on-street trails and the Desjardins Trail.

3.5. Municipal Service and Utilities

There is a dense network of water mains, combined sewers, sanitary sewers and storm sewers along the corridor, with some areas having up to 3 water mains running along the corridor.

3.5.1. Public Utilities

The underground utility infrastructure includes duct banks, sewer lines, water mains and gas mains. The surface infrastructure includes street lighting poles, hydrants and maintenance holes access covers.

Lighting

The street lighting network is typically fed via an underground hydro cable with the certain aerial connections from pole to pole in locations where the underground cable might have failed.

Communications

Bell Canada has a discontinuous network of ducts that come in and out of the LRT corridor at different locations with the largest presence of duct banks at in the west end of the corridor. The detailed-design will ascertain the need for relocation as a 'Level A' utility survey will be required to provide existing vertical depth of the installed plant (duct banks and chambers).

A dense network of underground hydro duct banks serves the corridor, a possible reason for the corridor being virtually free of pole mounted hydro cables. Some areas exhibit up to 21 100mm ducts in a duct bank, such as at the King Street and Bay Street intersection.

Communication Company All-stream has a network that extends from Dundurn Street to James Street, with an additional crossing of the guideway at the Catherine and Wentworth intersection.

The area also has some existing aerial crossings of hydro wires such as the intersection of King St. and Dundurn Street. Canadian Pacific has a video cable network that extends from Dundurn Street to Catherine Street. The existence of this network remains to be confirmed, as there has been no contact to ascertain their existence or locations.

The existing utility information shows an H.C.E. Pipeline west of Summers Lane, which coincides with the pedestrian bridge at this location. This utility owner will be further contacted to ascertain the existence and nature of their plant.

High-tension electric power transmission line towers are present east of Strathearne Avenue. The clearance requirements from the medium voltage catenary of the LRT to the hydro towers will be developed in the detailed engineering phase.

Gas

Based on the utility information received, it is concluded that there are no high-pressure gas mains along the corridor with the network generally made up of gas mains of diameters between 30mm to 15mm. Larger mains are found crossing the existing corridor with diameters ranging from 150mm to 40mm, with the largest main (40mm) crossing at Hess Street.

The available information shows a Sun-Canadian pipeline, which extends from Dundurn Street to Catharine Street. Through communications with Sun Canadian, it was confirmed that Sun Canadian has no active plant in this corridor.

There is a Natural Gas pipeline near the Queenston Traffic Circle. Based on current survey information, it is estimated that the pipeline has an approximate depth of 2.m, which should not interfere with the construction of the guideway or the operation of the LRT. This will need to be verified during the design phases.

IMPACT ASSESSMENT, MITIGATION, AND MONITORING

Table of Contents

List of Figures

List of Tables

4. IMPACT ASSESSMENT, MITIGATION, AND MONITORING

Section 9 (2) of the *Transit Projects Regulation (Ontario Regulation 231/08)* mandates a project proponent to address the following information within an Environmental Project Report:

- The proponent's assessment and evaluation of the impacts that the preferred method of carrying out the transit project and other methods might have on the environment; and the proponent's criteria for assessment and evaluation of those impacts;
- A description of any measures proposed by the proponent for mitigating any negative impacts that the preferred method of carrying out the transit project might have on the environment; and
- If mitigation measures are proposed, a description of the means the proponent proposes to use to monitor or verify their effectiveness.

For the most part, the features and sensitivities identified in Chapter 4 are summarized for each environmental inventory. The studies and their criteria against which the project changes/impacts have been assessed are identified; Construction/operations impacts, proposed mitigation measures and resultant net effects, and proposed monitoring are described.

The information presented here contains a table summary of impact assessment, mitigation, potential net effect/impact, and monitoring/future work/contingency; along with specific changes that are attributed to the EPR Addendum scope of work.

4.1. Monitoring

The Hamilton LRT 2011 EPR requires a monitoring plan to be prepared in accordance with Subsection 9(2)(8) of *Ontario Regulation 231/08 (O. Reg. 231/08)*. This chapter details minor changes proposed to the monitoring plan approved in the Hamilton LRT 2011 EPR. The objective of the monitoring plan remains:

- To augment existing information and databases, where required;
- To determine the accuracy of impact predictions and the effectiveness of environmental protection measures;
- To ensure compliance with federal, provincial, and local legislation and regulation; and
- To ensure that commitments, plans, and programs are carried out as planned. Environmental commitments and mitigation measures will further be reflected within the construction contract documents.

These objectives are intended to determine the types of monitoring to be used, among which may include: baseline monitoring, implementation monitoring, effectiveness monitoring, and compliance monitoring described below.

4.2. Natural Environment

The purpose of this section of the report is to examine and document the impact assessment, mitigation and monitoring of:

- Hydrogeology;
- Contamination;
- Vegetation and Vegetation Communities;
- Wildlife and Wildlife Habitat;
- Fish and Fish Habitat;
- Air Quality;
- Stormwater; and
- Geotechnical.

4.2.1. Hydrogeology[1]

Based on current design information for the Hamilton LRT project, no significant impacts to the groundwater regime are expected. Groundwater recharge areas or wellhead (municipal well field) protection areas are present, however no private drinking water wells are within the project study area

Construction/Operation Impacts

Minor localized disturbance and impacts to groundwater may occur due to project related construction activities. These could include: construction dewatering (for structure foundations) and utility relocation (especially in shallow groundwater level areas; i.e. near shoreline or creeks); accidental spills or releases of contaminants (i.e. fuel, lubricating oil and metals) during refueling; operations and maintenance of the equipment; and potential contaminated soil and/or groundwater handling.

If, during the construction of the project, a spill (or other forms of contaminant release) occurs at the ground surface in these vulnerable areas, the contaminant (source) will infiltrate into the ground and migrate downwards through the unsaturated zone along a "pathway" towards the water table in a short period of time (due to the shallower groundwater table and higher hydraulic conductivity, i.e., sand and gravel). When the contaminant reaches the water table, in the groundwater system, it is very difficult to remediate as groundwater moves relatively slow and flushing out an aquifer (or purging/pumping) can take a very long time. Therefore, when working in these vulnerable areas, it is very important to prevent contamination from happening in the first place.

Potential impacts include:

- Temporary reduction of groundwater flow to surface water bodies and wetlands due to construction dewatering;
- Mobilization and discharge of contaminated groundwater (likely to be encountered) due to construction dewatering;
- Groundwater contamination due to accidental spills or release of contaminants, especially in those groundwater highly vulnerable areas (i.e. shallow groundwater level and regional aquifer areas, near shoreline) and intake protection zones; and
- Groundwater contamination due to contaminated soil stockpiling (if any generated from excavation).

Mitigation Measures and Net Effects

The potential impacts and recommended mitigation measures include:

- Limit dewatering duration and volumes as minimal as possible;
- Groundwater sampling should be conducted prior to discharge to assess baseline groundwater qualities;
- Discharge water should be treated prior to discharge if contamination/exceedance is detected;
- If extracted water is to be directed to the natural environment (i.e. creeks, ditches), proper erosion and sediment control measures should be implemented;
- Educate and train staff on procedures and protocols to avoid spills;
- Refuel equipment and vehicles on spill pads and/or in designated areas;
- Store and handle hazardous materials properly to prevent from releasing into the natural environment;
- Remove and dispose waste materials by licensed contractors;
- Utilize MOECC soil management best practices, including developing soils management plans for the project; and
- Avoid stockpiling contaminated soil in groundwater highly vulnerable areas.

Cover contaminated soil piles during rain events (to prevent contaminants/leaches from releasing into the ground).

[1] Source: Hamilton LRT – Environmental Project Report Addendum, Hydrogeological Update; prepared by SNC-Lavalin, October 13, 2013.

Dispose contaminated soil off-site (at a licensed waste facility) as soon as possible using licensed contractors.

Monitoring/Future Work

For the purpose of source water protection, a groundwater monitoring program should be developed during the detailed design phase of the project. The monitoring program should include both groundwater level and water quality monitoring to ensure that no adverse impact to the water sources will occur as a result of the construction of the project.

Construction dewatering discharges are most commonly conveyed to storm or sanitary sewers. If this strategy will be used to manage dewatering discharges, an agreement with Hamilton Water's Environmental Monitoring and Enforcement Group would be required well before any dewatering discharge is conveyed to the sewer system. The Environmental Monitoring and Enforcement group in Hamilton Water is responsible for upholding the City's Sewer Use Bylaw, and they would require further information to draft an agreement prior to discharging. Information such as proposed pumping rates and pumping volumes to the sewer as well as representative water quality data would be required, and these results would be compared against the Sewer Use Bylaw water quality criteria. The daily volumes and reported discharge quality would dictate the nature of the agreement. The Superintendent of the Environmental Monitoring and Enforcement Group in Hamilton Water, can be contacted by emailing sewerusebylaw@hamilton.ca for more information to better understand discharges to City infrastructure.

Contingency plans should be developed to handle contaminated soil and/or groundwater (in case encountered) and accidental spills during the construction period to prevent or minimize potential groundwater contamination.

4.2.2. Contamination[2]

The potential for adverse environmental impacts along the LRT corridor is considered medium to low. The subgrade material underlying the surface of the road may be fill material of unknown quality, which has been subjected to years to de-icing and may be considered potential impacted as a result. During the proposed earthwork activities for construction of the spur line, contaminated soil or groundwater may be encountered.

The potential for adverse environmental impacts directly within the OMSF site is considered high, considering the historical and on-going industrial operations at the property. Potential off-site sources of impact to soil and groundwater exist in the vicinity of the site due to current industrial and commercial operations on adjacent properties. If required, Phase I and Phase II Environmental Site Assessments will be undertaken during detailed-design.

Potential impacts associated with disturbance of contaminated properties include runoff of contaminated materials into watercourses, airborne transmission of particulate matter, and contaminant leaching into groundwater.

Construction/Operations Impact

There are localized areas of potential environmental concern adjacent to the alignment, which may impact the soils or groundwater encountered during construction. The likelihood of encountering contaminated material will depend on the actual land takings for the project. Testing of the soil and groundwater within the study area should be conducted prior to construction, in order to determine the appropriate method of disposal. During construction, impacts to activities can be mitigated by including special provisions in the contract documents if contaminated soil or groundwater is encountered.

Mitigation Measures and Net Effects

Where removal of potentially contaminated soil or groundwater is necessary, contractors will be required to test excavated soil and groundwater for suspected contaminants of concern identified in the area under construction. Testing of the soil and groundwater within the OMSF study area should be conducted prior to construction. The analytical results from the soil and groundwater sampling should be compared to the Ontario Ministry of Environment and Climate Change (MOECC) *Soil, Ground Water and Sediment Standards (July 2011)* in accordance with *Ontario Regulation 153/04 (O. Reg. 153/04)* (as amended) under Part XV.I of the *Environmental Protection Act* (EPA).

Monitoring/Future Work

Regular and frequent monitoring will be performed in areas where contamination has been identified. The City's contaminated Sites Management Program manual includes procedures for standard general on-site and perimeter monitoring, as well as non-routine monitoring, which will be applied to this project.

Phase 1 Environmental Site Assessment and potentially Phase 2 Environmental Assessments will be undertaken during detailed-design, if required.

4.2.3. Vegetation and Vegetation Communities[3]

The construction of the proposed Hamilton LRT (including the OMSF) will have impacts to both natural and culturally impacted vegetation communities (cultural and forest communities). This section presents the anticipated removals based on the current design grading limits for the proposed works.

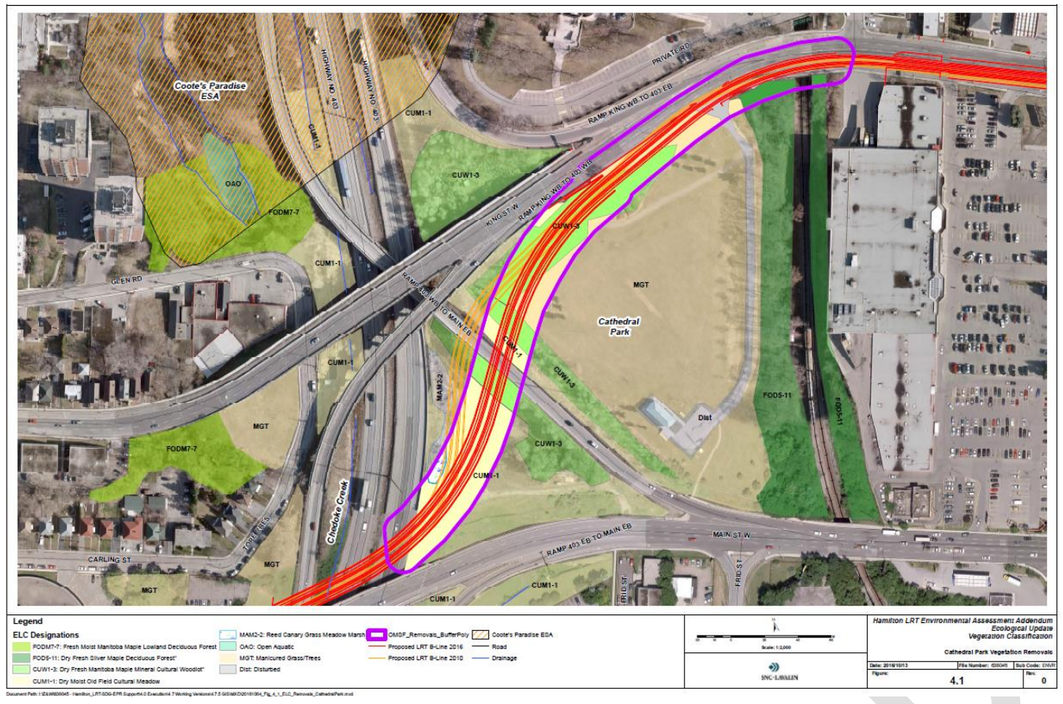
Figure 4-1 and Figure 4-2 outline removals based on ELC category at each of the Cathedral Park, and OMSF Locations. These removals are shown graphically in Figure 4-1 and Figure 4-2 on the following pages.

One vegetation SAR was observed during field investigations. Butternut was located in the deciduous forest units along the Chedokee Creek valley at the northern end of the study area. Subsequent review by AECOM noted a total of 20 trees, including three that whose Category 1 or Category 2 habitat are affected by the OMSF and Frid Street design..

[2] Source: Hamilton LRT – Environmental Project Report Addendum, Contamination Overview Study, prepared by SNC-Lavalin 13 October, 2013.

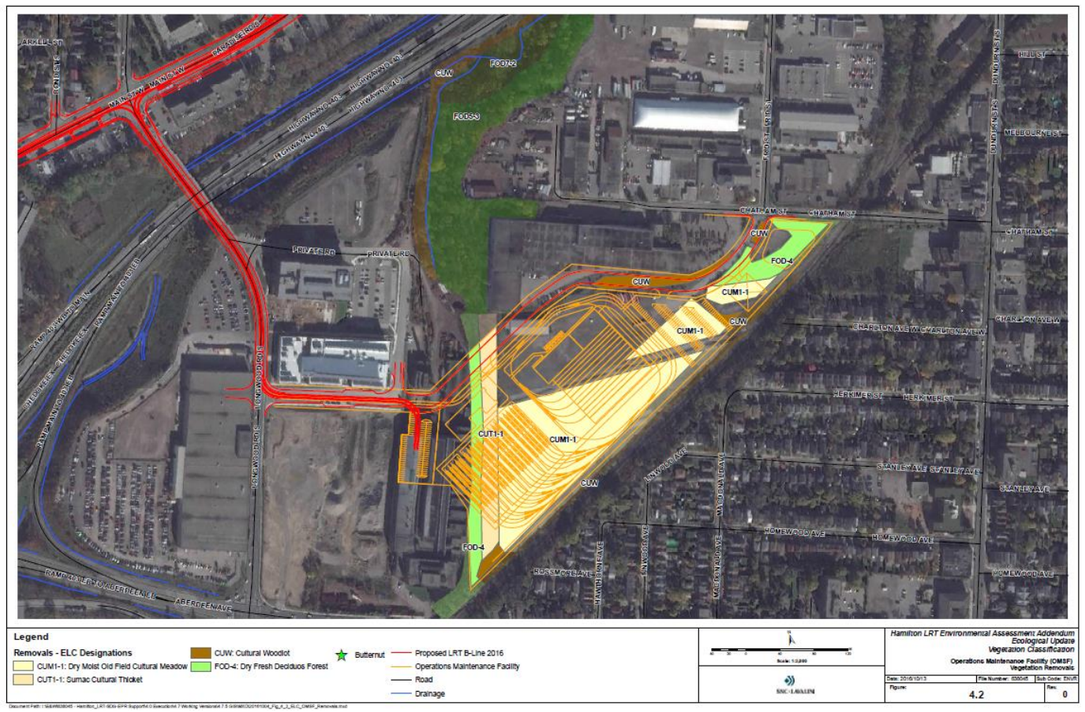
[3] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, October 13, 2013.

Figure 4-1: Project Vegetation Type Removals by Area (Cathedral Park)



Source: Hamilton LRT – Environmental Project Report Addendum, Table 4.1, Ecology Update, prepared by SNC-Lavalin, October 13, 2013.

Figure 4-2: Project Vegetation Type Removals by Area (OMSF)



Source: Modified from original; Hamilton LRT – Environmental Project Report Addendum, Table 4.2, Ecology Update, prepared by SNC-Lavalin, October 13, 2013.
Note: The OMSF site configuration was updated subsequent to the tree inventory. The most current OMSF site configuration is reflected within Figure 2-11.

Table 4-1: Project Vegetation Type Removals by Area (Cathedral Park)

Vegetation Type	Removals (ha)
CUM1-1	0.34
MAM2-2	0.01
CUW1-3	0.35
FOD5-11	0.04
MGT	0.16
Total	0.9

Table 4-2: Project Vegetation Type Removals by Area (OMSF)

Vegetation Type	Removals (ha)
CUM1-1	2.62
CUT1-1	0.49
CUW	0.27
FOD4	0.73
Total	4.11

Construction/Operations Impact

In addition to the direct impacts as a result of construction activities, the construction of the OMSF will have indirect impacts to vegetation communities, both during construction and operations phases. These indirect impacts may include:

- Release of construction-generated sediment to vegetation areas;
- Vegetation clearing/damage beyond the working area. This may include additional vegetation removals associated with grading encroachment into vegetated slopes;
- Damage to adjacent vegetation from tree felling and/or grubbing;
- Spills of contaminants, fuels, and other materials that may reach natural areas;
- Creation of opportunities for invasive species at the edges of the forest community associated with the Chedoke Creek valley; and
- Changes in drainage patterns (groundwater and/or surface runoff flow) that can affect dependent vegetation areas adjacent to the development area. Obstruction of existing surface/subsurface drainage patterns can result in upstream and downstream vegetation dieback/condition changes. Increase in downstream runoff can result in erosion effects on receiving vegetation.

Mitigation Measures and Net Effects

In order to minimize the potential for negative impacts to vegetation communities adjacent to the development area for the proposed OMSF development, the following general mitigation measures are recommended:

- Install temporary erosion and sediment control measures prior to construction, and maintain throughout construction;
- Routinely inspect sediment and erosion control measures, including after storm events, and repair as required;
- Any dewatering effluent (if dewatering is required) as result of the proposed works will be treated (i.e. filter bags, sediment traps) as needed, to ensure it does not transport excess sediment into vegetated areas;
- Stabilize and re-vegetate exposed surfaces as soon as possible;
- Clearly delineate vegetation clearing limits on both construction drawings and in the field, and field confirm with the contractor prior to clearing and grading. Equipment, materials and other construction activities will not be permitted in these zones;
- Vegetation that does not require removal for purposes of the construction will be protected through the installation and maintenance of temporary vegetation protection measures (i.e. temporary fencing);
- Trees to be removed will be felled into the proposed area of disturbance (and away from watercourses), to avoid impacts to vegetation outside of the project footprint;
- Tree grubbing will be restricted to the required activity zone. Where possible, tree stumps will be cut flush to the ground and grubbing will be avoided to minimize soil disturbance, particularly in erosion prone areas;
- Undertake tree management activities as required for safety and health of the balance of the vegetation unit;
- Unnecessary traffic, dumping, and storage of materials over tree roots will be avoided. Vehicle maintenance and fueling will be carried offsite, or at a dedicated area away from the top of bank. Refueling should not be permitted within 30m of any watercourse, or the top of bank areas; and
- It is recommended that a complete inventory and assessment of all trees that are to be affected by the proposed work be completed.

All mitigation measures stipulated within the Hamilton LRT 2011 EPR remain in effect. Please refer to those measures which address impacted natural areas adjacent to the corridor.

The above mitigation measures will be outlined in contract specifications and operational constraints, and on the detailed-design drawings for the Hamilton LRT project.

Monitoring/Future Work

Environmental site inspections will be required during key construction periods and at key locations. This will ensure environmental protection/re-vegetation measures are implemented and working, and any required remedial action is undertaken. A focused Butternut/health assessment survey should be conducted as part of the tree inventory during detailed-design. If species at risk are identified within the influence zone of construction activities, the Ontario Ministry of Natural Resources (MNRF) will be contacted to determine how specimens of such species should be treated.

Prior to any works taking place that might affect the Butternut trees, the following steps must be followed:

- A qualified Butternut assessor must determine the health of the trees;
- Send the health assessment report to the MNRF for a 30-day review period;
- After the 30-day review period the trees can be removed or harmed if:
  - They are Category 1 trees (non-retainable);
  - A maximum of 10 Category 2 trees (retainable) are to be removed/harmed in accordance with *O.Reg 242/08*; and
  - Trees that have been categorized as Category 3 (achievable) cannot be removed.

According to *Ontario Regulation 242/08* Butternut trees are divided into 3 categories:

- Category 1: in the advanced stages of disease as a result of Butternut canker (“non-retainable”);
- Category 2: the tree does not have Butternut canker or disease is not as advanced (“retainable”); and
- Category 3: could be useful in determining how to prevent or resist Butternut canker (“achievable”).

If any activities will impact ten or fewer Category 2 Butternut trees, the activity must be registered with the MNRF by submitting a Notice of Butternut Impact Form to the MNRF Registry and completing compensation plantings and monitoring as spelled out in *Ontario Regulation 242/08 (Section 23.7).* If more than ten (10) Category 2 Butternut trees, or any Category 3 trees will be impacted by any activity, then a *17 (2)(c)* permit under the *Endangered Species Act* will be required.

4.2.4. Wildlife and Wildlife Habitat[4]

The following section provides a summary of anticipated impacts to wildlife and wildlife habitat within the study area, as a result of the construction of the Hamilton LRT and construction work at the OMSF. These impacts are considered against the general wildlife habitat function of the project area, where mitigation takes into consideration local and resident wildlife communities often comprised of the most urban tolerant species.

Construction/Operations Impact

Potential effects to wildlife or their habitat as a result of the proposed works include:

- Direct removal of available habitat for resident species;
- Construction disturbance to adjacent habitat and communities;
- Potential for incidental killing or harm to local and resident wildlife species;
- Artificial lighting can change animal behaviour (i.e. nocturnal foraging, migration movements, light attraction or repulsion, social interactions); and
- Animal/vehicle conflicts may occur where there are existing migratory corridors such as along linear landscape features (i.e. valleys), and anywhere with low topographic complexity.

[4] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, October 13, 2013.

Mitigation Measures and Net Effects

To minimize impacts to wildlife and their habitat during construction, the following mitigation measures should be implemented:

- Minimize habitat removal through minimizing access, staging, storage, and grading footprints;
- Avoid harassment to wildlife species during all stages of construction;
- Construction zone should be walked at a slow pace to flush any animals out of the area prior to silt fence installation;
- Workers should be trained on the potential for mammal species to move through the project area, and should remain vigilant and alert to the presence of wildlife in the work area;
- Install temporary erosion and sediment control measures prior to construction, and maintain throughout construction;
- Routinely inspect sediment and erosion control measures, including after storm events, and repair as required;
- Any dewatering effluent (if dewatering is required) as result of the proposed works will be treated (i.e. filter bags, sediment traps) as needed, to ensure it does not transport excess sediment into vegetated areas;
- Stabilize and re-vegetate exposed surfaces as soon as possible. Construction activities must adhere to the *Migratory Birds Convention Act*, which states that no tree cutting can take place from April 1 to August 31 in any given year;
- If tree removal cannot occur outside of the migratory bird nesting window, then undertake a pre-clearing nesting bird survey by a competent avian biologist;
- Ensure the construction areas are delineated by fencing (i.e. silt fencing) to exclude wildlife from entering the work areas; and
- All construction vehicle movement should be at a slow pace to avoid trampling.

Monitoring/Future Work

MNRF should be contacted directly to discuss threatened, endangered or extirpated species protected under the ESA that are observed within the limits of disturbance to ensure that activities remain compliant with the Act. Furthermore, the Ministry requests reporting all sightings of rare species (animals and plants), natural and wildlife concentration areas in Ontario to the Natural Heritage Information Centre (NHIC), using the Rare Species Reporting Form to the NHIC. For information on how to report these sightings, please refer to the following website; https://www.ontario.ca/page/report-rare-species-animals-and-plants.

Monitoring of the migratory bird prevention measures, if required, will occur during the critical breeding/ nesting period (April 1 to July 15) to ensure that the measures are effective in restricting nesting on structures scheduled or removal or alteration; thus, eliminating the potential for incidental take.

A detailed Species at Risk assessment should be undertaken during the detailed-design component of the study for Chimney Swift, Bats and Barn Swallows.

Little Brown Myotis

A management biologist at the local MNRF district office should be contacted prior to undertaking bat surveys to ensure that they align with the most recent district approved survey protocols. David Denyes is the current Management Biologist out of the Guelph District Vineland office, and can be reached by email at David.Denyes@ontario.ca.

Any forested area that is classified as FOD/FOM/FOC/SWD/SWC/SWM are all considered SAR bat habitat unless proven otherwise (through examination of presence/absence of species by bioacoustic monitoring and presence/absence of suitable cavities for roosting).

If SAR bats are determined to be present, then a *17(2)(c)* permit under the *Endangered Species Act* will be required. Extensive consultation with the MNRF will be required (avoidance alternatives, overall benefit permits). Applying for an Overall Benefits permit typically require a year or more to get approval.

Some of the buildings that have been identified for removal along the B-Line may provide suitable habitat for the Little Brown Myotis. Surveys for bat roosting habitat or bat hibernacula were not conducted as the building removals have not been finalized. A comprehensive survey for bats will be required for all buildings that will be removed for construction of the LRT and these surveys will include:

- An interior search for evidence of bat roosting such as checking the attics for evidence of guano and/or the bats themselves roosting during the day;
- Observing the chimney soot clean-out (usually on older buildings) looking for evidence such as guano, skeletons, skulls etc. that would suggest bats are utilizing the chimney for roosting;
- Detailed searches of the building exteriors where bats could be roosting between cracks in the brick, soffits or the general façade of the building; and,
- It is also recommended to conduct evening exit surveys at each building whereby observers are positioned around the building 30-45 minutes before sunset and one hour after sunset to observe any bats that may be exiting the building to forage at night.

Chimney Swift

Chimney Swift does not require permitting under the ESA but the project must be registered with the MNRF and there are certain steps to take which includes:

- Register the work with the MNRF (Notice of Activity);
- A Chimney Swift Mitigation and Monitoring Plan must be prepared;
- Describe the chimney and your activity (before you begin);
- Estimate the number of chimney swift using the chimney (before you begin);
- List the steps you took to minimize effects on chimney swift;
- Describe what you did to create habitat; and
- The habitat must be monitored for 3 years include information collected during monitoring.

The mitigation/monitoring plan must be prepared before any work begins and this record must be kept for 5 years after the work has been completed.

Barn Swallows

To minimize disturbance to barn swallows that are assumed to be nesting in the adjacent Canadian Drawn Steel Company buildings and that were observed foraging within the OMSF lands, it is recommended that site alterations within the suitable foraging areas of the subject lands be scheduled to avoid critical times when the barn swallow are carrying out key life processes relating to breeding, nesting and rearing. The period of greatest energy demand for a swallow is during nestling rearing. This barn swallow active season usually starts around the beginning of May and ends around the end of August.

4.2.5. Fish and Fish Habitat[5]

Indirect impacts to fish and fish habitat are possible due to land and water based construction activities near Chedoke Creek (i.e. release of silt as a result of poor sediment controls, fuel spills), as well as construction access to roads. The aquatic habitat effects analysis focused on the evaluation of the fisheries and aquatic habitats with respect to the effects from construction activities and the operation of the facility.

[5] Source: Hamilton LRT – Environmental Project Report Addendum, Ecology Update, prepared by SNC-Lavalin, October 13, 2013.

Construction/Operations Impact

Other potential effects to fish and fish habitat that are applicable to the project include:

- Discharge of sediment to a watercourse from earth/spoil stockpiles, grading and excavation activities associated with highway reconstruction, and culvert works resulting in the impairment of water quality and/or physical damage to habitat;
- Changes to groundwater discharge to the creek;
- Release of fuel, oil, and/or grease contaminants from mobile equipment, resulting in unacceptable contaminant concentrations in receiving watercourse; and
- Change to sensitive life stages/process (i.e. spawning) if in-water works are not timed appropriately.

Mitigation Measures and Net Effects

To address the potential impact to fish and fish habitat, the following key design and construction mitigation measures with respect to the works in the study area, will be incorporated in the construction contract through the dtailed-design drawings and contract documentation:

- Design and install native woody vegetation and groundcover to pre-construction conditions or better;
- Design and implement erosion and sediment controls to prevent erosion of exposed soils and migration of sediment to watercourse;
- Store, handle, and dispose of all excess materials in a manner that prevents their entry to a watercourse;
- Operate, maintain, and store (i.e. fuel, lubricates) all equipment and materials in a manner that prevents the entry of any deleterious substances to the watercourse;
- Maintain existing ground cover such as grasses or other low lying vegetation within the valley, particularly on the banks of Chedoke Creek and in close proximity to surface water features and other sensitive areas;
- Properly maintain erosion control measures, including following storms events, until all construction work has been completed and the site has been stabilized; and
- Refuel and maintain vehicles and equipment at the staging areas or other pre-designated locations which are a minimum of 30m removed from the surface water system.

Monitoring/Future Work

If needed, an environmental monitoring plan to assess the mitigation measures for protection of aquatic and surface water resources will be prepared. Monitoring during operations is anticipated to be limited to sediment accumulation and functioning of stormwater management facilities, and stability of drainage systems and slopes near the watercourses in the study area.

4.2.6. Air Quality[6]

The project was reviewed for the potential to create project related changes in traffic that impact air quality at nearby sensitive land uses. The impact to traffic change was considered negative if it increased the potential for an air pollutant to exceed its acceptable threshold, and positive if it decreased this potential. The potential for construction activities to cause temporary impacts at nearby sensitive land uses was also studied.

Air Quality Impacts from Changes in Road Traffic

Since the proposed Hamilton LRT is an electrified rail system, it does not produce any significant local air emissions. Rather, it displaces emissions that would otherwise be generated by alternative methods of carrying its passengers, either automobile or bus. However, existing roads and road traffic conditions will be altered to accommodate the B-Line LRT. For example, the present-day volume of road traffic on King Street in the downtown area will be significantly reduced with the LRT in place, while some other streets will pick up overflow from the King Street corridor and experience increased traffic.

Air Quality Impacts from the Operation, Maintenance and Servicing Facility (OMSF)

The proposed location of the OMSF near Chatham and Frid Street, east of Longwood Road South, and shared running track will extend from the intersection of Longwood and Main Street, across Longwood Bridge over Highway 403, and via Frid Street to the north end of the site.

As part of the development of the OMSF site, Frid Street will be extended to connect the existing western portion from Longwood Road to the existing eastern portion to Main Street West.

One of the advantages of the proposed site is that rail access can be created without using one of the existing street corridors. Therefore, the rail traffic to and from the site will have no impact on local road traffic in the vicinity of the residences. The site will generate some employee traffic on the local roads, as evidenced by the 236 parking spaces that are included in the current OMSF site layout. This traffic will contribute a small increase in local levels of vehicle exhaust pollutants. However, the site layout is designed to provide access to Longwood Road, and much of the employee traffic is likely to use that access, avoiding the residential streets. Therefore, the proposed facility is not expected to cause impacts to local road traffic that would significantly affect the local air quality in the residential areas.

Downtown Hamilton currently experiences levels of particulate matter that are relatively high compared to other parts of Southern Ontario. The proposed LRT will contribute a beneficial effect on airborne particulate matter by displacing a significant amount of bus and automobile travel in the downtown area but, nevertheless, it is desirable to minimize the amount of particulate matter generated by the OMSF.

Construction/Operations Impact

The air contaminant of greatest concern that could be emitted by the OMSF facility is dust particles, which can be categorized as total suspended particulate matter (TSP), inhalable particulate matter (PM10), and respirable particulate matter (PM2.5).

The operations at the OMSF facility will include activities and equipment that have the potential to generate air pollutant emissions, including sandblasting, spray painting, welding, wheel truing, sand handling system, compressed air blow-downs, steam cleaning, boilers, and emergency generators. These activities and equipment will be located inside the OMSF building.

Air quality impacts during construction of the LRT were addressed in RWDI's previous report for the Hamilton LRT EPR, prepared in 2011. It was recommended that an emissions management plan be developed for construction, setting out the various practices to be undertaken to minimize dust and other air pollutants. A list of standard practices was provided. No updates are required to the 2011 recommendations for construction.

Mitigation Measures and Net Effects

To comply with provincial regulations (*Ontario Environmental Protection Act* and *Regulation 419/05*), the OMSF must be designed so that off-site concentrations of air contaminants emitted from it are below the provincial standards at all times. This has to be documented in an Emission Summary and Dispersion Modelling (ESDM) report, which is submitted to the Ontario Ministry of Environment and Climate Change (MOECC), together with an application for *Environmental Compliance Approval* (ECA). This must be done prior to construction and operation of the facility.

Sufficient details on the potential air emission sources at the facility are not available at the present time, to predict off-site air contaminant concentrations using a computer dispersion model. Based on past experience, however, it is anticipated that the emissions will need various control measures in order to comply with both the provincial air quality standards in the outside air, and provincial occupational exposure limits for workers inside the facility. All activities capable of generating significant airborne particles (i.e. traction motor blow downs, steam cleaning, sandblasting, sand handling, welding, wheel truing) should be subject to either general ventilation or localized capture systems that are equipped with particle filtration.

The paint booth exhaust(s), in addition to having appropriate paint arrestors, should be designed with sufficient exhaust flow and stack height to ensure that off-site concentrations are below the standards for any regulated volatile organic compounds that are contained in the paint formulations, and are released into the air during spraying and curing. Any boilers and

[6] Source: Hamilton LRT Addendum, Air Quality – Existing Conditions; provided by RWDI Inc., December 14, 2016.

Source: Hamilton LRT Addendum, Air Quality Study Update; provided by RWDI Inc., December 14, 2016.

emergency generators should conform to the current tier of emission limits that are in place for new equipment at the time of procurement, and the exhaust stacks should be designed to provide appropriate dispersion. The specifics of these control measures, including locations, configurations and dimensions of exhaust vents, air flow rates of exhaust vents, type of filtration equipment, and expected efficiency of filtration equipment should be documented in the ESDM report, which should be prepared when sufficient information on the specifics is available (i.e. after detailed-design is under way).

Monitoring/Future Work

Ontario Regulation 419/05 under the *Environmental Protection Act* requires that every measure be taken to minimize emissions and prohibit visible emissions from escaping beyond the project limits of a construction site. A dust management plan will be developed during detailed design. During construction observation of visible emissions will be treated as a case where immediate action must be taken. Dust generation will be visually monitored to proactively achieve the goal of reducing impacts to local air quality. This minimizes the exposure of the general public and workers on-site to fine particles.

The anticipated effects on air quality are expected to be relatively small (positive in some cases and negative in others). Benzene from motor vehicles is mitigated by federal tailpipe regulations and by the LRT itself, which displaces bus and passenger car traffic. Benzene emissions from construction activities would be relatively minor, and mitigated by the use of higher-Tier (Tier 3 or Tier 4) equipment.

A project specific monitoring program during the operations phase is not proposed. The City of Hamilton will continue to assess area wide air quality under its current monitoring program (through Clean Air Hamilton), and it is expected that the Hamilton LRT operations will be captured by this initiative.

Continuous monitoring for particulate matter (PM10 and PM2.5) and NOx is recommended at two locations (downtown and at the MSF), including three months of pre-construction monitoring and up to a year of monitoring during construction.

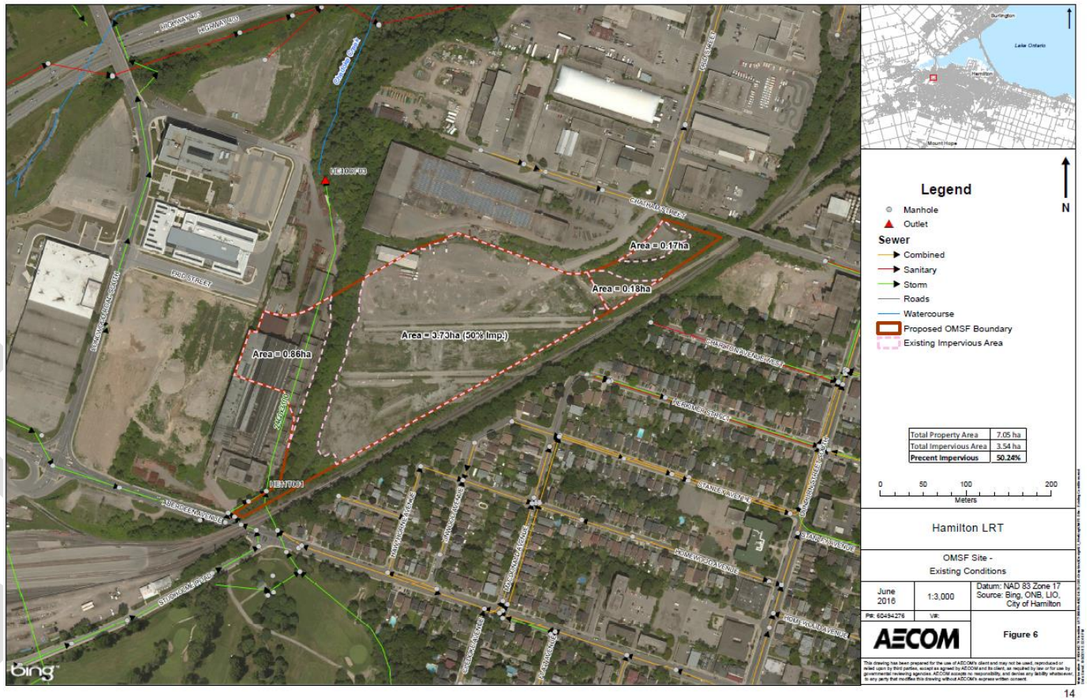
4.2.7. Stormwater[7]

The majority of the Hamilton LRT alignment will have surface run off collected and fed into the City of Hamilton's storm sewer system. The study area is largely urbanized and the proposed alignment will generally remain within the existing roadway allowances where the road sections are already built. The amount of impervious area will not increase substantially along the corridor and therefore the impacts on stormwater drainage are not significant.

Construction/Operations Impact

The OMSF site will require site plan approval, addressing stormwater quality and quantity controls. These controls are to be designed based on relevant criteria (Ontario Ministry of the Environment Stormwater Management Planning and Design Manual, 2003). Below are the conceptual design calculations for the pond design. The existing and proposed site conditions are shown in Figures 7.0 and 8.0 respectively.

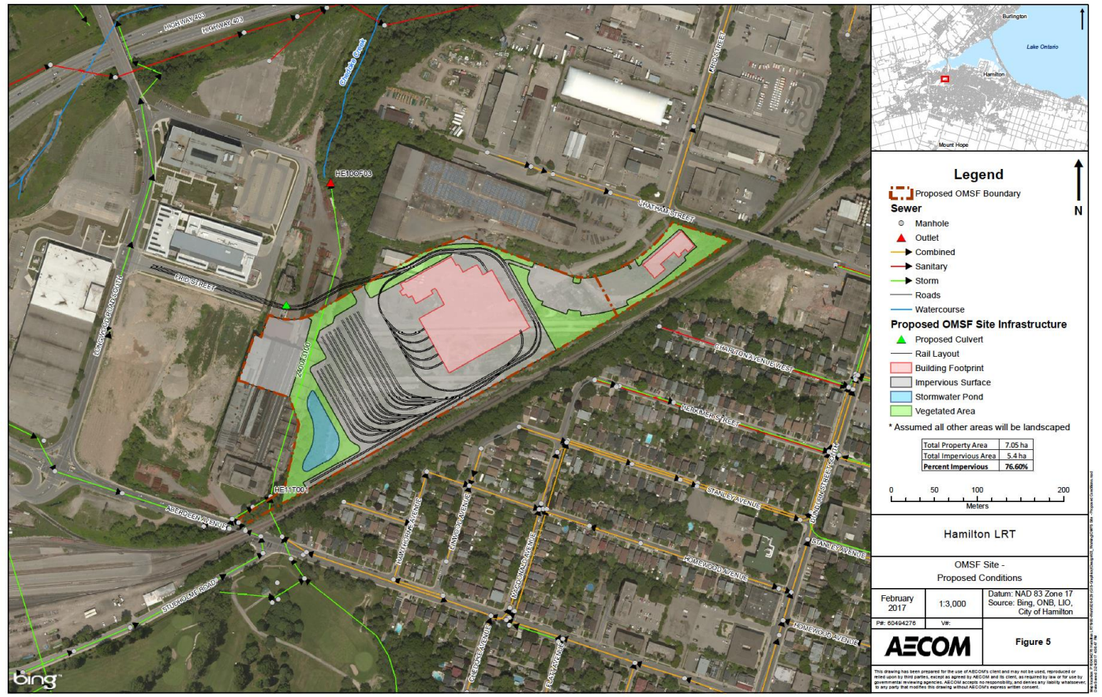
Figure 4-3: OMSF Site – Existing Conditions



Based on the above, an 80m x 27m pond (0.21ha footprint) with an overall depth of 3.0m (1.7m permanent pool depth and 1.3m allowable active storage) should be adequate to meet the requirements. Based on this sizing, the MOECC criteria for water quality and extended detention are met at a depth of approximately 2.6m. This allows for an additional depth of 0.4m, and approximately 749 cubic meters (749m^3) to provide peak flow control. Hydrologic calculations and peak flow control calculations have not been carried out, but pond size is assumed to be adequate for peak flow control based on percent impervious value of 50.2% for existing conditions and 54.2% for proposed – increase of only 4%.

[7] Source: Hamilton Light Rail Transit Environmental Assessment Report, Stormwater Management, prepared by AECOM, October, 2106.

Figure 4-4: OMSF – Proposed Conditions



Mitigation Measures and Net Effects

Where an increase in impervious surface area occurs, along with increased stormwater runoff, best management practices will be assessed in accordance with MOECC Stormwater Management Planning and Design Manual (2003) and City of Hamilton's Comprehensive development guidelines and financial policies (2016). Consideration will also be given to enhancing runoff conditions in existing road segments, where practical.

A preliminary review of the site suggests that the following design components are recommended for the grade separation, flyover of Highway 403 which will connect the alignment from Main Street West to King Street West, and at King Street, just west of Gage Avenue, where the LRT tracks will go under the CP track:

- This grade separation will need to be designed keep the sag 'dry' for up to the 1:100 Year design storm.
- The sag be isolated from overland flows from the surrounding area;
- The tracks be elevated on the upstream (based on the road slope) side to form a "bump" slightly above the estimated high water level on the road (approximately 0.30m above gutter elevation) to form a physical barrier to overland flows down into the sag. A similar "bump" should also be implemented on the downstream side to prevent overland backflows into the sag. In both cases the actual bump elevation required will need to be determined based on modelling;
- A barrier wall surround the depressed tracks and extend above the adjacent roadway to prevent overland flows on the roadway from spilling into the sag;
- An interceptor trench (with grate) be installed across the full width of the roadway upstream of the sag to capture overland flows along the roadway and route them to the downstream side of the sag. The use of such a trench would minimize the needed "bump" and barrier wall elevations; and
- Any flows resulting from rainfall onto the depressed rail area be collected and pumped to a downstream outlet. A direct gravity connection should be avoided to minimize the chance of backwater flows flooding the sag.
- Storage of run-off volumes should be designed based on pump failure condition.
- Release rate from the sag shall be controlled to the lesser of the 2-year pre-development flow rate or the available residual capacity of the receiving storm sewer.
- An adequate inlet system shall be designed to capture the peak flows and run-off volumes which will keep the sag dry in all storm events up to 1:100 year storm event and including the regional event.
- An erosion and sediment control plan is required to satisfy the criteria of *Erosion and Sediments Control Guidelines for Urban Construction* (Greater Golden Horseshoe Area Conservation Authorities, December 2006). The following control measures are recommended to be implemented during the construction:
- Erosion protection be provided around all storm manholes, sanitary manholes, and catch basins;
- Erosion control structures should be monitored regularly with sediment being removed when accumulations reach a maximum of 1/3 of the height of the silt fence;
- All erosion control structures should remain in place until all disturbed ground surfaces have been re-stabilized, either by paving or restoration of vegetative ground cover;
- The contractor must remove sediments from the municipal roadway and sidewalks at the end of each work day;
- A single construction entrance be utilized with a "mud mat" installed to minimize the amount of sediment transported off the site on construction vehicles tires;
- All disturbed areas not scheduled for construction within 30 days be stabilized and seeded immediately;
- Slopes greater than 5:1 be stabilized using geogrid or an erosion control blanket, and seeded or sodded as soon as possible; and
- During construction, slopes should be maintained with a dense cover of grass.

Monitoring/Future Work

A detailed surface water management plan is required for the Hamilton LRT Project, to be used for monitoring throughout construction.

A separate Storm Water Management (SWM) study will need to be undertaken to prepare the detailed stormwater management required for the OMSF site. Inspections should be completed weekly and after an event greater than 13mm of precipitation, and submitted regularly to the City and the Hamilton Conservation Authority (HCA).

During the development of the stormwater management plan and detailed-design, the Hamilton Conservation Authority (HCA) should be consulted; in order to review proximity and potential impacts to buried watercourse at the OMSF location.

4.2.8. Geotechnical[8]

Subsurface and groundwater information was reviewed and the investigation requirements for the next stage have been identified with consideration of Infrastructure Ontario (IO) AFP-Geotechnical, Hydrogeology, *Environmental Due Diligence Technical Requirements-Civil Infrastructure Projects* (final draft dated on January, 2016).

An assessment of the potential for contaminated sites within the study area has been completed concurrently (see Appendix C-6), and will have an impact on how groundwater is controlled during the construction stages.

[8] Source: Hamilton LRT – A-Line and OMSF Geotechnical EA Report; provided by AECOM, October, 2016.

Construction/Operations Impact

Depending on the site-specific subsurface conditions and subgrade inspection findings during construction, proper frost mitigation measures should be implemented to minimize any frost related maintenance issues, should they be identified.

Where deep excavation in sands and silts is anticipated, a positive groundwater control system will be required. The impacts of groundwater in areas of deeper excavation shall be assessed through a detailed hydrogeological assessment.

Mitigation Measures and Net Effects

In case of using short caisson foundations in a frost susceptible soil with a high groundwater table, adfreezing/frost heave uplift mitigation should also be considered.[9]

Preferably, construction is to be carried out during the summer months when the groundwater is usually the lowest in order to minimize the quantity of groundwater to be handled.

As part of the hydrogeology investigation (Hydrogeology Report Appendix C-1), the following hydrogeological testing of the geotechnical boreholes: will be conducted during detailed-design.

- Monitoring wells for every 1/3 borehole;
- Well development prior to testing;
- Water quality sampling of every monitoring well;
- Slug testing of every second monitoring well; and
- A short-term pumping test for each of the excavations for deep structures (if any).

Monitoring/Future Work

Due to the extensive minimum investigation requirements stipulated in the newer version IO AFP document (2016), consideration can be given to the use of Infrastructure Ontario (IO) AFP-Geotechnical, Hydrogeology, Environmental Due Diligence Technical Requirements (final draft dated on May, 2012), which has been successfully used for a number of large scale transit projects in the GTA.

4.3. Socio-Economic Environment

The purpose of this section of the report is to examine and document the impact assessment, mitigation and monitoring of noise and vibration and land use.

4.3.1. Noise and Vibration

In most areas construction activities should not last for more than two (2) years and in many areas substantially less time as activity proceeds along the route. Construction noise and vibration will be controlled where practical and economically feasible. However, elevated sound and vibration levels should be expected along the entire corridor and near the OMSF.

Bus Terminals

An assessment of the bus terminals has been completed using two scenarios. The first scenario assumes realistic and modern bus idling and movement sound levels and provides a more accurate picture of the expected sound levels from the bus terminals. The second scenario assumes louder average bus idling and movement sound levels and provides a picture of the worst-case mitigation requirements needed to control the bus terminal noise.

OMSF

The vibration analysis has indicated that the tangent track at the OMSF and spur line will have no impacts on nearby residential receptors. The special trackwork located closest to the residential receptors to the south of the OMSF will meet the ground-borne vibration criteria of 0.1mm/s RMS but are expected to exceed the vibration-induced noise criterion of 35 dBA by at least 10 dB or so.

The ambient sound levels at nearby residential receptors are fairly low. As a result, even modest sound levels generated by typical light rail maintenance facilities would result in a significant noise impact at the nearest residential receptors

Construction/Operations Impact

Bus Terminals

The assessment of bus terminal noise from the new McMaster bus terminal indicates impacts ranging from 4 to 18 dB at the nearest receptors. The assessment of bus terminal noise from the new MacNab bus terminal indicates impacts ranging from 8 dB at the nearest receptors. The assessment of bus terminal noise from the new Queenston bus terminal indicates impacts ranging from 13 to 19 dB at the nearest receptors during the worst-case period. In all cases, the greatest noise impact occurs between 6am and 7am as bus traffic ramps up earlier than ambient roadway traffic.

OMSF

The tangent track located closest to the vibration sensitive equipment in the McMaster Innovation Park and CanMET buildings has the potential to generate some vibration impacts if the sensitive equipment has not already been sufficiently isolated.

Mitigation Measures and Net Effects

All Areas - Construction

The following summarizes the recommendations to help control noise and vibration during construction.

- Equipment should adhere to the sound level limits provided within NPC-115, the FHWA guide, and the Boston Big Dig bylaw;
- Trucks should adhere to Transport Canada regulation 1106 as this provides stricter limits than NPC-118;
- All construction equipment used for this project, except for equipment used less than once per day (re-bar delivery etc.) should use broadband backup alarms instead of tonal backup alarms;
- All equipment used during any nighttime (2300-0700) construction, if permitted, regardless of size, should use broadband backup alarms;
- Implement construction vibration limits;
- Conduct a detailed assessment of construction noise and vibration and determine practical control measures to help reduce impacts;
- Consideration should be given to constructing any permanent noise barriers warranted by the project's impacts first so that the barriers also serve to help reduce construction noise impacts;
- Design and enact a communications and complaints protocol for the public to inform them of construction activities and allow them a forum to voice their concerns and complaints;
- Implement a comprehensive construction noise and vibration monitoring program, including regular site visits, to measure construction sound and vibration levels and continuously reduce/improve the impact; and
- Active briefing and review of contractors' practices and operations to ensure they continue to adhere to the requirements.

[9] Source: Geotechnical Review- Hamilton Rapid Transit Preliminary Design and Feasibility Study (B-line) September, 2011; provided by AECOM, October 14, 2016.

Bus Terminals

The following summarizes mitigation options to help control the bus terminal noise during operations:

- Ensure bus idling noise does not exceed 92 dBA Lw
- Ensure slow moving bus noise does not exceed 102 dBA Lw
- Depending on design, physical noise barriers may be required to attenuate noise impact on nearby residential properties

OMSF

Table 4-3 summarizes the noise control measures that can be expected to be required for the OMSF based on the current design and layout.

Table 4-3: OMSF Noise Control Measures

Noise Source	Noise Control Measure	Expected or Desired Reduction (dB)
Curve/Turning Noise	Rail Lubrication	5
Switch Noise	Movable Point Frogs	5
Air Handling and Makeup Air Units	Alternative Selection, Silencers, and/or Rooftop Barrier	5
Dust Collector	Alternative Selection, Silencers, and/or Rooftop Barrier	20
Cooling Tower	Alternative Selection, Silencers, and/or Rooftop Barrier	5

In addition to the source-based mitigation measures, noise barriers may be needed to protect the residential properties south of the OMSF. The details and exact height of the barrier will be subject to Detailed Design. If required, this barrier should be absorptive with an NRC rating of 0.75 to ensure that freight train noise reflections do not present another impact on nearby residences.

The Detailed Design should consider providing the maintenance area with acoustic roof deck or acoustic spray. With acoustic absorption in the space, the sound levels at the doors from maintenance noise will be significantly lower and will further negate the significance of maintenance activity noise.

It is recommended that the tangent track be provided with vibration embedded rail capable of at least a 5 dB (44%) reduction in the vibration levels. The speed of vehicles on the spur line should be limited to 30 km/hr. Otherwise, additional vibration control measures may be required.

At the OMSF, the closest special trackwork has the potential to modestly exceed the design guidelines at the CanMET building. Modest vibration isolation upgrades to the switches would be needed. Consideration may need to be given to isolating individual pieces of vibration sensitive equipment as opposed to further upgrades of the spur track.

Moveable point frogs and other noise reducing control measures can be implemented to minimize the impact noise. Slow orders over special trackwork can also be considered in specific cases. Constrained layer damping of the wheels, lubricated rails and wheels, and go-slow orders can be used to control wheel squeal.

Construction noise and vibration mitigation measures may include:

- Use of alternative methods of construction and types of equipment;
- Scheduling changes to move construction to less sensitive time periods (should be weighed against prolonging construction);
- For vibration-sensitive equipment, construction may be able to be scheduled around the use of such equipment. Alternatively, expedited 24/7 construction may significantly shorten the construction schedule and reduce the overall impact, which can be a function of both duration and intensity;
- Localized noise barriers such as around stationary equipment, staging areas, or long-term work areas such as the OMSF and bus terminals; and
- Designing haul and truck routes to minimize truck traffic through lightly travelled residential streets.

Monitoring/Future Work

Bus Terminals

The Detailed Design phase should use updated predictions on volumes, types of buses and sound levels, and finalized layouts to determine the details of the noise control measures. In all cases, bus passby noise is far more critical to the overall sound level than bus idling noise. Therefore, the detailed design should carefully account for how the buses move through the terminals. The typical bus and sound level should also be further refined during the detailed design phase.

The Detailed Design will need to review the exact location of the special trackwork and determine the efficiency of vibration propagation in the soil to choose the vibration isolation measures that may be required. Yard speeds should be limited to 15 km/hr.

The movement from the tracks from centre-running to side-running in the area just west of Dalewood Road and east of McMaster University has triggered some vibration impacts that cannot be addressed by a simple Level 1 embedded rail system. Instead, an upgraded Level 2 embedded rail system is recommended in this area.

OMSF

A more detailed Noise and Vibration Impact Assessment will be completed during Detailed Design. Aside from the normal scope of such reviews, the following should be addressed as part of the detailed assessment to confirm and design the vibration mitigation measures.

- Conduct vibration propagation testing of the OMSF site and surroundings to confirm the reduction in vibration with distance;
- Verify the performance of the existing vibration isolation systems provided for the sensitive equipment at CanMET and the McMaster Innovation Centre. This may entail in-field vibration measurements in addition to reviews of manufacturer's data;
- Confirm the vibration design criteria and acceptable levels at the sensitive equipment within CanMET and the McMaster Innovation Centre; and
- The contribution to the air-borne sound levels from the special trackwork should be reviewed.

Provincial and municipal guidelines provide basic restrictions and recommendations with regard to construction noise and vibration. The City of Hamilton enforces a noise bylaw which prescribes appropriate hours of operation for construction activities.

The applicable guidelines can be found in the following documents:

- MOECC's Model Municipal Noise Control By-law;
- The City of Hamilton By-Law No. 03-020, enacted January 22, 2003;
- NPC-115 'Construction Equipment'; and
- NPC-300 'Environmental Noise Guidelines.

By-Law No. 03-020 places restrictions on the hours of operation for all construction activity: in particular, construction is limited to between 7:00 a.m. and 7:00 p.m. on weekdays and Saturdays, with more stringent hours on Sundays and holidays. If any construction will need to be carried out through the night, special exemptions will need to be obtained with City of Hamilton Council approval. Because of the potential impact on receptors during the nighttime periods, it is recommended that the residents in the area be notified several weeks in advance of pending nighttime construction activities.

It is recommended that a prediction of the construction noise and vibration impacts be completed prior to the start of construction. This construction assessment should identify typical sound levels during construction and recommend mitigation measures to help control the noise and vibration impacts during construction.

4.3.2. Land Use[10]

From a general land use perspective, the benefits of LRT are numerous. LRT supports intensification, helping to achieve overall City intensification objectives. Establishment of LRT can stimulate opportunities for the development of a wider variety of housing choices for a wide range of residents and people from outside of the City who are attracted to urban living. The investment in LRT also represents an opportunity for re-urbanization by increasing population and overall investment, promoting job growth, and improving neighborhood vitality and image.

The introduction of light rail transit along the Hamilton LRT Corridor will be a key driver in realizing land use objectives that emphasize the important connections between land use and transportation by promoting future transit-supportive land uses along rapid transit corridors.

Along the middle sections of the corridor, community scale shopping opportunities may not return but rapid transit is viewed as a possible catalyst to attract additional smaller neighborhood scale amenities and retail uses to improve these areas and develop a local identity and neighborhood amenity. With interesting retail and neighborhood environments come interests in residential development. Therefore, the City's land use vision identifies the Hamilton LRT corridor as an important location for residential intensification rather than substantial new retail.

Opportunities for larger scale redevelopment projects are found in the vacant or underutilized areas of the Downtown, as well as just outside the Downtown. These sections have the land values and developable land available to make them attractive development sites. The introduction of the B-Line LRT service is also viewed as a catalyst to this type of redevelopment. Further, uses with large parking areas present along the corridor and in immediate stop area (e.g., west and east end commercial uses) present transit oriented development opportunities that will be complemented by the Hamilton LRT service.

The OMSF presents an opportunity to work cooperatively with the McMaster Innovation Park to provide complementary facilities, including road access, parking facilities and others, to promote and facilitate continued development in the Innovation Park.

Economic Benefits

The anticipated economic impacts of the Hamilton LRT were considered in two studies: The Impact on Property Values[11] and the Economic Potential[12] for the City of Hamilton. A summary of study conclusions can be found within the Hamilton B-Line EPR (2011).

LRT is generally accepted to have a significant influence on investment decisions and economic growth. In support of the conclusions in the foregoing section on land use impacts, the economic studies identify vacant land parcels and other low density parcels, such as parking lots, that could be developed into more transit supportive uses. LRT along the Hamilton corridor could create a property market uplift ranging from $50.0 Million to $143.5 Million, representing a 1.5% to 4.3% impact). [13]

Community Cohesion

With respect to community cohesion, the introduction of light rail transit assists the City towards achieving numerous objectives contained within City policy documents that ultimately all strive to achieve the vision for the City "to be the best place to raise a child and age successfully"[14], promote innovation, engage citizens and provide diverse economic opportunities (City of Hamilton Strategic Plan, 2017). In this respect, the introduction of LRT has the potential to enhance the quality of life for residents within the corridor influence area, and the City of Hamilton as a whole. Community cohesion will be enhanced through increased mobility and access provided by the Hamilton LRT. Mobility and walkability principles are directly applicable to the implementation of the Hamilton LRT, as they are to be addressed as part of the RT streetscape design along the entire corridor.

The Hamilton LRT will foster walkability for pedestrians by calming vehicle traffic, facilitating land use intensification, enhancing the streetscape, and adhering to the city's Urban Design Guidelines for walkability, when possible.

The Hamilton LRT alignment will work in parallel with the existing and proposed cycling routes to improve community connectivity to and from the corridor. Cycling facilities that travel in east-west direction are generally on separate roads running parallel to the B-Line corridor. These parallel east-west routes connect to the B-Line corridor at key locations by way of north-south cycle routes that lead to some of the key proposed stop locations, including Dundurn Street, Wellington Street North, and Sherman Avenue South.

Potential changes to Dundurn and York Boulevard identified in the traffic assessment will require re-evaluation of the share of the right-of-way between cyclists, pedestrians and traffic. Options include relocated cycle lanes or modified street cross-sections. Consultations with the cycling community and neighbourhood associations should continue as the design process develops.

The B-Line corridor will provide improved community access to adjacent recreation trails and assist in achieving higher levels of health, mobility, skill, and age ranges in using them. In addition to the several on-street trails the B-Line corridor will also provide direct access to the Desjardins Trail.

Construction/Operations Impacts

A number of properties along the corridor will have impacts on access to their site, or impacts to their frontages. Additionally, some may require full acquisition of the parcels affected, such as the OMSF site or the proposed terminal stop at Queenston, as well as properties along the corridor. Property impacts near LRT stops and at the proposed CP Rail underpass east of Gage Avenue may require demolition of buildings. In the current preferred design, approximately 281 properties are affected, including approximately 87 properties where there is a potential building impact. Temporary property needs may include time-limited easements to facilitate construction; these will be identified during the detailed-design stage of the project.

Property acquisition required for this project will be undertaken by Metrolinx. Specific property requirements will be confirmed during detailed design to determine the predicted property effects. Property acquisition required for the Hamilton LRT Project will be undertaken by Metrolinx, with the objective being to provide fair market value compensation to affected property owners in accordance with applicable laws.". The acquisition process emphasizes negotiation on a willing seller, willing buyer basis and the achievement of a mutually satisfactory agreement between Metrolinx and the owner. If necessary, expropriation may be required to acquire the necessary property in a timely and efficient manner.

There may also be adverse permanent and temporary impacts to individual business operations in the Hamilton LRT corridor. Consultation to date has suggested that an important business issue is the possible reduction in the level of customer and supplier vehicle access to the area (e.g., potential loss of passing traffic, on-street parking, and loading/unloading areas). The design of the project has been developed to minimize these impacts. The City of Hamilton and Metrolinx are committed to staging and scheduling construction in a manner that reduces temporary impacts during the construction period.

[10] Source: Hamilton Rapid Transit Preliminary Design and Feasibility Study - B-Line Environmental Project Report (Hamilton LRT 2011 EPR), provided by Steer Davies Gleave.

[11] Source: Hamilton Rapid Transit Benefits Case: Impact on Property Values Draft Report; provided by MK, July 28, 2009.

[12] Hamilton Rapid Transit Initiative: Economic Potential Study Final Report; provided by IBI in association with HDR, March, 2009.

[13] Hamilton Rapid Transit Initiative: Economic Potential Study Final Report; provided by IBI in association with HDR, March, 2009

[14] Source: Hamilton City Council adopts a new 2016 - 2025 Strategic Plan.

Mitigation Measures and Net Effects

The City and Metrolinx will establish a construction liaison committee during construction to provide quick access to construction related information, specifically schedule and timing information for business owners and residents. The committee will be made up of City and Contractor staff who will meet on site periodically. Business owners and residents directly affected by the current/future construction activity will be invited and encouraged to attend these meetings where the day-to-day issues affecting their home/business will be discussed. Issues such as business deliveries, local parking, and garbage pick-up will often be topics of concern. In addition to the construction liaison committee initiative, prior to each phase of construction, the City will conduct a broader public awareness campaign. It is expected that such ongoing strategic consultation and information dissemination will increase certainty about project impacts, create an acceptable contingency planning regime, and dramatically reduce the potential disruption to business activities and community cohesion.

While recognizing the influence of rapid transit as a positive catalyst for redevelopment, the City of Hamilton and Metrolinx has also recognized the potential adverse impacts of the new service. These include pressure for intensification or redevelopment that would displace important components of the existing housing stock in the City, such as affordable rental units.

Intensification and infill should be implemented with care and consideration of surrounding neighborhoods. Intensification, in and of itself, is not appropriate unless developments respect neighborhood character, are of appropriate scale, and include high quality design. Further direction regarding intensification is detailed the Urban Hamilton Official Plan and other planning guidelines and documents.

Monitoring/Future Work

In addition to monitoring that will occur through the construction liaison committee forum during construction, the City of Hamilton and Metrolinx will establish storefront locations dedicated to receiving public comments and concerns about construction activities and impacts.

With respect to long-term monitoring, planning within the Places to Grow policy environment requires comprehensive programs to monitor the various targets contained within the Growth Plan. Beyond monitoring for Growth Plan purposes, the Urban Hamilton Official Plan identifies monitoring and measuring performance of the Official Plan as critical to determine if:

- The assumptions of this Plan remain valid;
- The implementation of the policies fulfill the overall goals and objectives of this Plan;
- Growth targets listed in Sections A.2.3 - Growth Management – Provincial and B.2.4.1 - General Residential Intensification Policies, are being met; and
- The priorities identified in this Plan remain constant or require change.

Official Plan monitoring is carried out through statutory 5-year official plan reviews to evaluate whether the goals and objectives of the plan are being met and remain relevant. The more detailed policy direction is also monitored through secondary plan reviews. The City also actively monitors housing starts to track new development, and monitors intensification to track whether City objectives and Provincial targets are being met. Monitoring of economic activity and investment is done where city programs are in effect. Such monitoring can be established to track economic impacts in the LRT corridor over time.

4.4. Cultural Environment

The purpose of this section of the report is to examine and document the impact assessment, mitigation and monitoring of archaeology and built heritage and cultural landscapes.

4.4.1. Archaeology[15]

The Stage 1 Archaeology Report determined that four (4) previously registered archaeological sites are located within 1km of the study area (LRT B-Line, OMSF site, and High-Order Pedestrian Connection). This area has a long and complex Indigenous history due to its proximity to the Cootes Paradise and Lake Ontario. A review of the geography of the study area suggested a potential for the identification of Indigenous and Euro-Canadian archaeological resources, depending on soil conditions and the degree to which soils have been subject to deep disturbance. However, a property inspection determined that the study area has been subjected to deep and extensive soil disturbance events and does not possess archaeological potential. Therefore, the study area does not require further archaeological assessment.

Construction/Operations Impact

The project was assessed against the potential for encountering and disturbing archaeological resources adjacent to the disturbed right-of-way and OMSF site that remain undisturbed and contain archaeological potential. Should the proposed work extend beyond the current study area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands. It should be noted that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit.

Mitigation Measures and Net Effects

In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the MTCS should be immediately notified. Compliance with the following legislation is required:

- It is an offence under *Sections 48 and 69* of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological field work on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in *Section 65.1* of the *Ontario Heritage Act.*
- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to *Section 48 (1)* of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with *Section 48 (1)* of the *Ontario Heritage Act*.
- The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

Monitoring/Future Work

Complete all required AA (Stage 2 and Stage 3 if recommended by the Stage 2AA) as early as possible in the planning stages of the project.

[15] Source: Stage 1 Archaeological Assessment: Hamilton Light Rail Transit – Environmental Project Report Addendum, Part of Lot 19-21, Concession 3 (Former Township of Barton), County of Wentworth, City of Hamilton, provided by J. Bruin & Associates Inc. and Steer Davies Gleave, January 31, 2017.

4.4.2. Built Heritage Resources and Cultural Heritage Landscapes[16]

Cultural Heritage Screening[17] [18]

There are 256 properties that were screened using the Screening Questions outlined in the Draft Terms of Reference for Consultants: Cultural Heritage Screening Report for Built Heritage Resources and Cultural Heritage Landscapes (Metrolinx 2014). This screening process included the initial CHSR conducted by ASI, which identified 205 properties, plus the gap analysis completed by AECOM, which identified 51 additional properties.

Based on the heritage assessment, 53 of the directly impacted properties were subject to a CHER, while 25 indirectly impacted properties were recommended to undergo the CHER process in future design phases, as the nature of the impact may change as the design progresses.

There are no properties within the project study area that have previously been identified as a Provincial Heritage Property (PHP) or Provincial Heritage Property of Provincial Significance (PHPPS).

Cultural Heritage Evaluations[19] [20]

For convenience, Table 3-11 is repeated here as Table 4-4

Table 4-4 Cultural Heritage Screening Summary

Source	Number of Properties Identified	Properties that underwent Cultural Heritage Screening	CHERs Completed (Direct Impacts)	CHERs to be completed in future design phases (Indirect Impacts)
ASI CHSR				
Initial Assessment	230	205	54	0
AECOM Gap Analysis				
Re-assessment	N/A	N/A	43	4
New assessment	51	51	10	21
Total	**281**	**256**	**53**	**25**

Direct Impacts and Mitigation Measures

Table 4-5 shows the properties for which CHERs were conducted. (Note, three CHERs are still underway, and results will be included prior to the MOECC submission). Of the 53 Conducted CHERs, six (6) were identified to require Heritage Impact Assessments during detailed design to ensure that impacts to heritage resources are appropriately mitigated.

These include the properties with direct impacts – where LRT construction will require the demolition of the building, or where property requirements are sufficient to affect the use of the building.

[16] Source: Hamilton Light Rail Transit Cultural Heritage Screening Report, City of Hamilton, provided by J. Bruin & Associates Inc. and Steer Davies Gleave, October, 2016 (revised December 2016 & February 2017).

[17] Source: Additional Screening Sheets for Cultural Heritage Screening Report, provided by AECOM, February 23, 2017.
[18] Gap Analysis of ASI's Cultural Heritage Screening Report (December 2016) and Identification of Additional Screening Requirements, prepared by AECOM, February 23, 2017.
[19] Source: Additional Screening Sheets for Cultural Heritage Screening Report, provided by AECOM, February 23, 2017.
[20] Gap Analysis of ASI's Cultural Heritage Screening Report (December 2016) and Identification of Additional Screening Requirements, prepared by AECOM, February 23, 2017.

Table 4-5 Summary of Potential Cultural Heritage impacts and Mitigation Measures for Directly Impacted Properties

** For all properties listed in Table 4-9, a qualified heritage practitioner will be engaged during detailed design to ensure that the principles of heritage conservation are incorporated into the final design of the project as they impact heritage resources and attributes.*

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
McMaster to Cline Avenue								
Cline Avenue to Highway 403								
	85 Paisley Ave S	Gap Analysis	N/A	Building demolition, Road widening for Longwood Stop	Pending	Pending	Pending	Pending
9	160 BOND ST S	ASI CHSR	CHL 7	Building demolition, Road widening for Longwood LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property includes a building that is a typical example of mid-20th century suburban construction in Hamilton and elsewhere in Ontario. It is constructed upon an irregularly shaped lot on the northwest corner of Main Street West and Bond Street South, developed in 1943.	HIA not required
Highway 403 to Margaret Street								
20	612 KING ST W	ASI CHSR	N/A	Building demolition, Road widening for turning lane	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains two buildings, a residential dwelling (c. 185) and a veterinary clinic. The residential dwelling is at the rear (north) end of the property and was not addressed. The veterinary clinic is a single story building which is rectangular in plan with a flat roof.	HIA not required
21	621 KING ST W	ASI CHSR	BHR 4	Building demolition, Road widening for Dundurn LRT stop and turning lane	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The house at 621 King Street West was consistently used for residential purposes, and was home to a variety of residents throughout the 20th century. The structure retains a number of its design features connected to its vernacular Edwardian style. This style, popular in the first few decades of the 20th century was a simplified but formal composition with an emphasis on classical architectural motifs.	HIA not required
22	619 KING ST W	ASI CHSR	BHR 5	Building demolition, Road widening for Dundurn LRT stop and turning lane	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The building consists of a 2½ storey brick house that is one of two identical structures located adjacent to each other, both built in 1909. The structure contains some design elements that are remnants of the Edwardian style, popularly used between 1900 and 1930. However, a substantial ground floor addition has resulted in the heavy modification of a number of design elements to the	HIA not required

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
							street façade of the structure.	
Margaret Street to Caroline								
37	426-428 KING ST W	ASI CHSR	CHL 12	Building demolition, Road widening for track/turning radius	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early mid-20th century 2 1/2 story commercial building with a residential space above. This form is commonly found throughout Hamilton. The property appears to have been in recent commercial use, however it is currently vacant. The upper floors and addition at the rear of the building appear to be occupied and in use as a residential space.	HIA not required
Caroline Street to Catharine Street								
Catharine Street to East Avenue								
67	2 WEST AVE N	ASI CHSR	CHL 18	Building demolition, Road widening for Wellington LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure located on the property at 2 West Avenue North is a common example of an early- 20th century 2½ story Edwardian house. This form is commonly found throughout Hamilton.The house is located on the northeast corner of West Avenue North and King Street East. Wellington Square, a small park is located on the west side of the street, opposite the house. The property is one of a series of six early-20th century houses that extend across approximately half of this block. All six properties consist of 2½-story houses, all of a similar design.	HIA not required
East Avenue to Sanford Avenue								
68	401 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wellington LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a set of connected structures extending from the King Street East frontage to a rear laneway. The resulting building is made up of at least four individually discernable structures - an original victorian house with two additions to the nort (rear) and one to the south (front).	HIA not required
74	561-563 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for track/turning radius	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The building is a typical example of early- 20th cetury commercial and residential architecture found in urban municipalities in Ontario. The property is a rectanggular shaped lot	HIA not required

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
							on the northwest corner of King Street East and Steven Street. The lot is almost double the size of the rest of the properties on the north side of King Street East on this block as the property incldues three connected buildings that front onto King Street East and Steven Street.	
79	652-654 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid-20th century 1-story commercial building. It is located on a rectangular lot on the south east corner of King Street East and Grant Avenue and constructed of structural brick, build c.1935.	HIA not required
79	1 Grant	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	Meets criteria in O. Reg. 9/06 Property is a PHP	The structure located at 1 Grant Avenue is a representative example of an early-20th century 2½ story Edwardian house. The building features intact architectural details including rusticated stone window sills; basket-arched bay windows with hood moldings, decorative labels and brackets and decorative fielded panels impressed with a rosette motif. The main entrance and window above it are plain with flat openings. The gable features scalloped shingles. It retains a high degree of design integrity. The streetscape of this portion of King Street East has remained relatively unchanged since the development of the area in the early to mid-20th century. Nearly all of the buildings in this block, including the house at 1 Grant Avenue retain the majority of their heritage attributes.	The structure is a common example of an early/mid-20th century 1-story commercial building. It is located on a rectangular lot on the south east corner of King Street East and Grant Avenue and constructed of structural brick, build c.1935.	HIA will be completed during detailed design to ensure that impacts to heritage resources are appropriately mitigated.
80	656 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	Meets criteria in O. Reg. 9/06 Property is a PHP	The structure located at 656 King Street East is a representative example of an early-20th century 2½ story Edwardian house. The building features intact architectural details including rusticated stone window sills; basket-arched bay windows with hood moldings, decorative labels and brackets and decorative fielded panels impressed with a rosette motif. The main entrance and window above it	The structure is a representative example of an early-20th century 2½ story Edwardian house. The building features intact architectural details including rusticated stone window sills; basket-arched bay windows with hood moldings, decorative labels and brackets and decorative fielded panels impressed with a rosette motif. The main entrance and window above it are plain with flat openings. The gable	HIA will be completed during detailed design to ensure that impacts to heritage resources are appropriately mitigated.

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
						are plain with flat openings. The gable features a Palladian window and scalloped shingles. It retains a high degree of design integrity. The streetscape of this portion of King Street East has remained relatively unchanged since the development of the area in the early to mid-20th century. Nearly all of the buildings in this block, including the house at 656 King Street East retain the majority of their heritage attributes.	features a Palladian window and scalloped shingles.	
81	658-660 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property is a typical example of mid-20th century multi-storey urban apartment constrution, and contains details related to the Art Deco style. The building is upon an irregularly shaped lot on the south side of King Street East between Grant Avenue and Wentworth Street. The overall scale and massing of the apartment building appears to be relatively unaltered from its origional constrution in the 1930's.	HIA not required
82	662 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure located is a common example of an early/mid-20th century 3-storey building with commercial space on the ground floor and residential space above. This form is commonly found throughout Hamilton.	HIA not required
83	666-668 KING ST E	ASI CHSR	CHL 18	Building demolition, Road widening for Wentworth LRT stop	Meets criteria in O. Reg. 9/06 Property is a PHP	The property at 668 King Street East, includes a representative example of classical architecture typically used on commercial and institutional buildings in the early- 20th century with modest design elements from the Beaux Arts and Art Deco styles. Although a great deal of the exterior has been covered by more recent stucco, elements including the entablature, the motifs in the frieze as well as remnants of additional covered details such as pilasters on each façade contribute to its design value. The bank property has occupied the southwest corner of the intersection of King Street East and Wentworth Street South since 1921. As	The property located at 668 King Street East consists of an irregularly shaped lot on the southwest corner of the intersection of King Street East and Wentworth Street South, in Hamilton, Ontario. The structure on the property is a former bank building that was built specifically for the Dominion Bank in the 1920s.	HIA will be completed during detailed design to ensure that impacts to heritage resources are appropriately mitigated.

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
						a result of its frontages on both streets and its distinctive architectural form, it has played a role in defining the streetscape of this section of King Street East in Hamilton.		
Sanford Avenue to Barnesdale Boulevard								
98	789 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for track/turning radius	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two-and-a-half storey building in a residential form with a two-storey commercial addition and several smaller additions. The residential building has a slight L-shaped plan with a small, rectangular rear portion customary for the residences of its time. The pitched roof has a front gable and a rear street facing gable.	HIA not required
104	832 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for track/turning radius	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property is an example of mid-20th century urban apartment construction. The apartment building includes particular design elements such as the wooden brackets above the door on the King Street East façade, the decorative brick quoins on the corners of the building, and the raised parapet walls along the rooflines, but does not represent a particular style or character. Rather, it is a typical example of apartment construction found in Hamilton.	HIA not required
115	891 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a fresstanding, two storey main street vernacular building. It is rectangular in plan (though slightly askew at King Stret East), and the simple form rises to a flat parapet roof.	HIA not required
116	893 KING ST E 1STLF	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two-and-a-half storey residential structure attached to a single-storey commercial additiona which obscures part of main residential façade when viewed from the street. The residence is an ecclectic composition incorporating Italianate, Gothic Revival, and classical details.	HIA not required
117	895-899 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Meets criteia in O. Reg. 9/06 Property is a PHP	The visible portions of the structure suggest that this property's residential structure may include a rare	The property contains a one-and-a-half storey building in a residential form with a single-storey commerical	HIA will be completed during detailed design to ensure that impacts to

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
						architectural form for its time. Due to the lack of visibility of this structure from the public realm, and the knowledge that its main façade is intact behind the commercial addition, its design or physical value of the property are conditional upon closer inspection.	addition which obscures the main and east residential facades when viewed from the street. The residential structure is of a late Victorian style which is not discernable in detail from the street.	heritage resources are appropriately mitigated.
122	3 PROCTOR BLVD 1STLB	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property includes a two-storey corner building with a flat roof. It is a main street vernacular building which has no discernable style. Its plan follows the obtuse angle of the intersection of King Street East (north) and Proctor Boulevard (west), and steps to three different depths along its rear facade.	HIA not required
124	902 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Meets criteria in O. Reg. 9/06 Property is a PHP	The proportions, balance and symmetry of the form establish its roots in the Classical tradition, which is further developed in the restrained use of features of the Tuscan order. In its return to Classical ideals of balance, order, symmetry and proportion, the house reflects a late Revival trend that arose between the wars in part to counter the new Modernism. The property plays a role in maintaining and supporting the character of its surrounding neighbourhood. Although the building on the property is visually distinct from the other properties on St. Clair Avenue, the overall design is sympathetic to the other properties on the street. As a larger corner property, it plays a role in defining the streetscape of the residential street. However, the brick addition fronting onto King Street East is vernacular in nature and does not contribute to the streetscape of King Street.	The property located at 902 King Street East is a quadrangular lot on the southwest corner of King Street East and St. Clair Avenue. The structure on the property consists of a two-and-a-half storey residential structure, with a small one storey brick addition. The property was first developed in the 1920s, and the addition was added between 1940 and 1945.	HIA will be completed during detailed design to ensure that impacts to heritage resources are appropriately mitigated.
129	929 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two-storey specialized commercial building, fresstanding on all four sides, with no discernable style. Rectangular in plan, it is angled slightly at its south end where the primary façade meets King Street East.	HIA not required

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
131	937-943 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two-storey mixed-use main street vernacular building. Located at a corner, the building has a parallelogram plan, reflecting the angle at which King Street East crosses the local residential grid.	HIA not required
132	924 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a single-storey corner building of a double height with a flat roof and near-rectangular plan that follows the obtuse angle of the intersection of King Street East (north) and Sherman Avenue South (west).	HIA not required
134	949 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid-20th century 3-story commercial building with a residential space above.	HIA not required
135	951-953 KING ST E	ASI CHSR	CHL 20	Building demolition, Road widening for Sherman LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid-20th century 2-storey commercial building with a residential space above. This form is commonly found throughout Hamilton.	HIA not required
143	3 BARNESDALE AVE S	ASI CHSR	CHL 20	Building demolition, Road widening for track/turning radius	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two-storey corner home, with Arts and Crafts style detail and modifications carried out in a mid-20th century modern style and a garage.	HIA not required
Barnesdale Boulevard to Gage Avenue								
158	1125-1127 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid-20th century 2-storey commercial building with a residential space above. This form is commonly found throughout Hamilton.	HIA not required
162	1137 1/2 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid 20th century 2-story commercial building with a residential space aboe. This form is commonly found throughout Ontario.	HIA not required
163	1139 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid 20th century 2-story commercial building with a residential space aboe. This form is commonly found throughout Hamilton.	HIA not required
164	1141-1143 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid-20th century two-storey commercial building with a residential space above. This form is commonly found throughout Hamilton	HIA not required

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
165	1145 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure located on the property at 1145 King Street East is a common example of an early/mid-20th century two-storey commercial building with a residential space above. This form is commonly found throughout Hamilton.	HIA not required
166	1149-1151 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for track curve/CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure located on the property at 1149-1151 King Street East is a common example of an early/mid-20th century two-storey commercial building with a residential space above. This form is commonly found throughout Hamilton.	HIA not required
Gage Avenue to Ottawa Street								
170	1173 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property located is a quadrangular lot on the northeast corner of King Street East and Fairview Avenue. The structure on the property consists of a two-and-a-half storey dwelling, with a two storey addition on the front of the house, for previous commercial uses. The property was first developed in 1913, and the addition was added in 1940.	HIA not required
171	1175 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Pending	Pending	Pending	Pending
172	1177 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property at 1177 King Street East consists of a quadrangular lot on the north side of King Street East between Fairview Avenue and East Bend Avenue. The structure consists of a 1½ -storey bungalow with a two bay façade that is used for residential purposes. The main floor of the structure is constructed of brick on a rusticated concrete block foundation, while the upper storey is wood frame clad in vinyl siding.	HIA not required
173	1179 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property consists of an irregularly shaped lot on the north side of King Street East between Fairview Avenue and East Bend Avenue. The structure consists of a one-storey duplex with a five bay façade that is used to residential purposes. The wooden-frame structure is clad in vinyl siding. The structure also extends on to the	HIA not required

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
							property at 1181 King Street East.	
174	1181 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of an early/mid-20th century one storey residential duplex. The duplex is one of many small houses that were constructed in cities and towns across Ontario. The building is a simple hipped roof vernacular frame house with no pretense of style.	HIA not required
175	1183 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property at 1183 King Street East consists of a quadrangular lot on the north side of King Street East between Fairview Avenue and East Bend Avenue. The structure consists of a 1-storey structure with a two bay façade that is used for residential purposes. The wood frame structure is clad in vinyl siding. It has an end-gable roof with a boom-town front on the street façade.	HIA not required
176	1185 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Pending	Pending	Pending	Pending
178	1197 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of the practise of building speculative or income property in rows of detached houses using modest vernacular designs that were built throughout urban areas between the wars. This form is commonly found throughout Hamilton.	HIA not required
179	1199 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The structure is a common example of the practise of building speculative or income property in rows of detached houses using modest vernacular designs that were built throughout urban areas between the wars. This form is commonly found throughout Hamilton.	HIA not required
181	1203 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two-and-a-half storey detached bungalow. The house is vernacular in style, and its design is typical of early 20th century speculative housing development in southern Ontario.	HIA not required
182	1205 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two storey, detached bungalow. The house is vernacular in style, and its design is typical of early 20th century	HIA not required

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
							speculative housing development in southern Ontario.	
183	1207 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two storey bungalow with an angled commercial addition attached at the side. The house is vernacular in style with a design typical of early 20th century speculative housing development in southern Ontario.	HIA not required
185	1211-1215 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a one-storey building with a partial second storey addition on a triangular block which presents its two facades on King Street East (south) and Dunsmere Road (north), respectively. It is a main street vernacular building with several modifications and no discernable style.	HIA not required
186	1217 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two-storey corner building on a triangular block which presents its three facades on King Street East (south), Glendale Avenue North (east) and Dunsmere Road (north), respectively. With no discernable style, it is a main street vernacular building although it deviates from more typical examples because it addresses three streets on a small block.	HIA not required
187	2 GLENDALE AVE N	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property includes a two-and-a-half storey corner home of a rectangular plan. The building consists of a simple form rising to a front gable roof, which is hipped at the rear and punctuated by a shed roof dormer on the north side.	HIA not required
189	1257 KING ST E	ASI CHSR	CHL 21	Building demolition, Road widening for CP grade separation	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property includes a three-storey apartment block of a rectangular plan, one of a pair of similar and neighbouring blocks. The main façade consists of a central bay flanked by recessed blacony bays on the first three stories.	HIA not required
198	1145-1147 MAIN ST E	ASI CHSR	CHL 3	Building demolition, Road widening for Ottawa LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains two storey mixed-used main street vernacular building. It is free standing on the south, west and north, and abuts the neighbouring structure to the east.	HIA not required

Map ID	Municipal Address	Source	Known Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
199	1147 1/2 MAIN ST E	ASI CHSR	CHL 3	Building demolition, Road widening for Ottawa LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a one storey commercial structure in the south, which is connected to a larger two storey structure at the rear. Together, they have a rectangular plan, which rises to a flat roof on the commercial portion and shallow gable room at the rear structure.	HIA not required
200	1149-1151 MAIN ST E	ASI CHSR	CHL 3	Building demolition, Road widening for Ottawa LRT stop	Does not meet criteria 9/06 or 10/06 and is not a PHP.	Not a PHP, therefore a Statement of Cultural Heritage Value or Interest and Heritage Attributes is not identified	The property contains a two storey, mixed-use main street vernacular building. It has a rectangular plan, and rises to a flat parapet roof. It is attached to a neighbouring building at the west, which the south, east and north facades are all exposed. The building employs vernacular motifs and tendencies typical of late 1910s and early 1920s design.	HIA not required
Ottawa Street to Kenilworth Street								
Kenilworth Street to Queenston								
OMSF								
265	606 ABERDEEN AVE	ASI CHSR	N/A	Partial building demolition, OMSF site	Meets criteria in O. Reg. 9/06 Property is a PHP	The structure is a representative example of early twentieth century architecture. 606 Aberdeen consists of a four storey head hourse and a steel framed pattern shop and foundry space. It was constructed for the expansion of Canadian Westinghouse in the 1920's, a major employer inthe area at the time.	The site contains a twentieth century manufacturing works, comprising multiple adjoining structures. The core structure combines a four storey head-house with three one-story production sheds.	HIA will be completed during detailed design to ensure that impacts to heritage resources are appropriately mitigated.

Indirect Impacts and Mitigation Measures

The properties listed in Table 4-5 have indirect property impacts (not affecting the use of the building). As design phases continue, CHERs will be completed for these properties as necessary, based on current design.

Table 4-6: Summary of Potential Cultural Heritage impacts and Mitigation Measures for Indirectly Impacted Properties

Map ID	Municipal Address	Source	Heritage Resource Category	Impact	Cultural Heritage Evaluation Report Outcome	Summary of Heritage Value or Potential	Description of Resource	Mitigation Measure
McMaster to Cline Avenue								
	1 Gary Ave	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
Cline Avenue to Highway 403								
	87 Newton Ave	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	980 Main St W	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	972 Main St W	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	970 Main St W	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
15	25 LONGWOOD RD S	ASI CHSR	CHL 9	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
Highway 403 to Margaret Street								
Margaret Street to Caroline								
	577 & 579 King St W	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
42	363 KING ST W	ASI CHSR	BHR 13	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	285 King St W	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
43	4 QUEEN ST S	ASI CHSR	BHR 15	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
Caroline Street to Catharine Street								
Catharine Street to East Avenue								
66	399 KING ST E	ASI CHSR	CHL 17	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	244 King St E	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
East Avenue to Sanford Avenue								
	520 King St E	Gap Analysis	N/A	Road widening	To be determined from	To be determined from	To be determined from CHER	To be determined from

					CHER in later design phases	CHER in later design phases	in later design phases	CHER in later design phases
	608 King St E	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	665 & 667 King St E	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
Sanford Avenue to Barnesdale Boulevard								
	928 King St E	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
Barnesdale Boulevard to Gage Avenue								
Gage Avenue to Ottawa Street								
	1254 & 1256 King St E	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1101 Main St E	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	3 & 7 Grosvenor Ave S	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
201	1175 MAIN ST E	ASI CHSR	CHL 3	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	2&4 Ottawa St N	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
Ottawa Street to Kenilworth Street								
Kenilworth Street to Queenston								
	1207&1209 Main St E	Gap Analysis	N/A	Road Widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1365-1367 Main St E	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1369-1371 Main St E	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
	1570 Main St E	Gap Analysis	N/A	Road widening	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases	To be determined from CHER in later design phases
OMSF								

4.5. Transportation and Utilities[21]

The purpose of this section of the report is to examine and document the impact assessment, mitigation and monitoring of the:

- Transit network;
- Pedestrian and cycling network;
- Road network; and
- Surface and subsurface utilities.

4.5.1. Transit Network

The 2011 EPR developed a future bus network to support the LRT that included:

- Some reductions in service in parallel routes directly affected by the LRT service (compared to future levels);
- Service improvements in the corridor beyond the LRT to maximize connectivity; and
- Re-configuration of routes to improve connections to the LRT.

The same principles have been maintained for the updated LRT support network. Chief differences include:

- Additional service levels throughout the network, to maintain consistency with the 10-year transit strategy, which was developed after the 2011 EPR report; and
- Extension of bus service and increased service levels between Eastgate and the LRT terminus at Queenston.

Changes in future service assumed to be in place without an LRT were compared to the projected service with and LRT to determine the relative impacts and benefits of introducing the LRT. These results are fully documented in the Ridership Forecasting Report, as part of Appendix E.

The following assumptions have been made in defining the proposed bus network changes:

- Traffic circulation on the B-Line corridor is amended as proposed, with single lane / direction operation east of Dundurn. This precludes local transit operation these segments, and results in the relocation of Route 1 – King westbound to parallel streets north of King. A detailed operational assessment will be undertaken to determine the most effective and practical routing;
- Local service is removed from the King Street and Main Street between Queenston and Dundurn.
- Local service is maintained through a combination of Route 5 – Delaware buses on Main Street West from Hwy 403 to Cootes Drive and beyond;
- A reduced level of bus services within the LRT corridor (compared to future service levels) between McMaster and Eastgate, but frequencies maintained to outer destinations; and
- Through services beyond the ends of the corridors (e.g. Stoney Creek) retained wherever possible, though sometimes with an increased journey time to Downtown as a result of being interlined with local bus services rather than B-Line expresses as now.

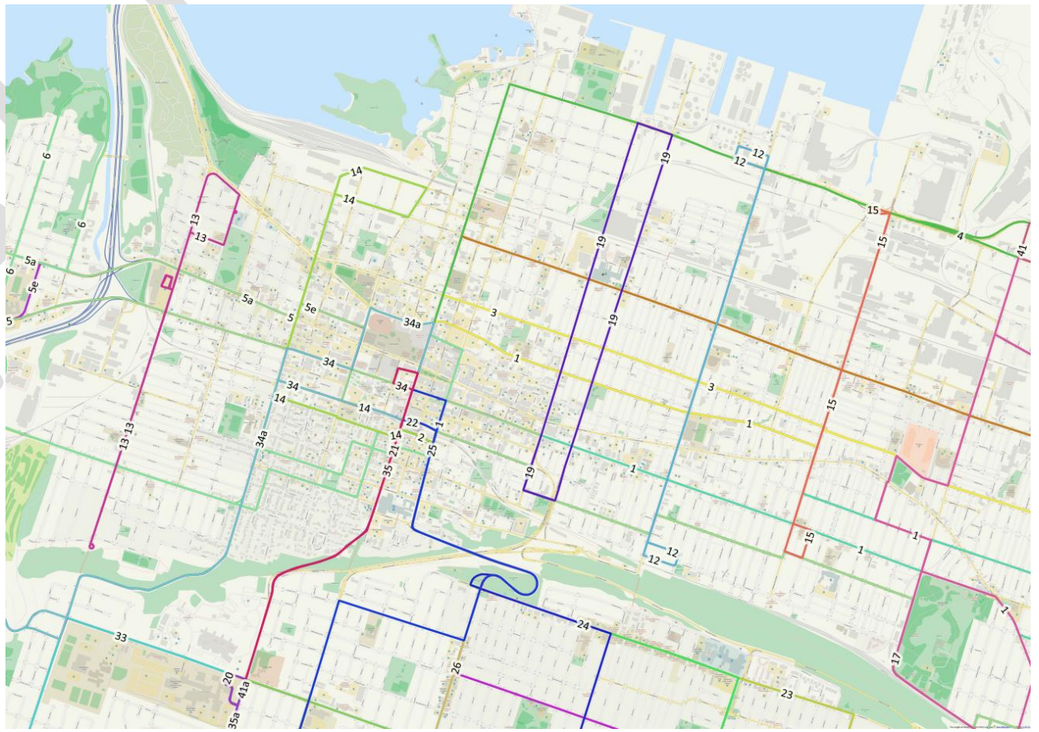
Figure 4-5 and Table 4-7 detail the proposed changes. The headways in the table refer to the weekday AM peak; base service levels could be slightly less but the same pattern would apply.

Table 4-7 shows the proposed AM peak levels of service (headways) for 2024 (opening day) as well as 2031 and 2041, which were used for ridership modeling. In the modeled scenarios, headways were calculated based on projected changes in population and employments, and were not adjusted to integers reflecting actual operating parameters.

These figures illustrate the changes in bus service in the core section, where the LRT will provide a substantial increase in capacity, while providing good service levels on the outer branches as feeders:

- Route 10: B-Line Express is eliminated in favour of the LRT;
- Route 1: King, which currently operates at 6-minute intervals, will see service reduced;
- Route 5: Delaware, with several branches operates and 7/8-minute headways, will likely continue to increase levels of service, then see a modest reduction following the LRT, with continued growth afterward. Feeder portions beyond the LRT will provide good connectivity at the terminus stops;
- Route 51 University: will continue to have service improvements as a feeder service; and
- Routes in the west end of downtown are reconfigured, with Route 7 and Route 8 integrated into new routes 13, 14 and 19 to provide better LRT connectivity.

Figure 4-5: B-Line LRT Plus Proposed Supporting Bus Network



[21] Source: Hamilton Rapid Transit Preliminary Design and Feasibility Study - B-Line Environmental Project Report (Hamilton LRT 2011 EPR), provided by Steer Davies Gleave.

Table 4-7: Proposed Bus Network Headways

#	Route Name	Headway (minutes)		
		2024	2031	2041
1	King	10	8.9	8.0
2	Barton	6	5.4	4.9
3	Cannon	15	15.0	12.5
4	Bayfront	15	13.3	12.0
5	Delaware	6	5.4	4.5
6	Aberdeen	20	20.0	15.0
10	B-Line Express	-	-	-
11	Parkdale	20	17.8	16.0
12	Wentworth	20	20.0	20.0
13	Dundurn	20	20.0	20.0
14	Queen	20	20.0	20.0
15	Sherman	20	20.0	20.0
16	Ancaster	20	20.0	12.0
17	Gage	20	20.0	15.0
18	Waterdown	15	15.0	10.0
19	Victoria-Wellington	20	20.0	20.0
20	A Line	10	9.0	8.2
21	Upper Kenilworth **	12	10.9	9.2
22	Upper Ottawa **	12	10.9	8.6
23	Upper Gage **	12	9.3	7.6
24	Upper Sherman **	12	9.3	7.8
25	Upper Wentworth **	12	10.0	7.5
26	Upper Wellington **	12	10.0	8.3
27	Upper James	12	10.5	8.7
30	T Line	10	9.2	7.9
33	Sanatorium	12	10.7	9.6
34	Upper Paradise	12	12.0	9.0
35	College	12	10.5	8.4
41	Mohawk	12	11.1	9.6
43	Stone Church	20	20.0	13.3
44	Rymal	20	18.0	12.9
45	Heritage Green Local *	30	29.0	24.2
51	University	7.5	7.5	4.3
52	Dundas - P. Valley & U. Gardens	30	30.0	15.0
53	Dundas - York Heights	30	30.0	15.0
55	Stoney Creek Central	10	8.6	7.5
58	Stoney Creek Local	20	20	13.3

**Extended in 2031*
***Extended in 2031 and 2041*

4.5.2. Traffic Operations

Most of the B-Line route between Highway 403 and Queenston is currently a 4-lane single roadway, carrying westbound traffic only (King Street West and King Street East) and two-way traffic (Main Street East). The Main Street West segment is primarily two-way traffic, with three eastbound and two westbound lanes, and centre left-turn lanes or dedicated left turn lanes.

In designing the LRT layout along such sections, two key requirements are:

- Provision of a segregated centre-running LRT alignment; and
- Minimizing property requirement and loss of property access.

The conversion of two existing traffic lanes to segregated LRT east of Hwy 403 removes two (or three) traffic lanes from the existing road network, and reduces the vehicular capacity (although not the person-capacity) of the roads concerned. In the segment west of Hwy 403, the lane capacity is maintained.

The project was assessed against the following criteria with respect to traffic operations:

- Changes to traffic circulation in the B-Line corridor, on adjacent local and arterial roads and across the wider Hamilton downtown highway network;
- Changes in permitted and prohibited turning movements;
- Changes in property access; and
- Changes in parking and loading provisions.

An initial model run was conducted to identify the overall impacts of the introduction of the LRT compared to the projected conditions without the LRT, based on 2031 conditions. These impacts were then mitigated with a series of measures that were tested in successive iterations of the model to reach a preferred solution.

Two base conditions were created: September version based on 2031 conditions and the alignment presented at PIC #1 and December version, which built on the mitigation measures of the September version and introduced further mitigation measures. The December version was based on the refined alignment developed prior to PIC #2. This summary ignores the process changes between the two versions, presenting the overall aggregate impacts and mitigation.

Traffic Lane Changes

The key changes to traffic circulation in the B-Line LRT corridor are set out below:

- Near the western terminus, from the McMaster stop east of Cootes Drive, to Dalewood Avenue, the LRT will operate on the

north side of the street, in both directions. The existing turning movements will be maintained throughout this section of the corridor.

- East of Haddon Avenue, the centre left-turn lane will be eliminated and unsignalized intersections will be limited to right-in/right-out movements only, similar to the 2011 EPR design.
- In the vicinity of the Highway 403 crossing, the existing one-way circulation (westbound on King Street West and Paradise Road South; eastbound on Main Street West) is retained with north side running LRT on Main to an LRT only bridge leading to King St, similar to the 2011 EPR design.
- King Street, west of Dundurn, remains one-way westbound with south side LRT, , similar to the 2011 EPR design.
- East of Dundurn, King Street will be generally one lane in each direction, with centre-running LRT, with the following exceptions:
    - From Queen Street to Hess Street: westbound vehicles only, with the LRT on the south side;
    - James Street to John Street, westbound vehicles only, with LRT on south side; and
    - From Catharine Street to Wellington Street: eastbound vehicles only, with the LRT on the north side.
- From the Delta to Queenston, Main Street East will operate with one lane in each direction and centre-running LRT.
- The change in lane configurations introduces a variety of new intersection configurations along King Street and Main Street East between Dundurn and Queenston.
- Introducing eastbound traffic on King Street allows the opportunity for new southbound left turns and northbound right turns from perpendicular streets and eastbound left turns from King Street. Left turns across the LRT tracks are limited to key signalized intersections. Left turns from King Street are only permitted where separate left turn lanes can be accommodated.

Permitted and Prohibited Turning Movements

With the introduction of LRT and the associated changes to traffic circulation, there will be changes to the turning movements which are permitted along the B-Line route, particularly where these movements cross the LRT tracks. These changes are required both to facilitate the smooth reliable running of the LRT system, with the appropriate level of priority at signalized intersections, and on safety grounds.

Where the LRT tracks run adjacent to traffic lanes (whether on the side of road or a central alignment) the layout is such that the direction of travel on the LRT lane is the same as in the adjacent traffic lane. This arrangement minimizes the total road width required, and avoids the situation where drivers can be presented with an oncoming LRV approaching on the 'wrong' side. Similarly, pedestrians crossing the road are presented with vehicles in the closest lane(s) approaching from the left, and in the far lane(s) approaching from the right, in the conventional manner.

With this layout, drivers wishing to turn left (or U-turn) across the LRT tracks will have a clear view of an oncoming LRV (on the track further to their left). However, they may not be aware of a LRV approaching from behind on their left-hand side. In order to minimize the risk of accidents, it is necessary to prohibit uncontrolled left turns and U-turns across the LRT tracks. This applies both to the central running LRT tracks on two-way roads, and on streets where the LRT tracks are on the left-hand side of the one-way traffic lanes.

Right turns into and out of side roads (which do not cross the LRT tracks) are not affected and will continue to operate as at present. Thus, many side streets along the centre-running sections of the route and on the non-LRT side of the side- running sections will, in future, operate as right-in/right-out only.

Left turns and U-turns will be permitted at signalized intersections. However, over much of the B-Line route there is insufficient space for dedicated lanes for left-turning vehicles (turning across the LRT tracks), in addition to the lanes for ahead and right-turning traffic. At these locations, left turns will be prohibited, to prevent queued left-turning vehicles from holding up all traffic in the one direction. In response to this, some drivers of motorized vehicles are expected to either change their routing to alternative routes or, if convenient, change their travel to LRT instead of private car. It is important to note that while the traffic capacity of the corridor will be reduced, the people carrying capacity of the corridor will be increased by introducing the LRT service.

Left turns out from or into a side street, across the LRT tracks at unsignalized intersections, will not be permitted.

Access to Properties

With the centre-running alignment in most sections, private property access has been made more consistent, with generally right-in /right-out movements permitted. Drivers wishing to make the left turn will have to either make a U turn at a suitable point or use the local road network to approach or leave in the appropriate direction.

During the ongoing design, where the opportunity exists, accesses will be reconfigured to improve property access. It is expected that at some of the corner properties this can be achieved by moving the access to the side street. At other locations, there are commercial properties that have frontage parking areas accessed individually. Interconnecting these could provide the opportunity for improved access without affecting the LRT or street access. Similarly, rear-lanes will be examined for improved access opportunities.

Parking and Loading

With the change to centre-running alignment on King Street from Dundurn to the Delta, all on-street-parking and loading areas in this area will be eliminated.

Previous parking studies have identified a large surplus of nearby spaces throughout the corridor, though with higher utilization and less availability in the core area compared to areas outside of the Downtown[22]

Detailed-design will identify the number of spaces that need to be replaced within specific areas of the corridor and the opportunities to replace these with off-street parking and off-street loading spaces, loading spaces on adjacent side streets or on remaining portions of properties acquired for LRT purposes, and creation of laneway access to the rear of buildings.

Summary of Impacts

This section compares the impacts of the LRT alignment on the 2031 traffic volumes that are projected to occur without the LRT alignment. Generally, traffic volumes are expected to increase throughout the network related to population and employment growth, resulting in intersection congestion at various points in the network. A variety of measures were introduced to the network to achieve a functional 2031 BAU network.

Generally, there are two principal impacts resulting from introducing the LRT alignment as proposed:

- the significant reduction in westbound capacity on King Street east of the 403 to Queenston would divert traffic to parallel routes, particularly Cannon and Barton, but also the Hunter / Aberdeen corridor; and
- Turning restrictions to and from the LRT alignment funnels demand to key intersections that permit full moves or U-turns.

The principal corridors for the diversion of traffic depend on the distance to be travelled within the LRT corridor: the longer the travel distance, the further traffic will tend to divert. For example, trips from beyond the corridor to the east could divert as far north as the Burlington Street corridor, while trips from within the corridor may only divert as far as Barton and Cannon; trips within the downtown area also divert to Hunter and Aberdeen. Figure 4-6 illustrates this diversion pattern and the resulting area of congestion in the corridor from north of the corridor in the downtown through to the intersection of King and Dundurn.

This diversion of traffic and the resulting patterns create congestion in several areas:

- Main Street West Segment
    - Maintaining three eastbound traffic lanes results in traffic volumes within the capacity of the roadway and the intersections.

[22] MMM Group, Downtown Hamilton Parking Study and Parking Garage Assessment, City of Hamilton, 2012.

- King/Dundurn
    - The diversion pattern shown in Figure 4-6 results in considerable pressure on the route from the parallel streets back to the intersection of King Street with Dundurn Street to access Hwy 403 and King Street West. While some of the diverted traffic uses York Street to and from the east, and some uses Aberdeen Street to and from the west, a considerable amount of traffic still seeks a path to King Street to access Hwy 403 and west Hamilton.
- Downtown and International Village
    - Intersections through the Downtown and the International Village see a reduction in the overall intersection level of service with increased congestion. Due to volume reduction on certain traffic movements some intersection level of services are improved.
- Delta Area
    - The convergence of Main Street East and King Street East at the Delta results in considerable congestion in both the No-LRT and LRT scenarios.
- Off-Corridor Impacts
    - Diversion of traffic from the LRT corridor causes a substantial increase in traffic along Cannon and Barton, as well as York Street from Queen/Cannon through Dundurn.

Figure 4-6 Traffic Diversion Patterns

Mitigation Measures and Net Effects

The changes in road layout, traffic circulation and access routing have been assessed using accepted practice traffic modelling tools. In summary, these have demonstrated that the preferred scheme results in a general decline in the operational performance of the municipal road network, particularly at intersections, due to the reduction in capacity on the corridor for other motorized road users. However, alternative corridors, such as Barton Street, King Street East and Cannon Street and Wilson Street, generally have sufficient capacity to accommodate the level of re-assigned traffic.

The following mitigations were identified and implemented at a number of locations throughout the network:

- Traffic signal operations
- Staging changes
- Signal cycle times
- Turning lane reallocation
- Addition of a dedicated slip lane
- Timing allocation
- Dedicated turn phases
- Intersection layout
- Addition of turning lanes
- Turn movement bans

Figure 4-7 shows the 2031 AM Peak hour traffic volumes in the network without the LRT. Figure 4-8 shows the volumes for the same period, after the mitigation measures are taken into account. Figure 4-8 illustrates the differences between the two – depicting the links where traffic increases (green) and deceases (red) in the LRT scenario, compared to the BAU scenario

The greatest impact on traffic operations is on the west side of the network, due to the reduction of capacity on the westbound section of King Street, Downtown to Dundurn Street. This results in a reassignment of traffic onto the York Boulevard westbound link, and the subsequent southbound route along Dundurn Street North, to reach the King Street/Dundurn Street intersection. The primary destination zones for this traffic are the McMaster University area and the residential areas to the west, such as Dundas and Greensville, as well as Highway 403 westbound. A portion of traffic bound for Highway 403 eastbound will divert to the York Boulevard access, moderating the increase in this pattern. To facilitate traffic movements to the King Street flyover, a number of improvements are proposed in the following locations:

- Dundurn Street
    - Possible reconfiguration of the bike lanes on Dundurn to operate on parallel streets, including Breadalbane Street and Jones Street to Dundurn. This will provide sufficient space for an additional southbound traffic lane without property impacts. Operation of parallel streets is subject to consultation with neighbourhoods and cycling community
- Dundurn/King
    - One slip lane for the southbound right turn and 1 lane for southbound through;
    - Two lanes westbound through, including a shared right-turn lane (added one lane of 15m) and one additional lane for westbound left turn and U-turn (7m);
    - A total of three lanes exiting westbound;
    - Property impacts on north-west corner and south-east corner; and
- Dundurn/York
    - Three lanes eastbound and westbound through (with one additional lane of 10m) and Jones Street;
    - One lane eastbound right turn;
    - Two lanes westbound left turn (one additional 100m lane for westbound through); and
    - Two lanes westbound through (one additional 100m lane for westbound left turn).
- York/Cannon/Queen
    - Three lanes on eastbound and westbound approach.

In terms of overall net effects, the implementation of the B-Line LRT can be accommodated by the existing road network, albeit with a general reduction in performance for other motorized road users. This is offset by the increase in people carrying capacity on the corridor and the introduction of some offline intersection and link improvements.

Changes in Mitigation from previous EA

Since the last study was undertaken, the modelling process has evolved and the VISUM network now more accurately represents the signal coding and traffic operation. This has the benefit of more accurately representing flows and traffic operation in the wider area, as the capacity is appropriately restrained and reduced from the EMME volumes which really assume more free-flow conditions.

A key addition to the modelling for the latest work is the extension of the network to the Waterfront and to include the Aberdeen Avenue area. In the previous work, the impacts on Aberdeen were examined separately from VISUM and were based on EMME and SYNCHRO analysis. While these were the best tools available at the time, the EMME tends to over estimate flows and potentially provided a worst case for the outcome of the SYNCHRO analysis.

Overall the latest work concurs with the outcomes of the previous study, and it should be noted that there are differences from both the Business as Usual and even the current 2016 situation than were assumed previously. These combined with changes to the LRT design and operation, and improvements to the traffic modelling process will ultimately result in minor differences to the conclusions. The scenario year for this study is also 2031 rather than 2021. The impacts of the new design are consistent with the previous work, identifying similar concerns with the west end of Downtown. However, some of the previously identified impacts on local streets are not as significant due to a "centre-running" reconfigured design.

The differences between the original 2011 EPR recommendations and this updated version are set out in the table below with a commentary on the reasoning for these differences.

Table 4-8: Comparison of Network Mitigation from Previous EA

Intersection	Original EA	Current EA	Comment
Dundurn/King	Additional free-flow southbound right turn lane. Revisions to Fortino's entrance from King to Dundurn	One slip lane for the southbound right turn and one lane for southbound through; Two lanes westbound through (one additional 150m lane) and one additional 70m lane for westbound left turn and U-turn; a total of three lanes exiting westbound. Similar changes to Fortino's access	One to two-way conversions have changed traffic patterns in the network and combined with slightly higher traffic volumes (2031 rather than 2021) have made an already congested intersection more congested requiring the additional segregation of turns
Dundurn/York	Additional westbound left turn lane. Requires re-allocation of lanes on Dundurn St N between York and King	Added two short lanes (100m) at intersection for westbound left/through movements Added one short lane (100m) at intersection for eastbound through movement Added one short lane (100m) to accommodate northbound right turn along York York Boulevard (between Dundurn and Queen) three lanes each direction	One to two-way conversions have changed traffic patterns in the network and combined with slightly higher traffic volumes (2031 rather than 2021) have made an already congested intersection more congested requiring the additional segregation of turns Previous EA did not consider loss of capacity due to new bike lanes on York Blvd, implemented after the 2011 EPR.
Parkdale/ Britannia	New signalized intersection	New signalized intersection	Similar mitigation
Britannia Avenue	Removal of 4-way stop signs, replaced with 2-way stop signs	Intersection optimization required	Similar mitigation
Aberdeen Avenue / Dundurn	Additional turn lane	No mitigation	In the previous study, this was outside the core modelled area. For the EA update it was included in the core analysis rather than as a separate exercise
York Street	3 lanes in each direction	3 lanes in each direction	Similar mitigation, however, additional EB lane should be reviewed in context of cycling infrastructure
Locke and York	No mitigation	Westbound left turn has been banned Three lanes for all approaches along York 100m in length (east and westbound)	One to two-way conversions have changed traffic patterns in the network and combined with slightly higher traffic volumes (2031 rather than 2021) have made an already congested intersection more congested requiring the additional segregation of turns
Cannon and Queen/ York	No mitigation	Three lanes on westbound approach (York)	Similar to above

Recommended mitigation measures to address loss of loading facilities include:

- Designate new on-street loading space on closest side-street to properties losing access to on-street loading on Main Street or King St;
- Designate on-street loading space where feasible and where property is available; and
- Improve public alleyways, particularly north of King Street in the International Village, from Walnut Street to Wellington Street.

A comprehensive parking management plan will be developed to minimize or replace any short-term parking loss for individual homes and businesses both in the short-term during the construction stages and in the longer-term, once the project is constructed and operational. As part of the detailed-design of the project, delivery and loading arrangements and potential parking replacement solutions will be formulated and discussed with the affected property owners.

4.5.3. Frid Street Extension

The proposed extension of Frid Street has been modified to relocate the alignment northward to achieve more contiguous property for the OMSF. The Frid Street Extension EA details the expected impacts, mitigation and monitoring. The additional requirements listed here reflect the change in the alignment to accommodate the OMSF.

Mitigation Measures and Net Effects

The relocation of the Frid Street alignment has been identified to have potential impacts on sensitive vegetation in the area (see Section 4.2). Further study of the vegetation will be conducted to determine the necessary and appropriate mitigation.

Monitoring

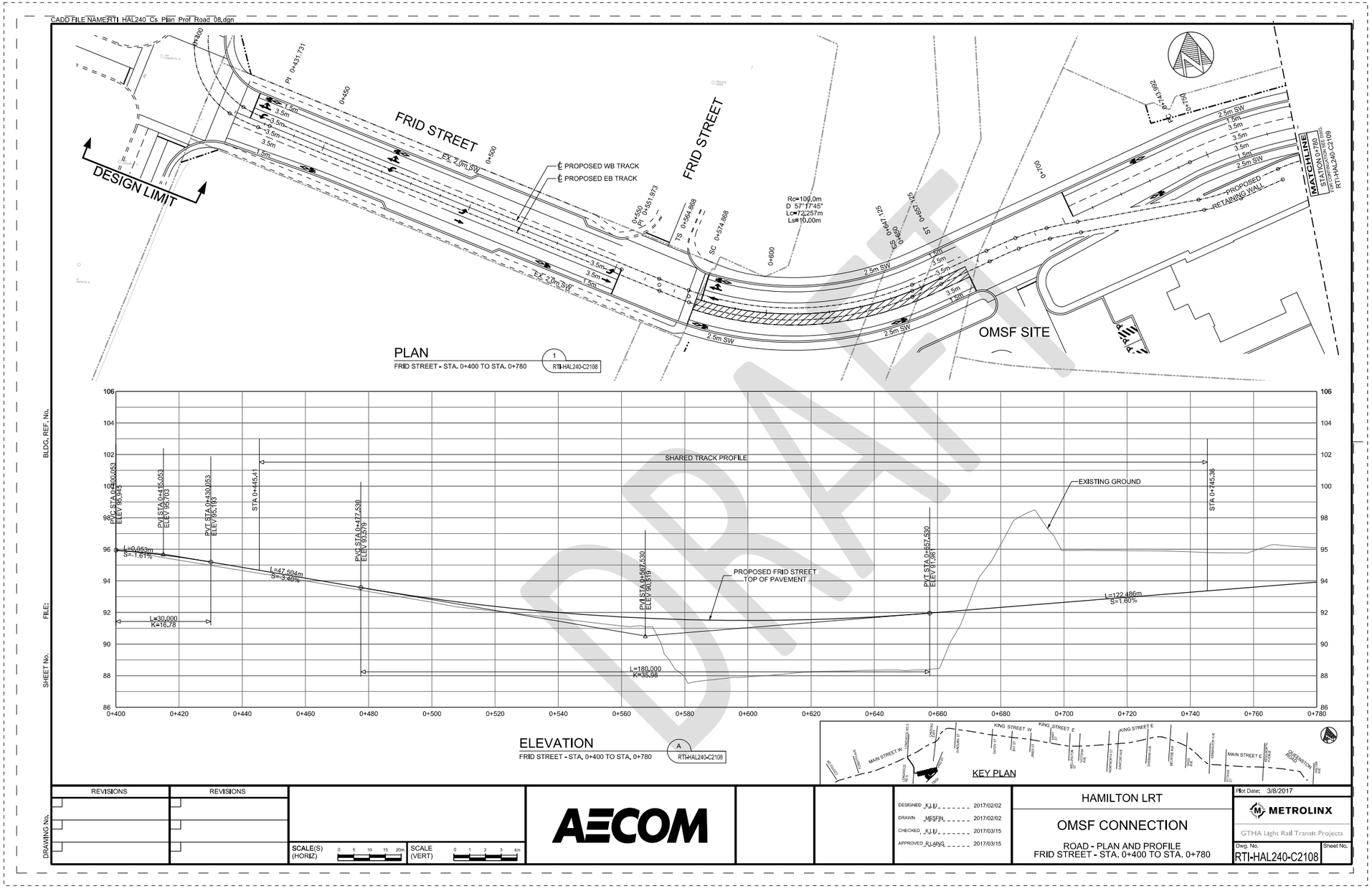
Depending on the outcome of detailed health assessment described in Section 4.2.3, additional monitoring may be required, and will be completed in accordance with the requirements of the MNRF.

Figure 4-7: 2031 PM Peak hour volumes BAU Scenario (without LRT)

Figure 4-8: 2031 PM Peak hour Volumes – LRT Scenario (with LRT)

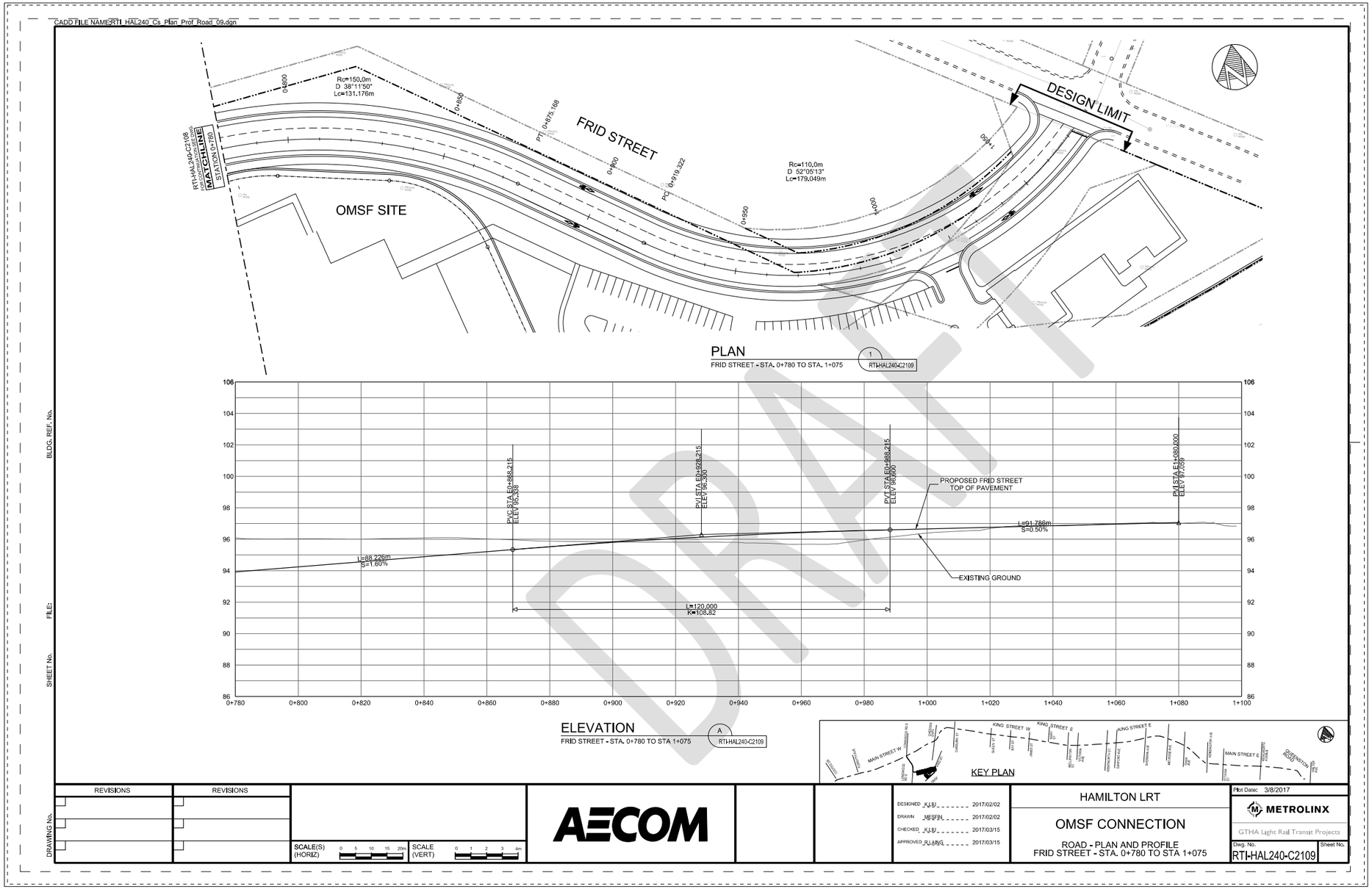
Figure 4-9: 2031 PM Peak Hour Volumes – Difference between BAU Scenario and LRT Scenario

Figure 4-10 Frid Street Extension Re-alignment – Plan and Profile



METROLINX
HAMILTON LRT LIGHT RAIL TRANSIT
Hamilton

Figure 4-10 Frid Street Extension Re-alignment – Plan and Profile (continued)



METROLINX
HAMILTON LRT LIGHT RAIL TRANSIT
Hamilton

4.5.4. Surface and Subsurface Utilities

The 2011 EPR identified general utility locations for municipal services, hydro, communications and lighting.

Generally, the objective for sub-surface utilities is to keep them out of an exclusion zone beneath the LRT to permit full access and mitigate the long-term detrimental effects of stray current. With the shift to a centre-running alignment, this exclusion zone takes up a larger portion of the available right-of way (since a portion was previously outside of the roadway), and will make utility relocation more complicated, and likely more expensive.

Detailed-design of the LRT corridor will fully identify the utility impacts and mitigation measures, which might include:

- Protection of utilities that cross the corridor;
- Relocation of parallel utilities to outside the exclusion zone;
- Combining light standards with OCS poles; and
- Burying current overhead utility wires that cross the LRT corridor.

The LRT passes under a major high voltage Hydro One power transmission corridor in the vicinity of the Queenston Traffic Circle. Early discussions with Hydro One took place to determine potential impacts to their corridor and any restrictions that might be in place concerning the passage of a LRT alignment under the high voltage north-south hydro corridor at this location.

Hydro One requires that the Metrolinx ensure that the minimum distance from the lowest point of the high voltage hydro lines and the overhead contact system OCS) cables be respected. This design of the OCS respects that minimum distance.

The other requirement was to not locate any LRT structure beneath the hydro line. The design of the Queenston stop and associated bus facility has taken this into consideration

Mitigation Measures and Net Effects

A detailed traffic management plan, comprising a construction staging and street closure or lane reduction plan will be prepared as part of the detailed-design stage of the project. To avoid undue traffic flow and access restrictions in the corridor, the construction sequence should be planned in manageable segments, with the shortest practical lengths of the corridor being subjected to lane closures or restricted access at any one time during construction.

Where restricted access to existing residential, commercial and business properties is to occur as a result of utility relocations, the owners will be notified in advance of the alternative access arrangements to be provide to the owner to ensure continuous access during the construction period. Adequate protection will be in place to ensure site safety at all times to protect the public and the owners from the construction sites.

Monitoring

As part of the traffic management plan and construction contract(s), a monitoring and complaint process will be in place to ensure:

- Traffic and transit operations are not unduly compromised by construction in the LRT;
- Traffic and transit modifications are operating efficiently during the operational phase of the project;
- Safety is a priority on site for all construction employees and member of the public who have to access the corridor;
- There are no undue service interruptions during the construction phase;
- Environmental protection requirements are being met with regard containment of effluent from utilities relocation/replacement construction sites; and
- Minimal risk from potential for exposure of for exposure of contaminated soils as a result of uncovering abandoned utilities.

4.6. Minimal risk from potential Climate Change

Climate change is defined as any significant change in long-term weather patterns. The term can apply to any major variation in temperature, wind patterns or precipitation that occurs over time. Global warming describes the recent rise in the average global temperature caused by increased concentrations of greenhouse gases (GHGs) trapped in the atmosphere. Scientists have concluded that human activity is largely responsible for recently observed changes to our climate since GHGs are mainly caused by burning fossil fuels to produce energy.

The Government of Ontario has committed to reducing GHG emissions to 80% below 1990 levels by 2050 and has established two mid-term targets of 15% below 1990 levels by 2020 and 37% below 1990 levels by 2030. The Ontario Ministry of the Environment and Climate Change (MOECC) has developed a Climate Change Strategy (MOECC, 2016), which outlines the five areas that Ontario will focus on in order to achieve the GHG reduction targets including:

- A prosperous low-carbon economy with world-leading innovation, science and technology;
- Government collaboration and leadership;
- A resource-efficient, high-productivity society;
- Reducing GHG emissions across key sectors; and
- Adaptation and risk awareness.

As an agency of the Government of Ontario, Metrolinx has prioritized achieving progress towards sustainability (Metrolinx 2014) which is in alignment with the MOECC Climate Change Strategy. Metrolinx has developed a draft Sustainability Strategy (2015 – 2020) that outlines priorities and objectives that provide a framework to guide work in all parts of the organization as the implementation of the regional transportation plan is lead through an extensive program of tangible deliverables. Metrolinx's Sustainability Strategy includes International Association of Public Transport (UITP) and American Public Transportation Association (APTA) sustainability commitments. These associations aim to enhance quality of life and promote sustainable transportation in urban areas. Both of these programs support becoming more sustainable by following a framework of requirements and measuring progress year over year. The Sustainability Strategy focuses on five priority sustainability goals that represent the areas of greatest need and opportunity. The goals are supported by action items and measurement indicators to ensure accountability, integration, and attention on key sustainability issues. The five goals of the Sustainability Strategy include:

- Become climate resilient;
- Reduce energy use and emissions;
- Integrate sustainability in our supply chain;
- Minimize impact on ecosystems;
- Enhance community responsibility.

4.6.1. Impacts of the Project on Climate Change

With these commitments in mind, the impact of the Hamilton LRT Project on climate change has been considered. The Government of Ontario has committed to electrification of the LRT corridor. Public transportation is a beneficial service that can reduce traffic congestion and lessen the need for new and expensive road infrastructure, as well as decrease carbon emissions and air quality concerns associated with automobile use.

The construction of the LRT will require the removal of trees in the corridor, which will result in a temporary loss of an existing carbon sink within the local environment of the Study Area. Measures for the compensation of existing tree loss and replacement will be specified in a Landscape Plan, developed during the detailed-design phase of the project. Wherever possible, tree loss will be compensated at a net benefit.

4.6.2. Impacts of Climate Change on the Project

As a result of climate change, storm events are predicted to become more intense, which can result in larger volumes of precipitation at one time. Climate change has the potential to impact the project during the construction phase of the project as well as the long-term operation of the Hamilton LRT.

Consideration of stormwater is an important part of designing resilient LRT infrastructure. Mitigation measures and a Stormwater Management Strategy are to be developed during detailed-design. An increase in storm intensity can make erosion and sedimentation more likely in the Study Area, especially during construction. Erosion and sediment control (ESC) measures will be implemented during the construction phase of the project to ensure stormwater runoff is not laden with sediment. ESC measures will be installed during construction and monitored during the post-construction period.

4.7. Benefits of the Project[23]

As noted in the Hamilton LRT 2011 EPR, in general the benefits of a well-developed transit system for the health and vitality of big cities are well documented. Transit helps cities be more livable and vibrant by:

- Ensuring that transit is a more attractive travel option by improving travel times, comfort, and reliability of service;
- Increasing the people movement capacity in all corridors, generally without the widening of roadways and in an environmentally sound manner, so that they can take advantage of the employment, educational, recreational, and many other opportunities cities offer;
- Providing alternative travel choices for non-drivers, including transit and enhanced environments for cycling and walking;
- Providing opportunities to include urban design and streetscaping features in the construction of the LRT line;
- Improving air quality and, in doing so, improving people's health and their ability to enjoy outdoor spaces and activities;
- Reducing the wear-and-tear on city roads and the need to spend tax dollars on repairing and expanding road infrastructure; and
- Ensuring the long-term economic stability and environmental sustainability by reducing climate-changing emissions and reliance on fossil fuels.

4.8. Summary of Potential Impacts, Proposed Mitigation Measures, Monitoring and Future Work

Commitments identified in the Hamilton LRT 2011 EPR pertaining to sections of the Project not covered by the Addendum remain in effect. Table 4-9 summarizes commitments made during the Hamilton LRT 2017 EPR Addendum.

[23] Source: Metrolinx Transit Project Assessment Process, Eglinton Crosstown LRT, Section 5 p.62; Environmental Project Report Addendum, October 2013.

Table 4-9: Summary of Potential Environmental Condition Changes, Mitigation, Net Effects and Monitoring

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
TRANSPORTATION AND UTILITIES							
Transit Operations	Altered levels of transit service in and connecting to B-Line	City, Transit Patrons	LRT corridor	Alterations to transit system operations in the east-west pattern of bus routes on King Street and Main Street. Bus services along the corridor will be affected by temporary re-routing of the B-Line and other bus services during the construction period.	Changes to existing routes that do not parallel the LRT directly, to improve frequencies on routes that could act as feeders to the LRT Corridor.	Increased service levels in LRT Corridor, matched by efficient transit connections on adjacent routes.	A monitoring and complaint process will be in place to ensure: Traffic and transit operations are not unduly compromised by construction in the LRT corridor; Traffic and transit modifications are operating efficiently during the operational phase of the project.
Traffic Operations	Changes in level of traffic service Changes to property access Turning movement prohibitions Parking and loading restrictions	City, Road Users, Emergency Services Providers	LRT corridor Adjacent arterial road network	Street closures and interruptions should be limited to partial lanes closures wherever possible. Major changes to traffic circulation in the B-Line LRT corridor. Entrances and unsignalized intersections on the centre-running sections of the route sections will operate on a right- in/right-out only basis.	A detailed traffic management plan, comprising a construction staging and street closure or lane reduction plan will be prepared as part of the detailed-design stage of the project. It is anticipated that only short segments of the alignment will be closed or will experience limited access during construction. To ensure that there will not be undue traffic flow and access restrictions, in the corridor, the construction sequence is intended to in manageable segments, with manageable lengths of the corridor being subjected to lane closures or restricted access at any one time during construction. Improvements to traffic operations/controls on other arterial roads (additional turning lanes; traffic signal optimization; turn prohibitions). Some accesses will be reconfigured to provide access via side streets. At other locations, there are commercial properties that have frontage parking areas accessed individually.	Implementation of the B-Line LRT can be accommodated by the existing road network, albeit with a general reduction in performance for other motorized road users. This is offset by the increase in people carrying capacity on the corridor and the introduction of some offline intersection and link improvements.	As above.
Surface and Subsurface Utilities	Utility relocation and service interruptions during construction	City, Utilities Companies, Utilities Users	LRT corridor	In general, the standard construction sequence for completing utility relocations will be used during construction and minimal impacts to existing services or service interruptions are expected.	Owners of existing residential, commercial and business properties will be notified in advance by the City if utility relocation will occur. Alternative access arrangements will be provided to the owner. Adequate protection will be in place to ensure site safety at all times to protect the public and the owners from the construction sites.	Limited service disruptions.	Conduct additional engineering surveys and contact utility owners further to ascertain the existence and nature of their plant, and feasibility of relocation. Monitor and address service disruptions (complaint protocol). A monitoring plan will be in place to ensure: safety as a first priority for the public and employees. Monitoring of environmental protection requirements with regard to utilities, such as storm and sanitary sewers to ensure no runoff and capture of runoff during construction. Monitoring of any potential for contaminated soils as a result of uncovering abandoned utilities.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
SOCIO-ECONOMIC ENVIRONMENT							
Land Use Structure and Economic Impacts	Changes to land use structure (redevelopment potential; intensification; housing stock; property impacts; business impacts)	City, Property Owners, Residents, Business Operators	Proposed LRT corridor	The LRT will be a key driver in realizing land use objectives that emphasize the important connections between land use and transportation by promoting future transit-supportive land uses along rapid transit corridors. Enhanced access to regional attraction nodes. Pressure for redevelopment that would displace existing affordable rental units. Frontage and access impacts to approximately 200 properties along the LRT corridor. Potential loss of passing traffic, loss of on-street parking and loading and unloading areas for businesses.	The City will form a construction liaison committee to provide quick access to construction related information, such as timing and schedule information for business owners and residents. Prior to each phase of construction, the City will conduct a broader public awareness campaign. Acquire property in a manner that ensures individual rights are respected and protected, and to provide fair compensation within the framework of the Metrolinx's policy and associated legislative instruments governing the acquisition of property for City projects. The acquisition process emphasizes negotiation on a willing seller, willing buyer basis and the achievement of a mutually satisfactory agreement. Engage in property expropriation only as required. Parking management plan to be developed to including re-designating short-term parking spots on adjacent side-streets and developing layby and parking/loading areas from remnants of acquired properties	Overall increase in land use diversity and intensification. Increased certainty about project impacts, creation of an acceptable contingency planning regime, and reduction in the potential disruption to business activities and community cohesion.	Continue long-term monitoring of land use transformation to ensure compliance with and relevance of Official Plan objectives, targets and policies. Continue to monitor housing starts intensification to track whether City objectives and Provincial targets are being met. Establish storefront locations dedicated to receiving public comments and concerns about construction activities and impacts.
	Changes to Economic Base	City, Development and Business Interests	Proposed LRT corridor and catchment area	6,000 jobs would be created during the B-Line LRT construction phase, with up to 1,000 ongoing jobs due to operations and maintenance. Benefit of $2 Million annually, based on reductions (7.5%) in a number of air pollutant levels by weight. Property market uplift ranging from $50.0 Million to $143.5 Million (1.5% to 4.3% impact).[24]	None required.	Significant attraction of residents, businesses and investment to the LRT Corridor.	Continue monitoring employment rates as an index of the economic health of the City. Changes in municipal tax assessment base.

[24] Hamilton Rapid Transit Initiative: Economic Potential Study Final Report; provided by IBI in association with HDR, March, 2009.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Community Cohesion	Community connectivity and mobility	City, Community Organizations, Trail Users	Proposed LRT Corridor and catchment area Adjacent trail system	Increased mobility/walkability and access to community attractions and amenities. The LRT will work in parallel with the existing and proposed cycling routes and recreation trails to improve community connectivity to and from the corridor. Possible decrease in walking and cycling access to businesses and residential areas during construction. Potential relocation of cycling facilities in York / Dundurn / King area	The City, Metrolinx, Contractor, the Hamilton Chamber of Commerce, business owners, and residents to work together to provide opportunities for walking and cycling access to businesses and residents during construction where possible. City will consult with cycling community to develop suitable alternatives when and where required	Enhanced quality of life for residents within the corridor influence area, and the City of Hamilton as a whole. Support affected businesses and residents by providing walking and cycling access during construction.	Ongoing monitoring, communication, and adjustments to walking and cycling access during construction.
Surface Water and Aquatic Ecosystem (1)	Harmful alteration, disruption or destruction (HADD) of fish habitat	HCA, MNRF, DFO	Chedoke Creek	Potential loss of fish habitat as a result of construction and operation activities such as excavation, bridge/culvert structural work, excess material storage, equipment maintenance, waste water management within the study area.	Design and implement erosion and sediment controls to prevent or reduce sediment discharges to the existing sewer system and natural watercourses, including application of best management practices (e.g., Erosion & Sediment Control Guideline for Urban Construction (2006)). Conduct work in a continuous fashion to minimize the duration of potential impacts. Maintain the area of disturbance to a minimum. Design drainage and stormwater management systems to mimic natural drainage patterns. Store, handle and dispose of all excess materials to prevent their entry into watercourses. Manage concrete effluent and dewatering to prevent release of contaminated water into receiving watercourses, including capture and transport of effluent off-site. Equipment re-fuelling will take place no closer than 30m from any watercourse. Prohibit/limit construction access to watercourses / watercourse banks, where practical.	A harmful alteration to fish habitat may result. “Low risk” if mitigation measures are implemented.	Monitoring during construction. Development and implementation of spills management plan.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Surface Water and Aquatic Ecosystem (2)	Fish mortality during construction	HCA, MNRF, DFO	Chedoke Creek	Fish may potentially be injured or killed due to spills – chemical or sediment. Change to sensitive life stages/process (i.e. spawning) if in-water works are not timed appropriately.	Equipment re-fuelling will take place no closer than 30m from any watercourse. Design and implement erosion and sediment controls. Design and install native woody vegetation and groundcover to pre-construction conditions or better. Maintain existing ground cover such as grasses or other low lying vegetation within the valley, particularly on the banks of Chedoke Creek and in close proximity to surface water features and other sensitive areas.	Potential impacts during construction can be managed and reduced with the appropriate mitigation measures as well as the drainage and stormwater management design.	Monitoring during construction.
	Barriers to fish movement	HCA, MNRF, DFO	Chedoke Creek	None expected.	None required.	None expected.	None required.
	Baseflow alterations	HCA, MNRF, DFO	Chedoke Creek	None expected.	None required.	None expected.	None required.
	Increased water temperature	HCA, MNRF, MOECC	Chedoke Creek	None expected.	None required.	None expected.	None required.
	HADD of rare, threatened or endangered (RTE) species	HCA, MNRF, DFO	Chedoke Creek	No RTE species identified.	None required.	No net impacts.	None required.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Vegetation Communities (1)	Loss of street trees and vegetation from natural areas resulting from new alignment, OMSF, and widening of existing roads to accommodate the LRT	HCA, MNRF, City	Main Street W. Gore Park Scott Park Delta S.S. 403 crossing and Cathedral Park Chedoke Creek Valley OMSF	Potential loss of street trees (identified in Appendix C-5) Cathedral Park vegetation removals total 0.9ha, which includes, • 0.34ha of CUM1-1 (Dry Moist Old Field Cultural Meadow) • 0.01ha of MAM2-2: Reed Canary Grass Meadow Marsh; • 0.35ha of CUW1-3: Dry Fresh Manitoba Maple Mineral Cultural Woodlot; • 0.04ha of FOD5-11: Dry Fresh Silver Maple Deciduous Forest; • 0.16ha of MGT: Manicured Grass/Trees. OMSF vegetation removals total 4.11 ha, which includes, • 2.62ha of CUM1-1: Dry Moist Old Field Cultural Meadow; • 0.49ha of CUT1-1: Sumac Cultural Thicket; • 0.27ha of CUW (Cultural Woodlot) • 0.73ha of FOD-4: Dry Fresh Deciduous Forest. Release of construction generated sediment to vegetation areas.	Minimize encroachment on remnant woodlots and large healthy trees. Trees and areas to be preserved within and adjacent to the ROW will be identified in a Tree Protection Plan and protected with snow fence defining Tree Protection Zone(s) Inclusion of hard and soft landscaping in the corridor, including planting of additional street trees, where opportunities present themselves Approval will be obtained, and compensation/reimbursement will be provided, as required, for displacement of publicly owned roadside trees on public property, in compliance with City of Hamilton's Public Tree Removal Policy, the Forest Management Plan (Reforestation Policy) and By-Law 06-151 (Public Trees By-Law), as amended. Utilize native species for identified restoration areas. Movement of construction machinery will be limited to the boundaries of the ROW and operated in a manner that minimizes damage to adjacent trees. Wherever possible, construction activities will be restricted within the dripline of all trees not required for removal.	Potential impacts during construction can be managed and reduced with the appropriate mitigation measures, assuming compensation and reimbursement funds are directed to post-construction tree replacement.	It is recommended that the 2017 AECOM tree inventory and assessment of all trees that are to be affected by the proposed work be reviewed during detailed-design. Compensation of existing tree loss and replacement will be specified in the Landscape Plan, developed during detailed-design. Environmental site inspections during construction to ensure environmental protection/re-vegetation measures are implemented and working and any required remedial action is undertaken. Plantings of woody and herbaceous vegetation will be checked periodically for a period of one year to ensure an acceptable survival rate. Routinely inspect erosion and sediment control measures, including after storm events, and repair as required.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Vegetation Communities (2)	*(Continues from above)*	*(Continues from above)*	*(Continues from above)*		Unnecessary traffic, dumping and storage of materials over tree roots will be avoided. Vehicle maintenance and fueling will be carried offsite, or at a dedicated area. Tree grubbing will be restricted to the required activity zone. Where possible, tree stumps will be cut flush to the ground and grubbing will be avoided to minimize soil disturbance, particularly in erosion prone areas. Roots and branches, if damaged, will be treated using approved horticultural methods. Any dewatering effluent (if dewatering is required) as a result of the proposed works will be treated (i.e. sandbags, sediment traps) as needed to ensure it does not transport excess sediment into vegetated areas. Stabilize and revegetate exposed surfaces as soon as possible. Install temporary erosion and sediment control measures prior to construction and maintain throughout construction. Return ROW to pre-construction or better condition. Wherever possible, tree loss will be compensated at a net benefit.	*(Continues from above)*	*(Continues from above)*
	Impacts to rare or significant plant species	HCA, MNRF	Chedoke Creek Valley OMSF site	None expected.	No rare or significant species have been identified within the study area, based on limited surveys. However, if observed, MNRF will be contacted to determine how species at risk will be treated.	None expected.	It is recommended that the tree inventory (AECOM, 2017) and assessment of all trees that are to be affected by the proposed work be reviewed during detail design, including a focused Butternut/ health assessment. The Butternut assessment survey should include the vegetative areas of the OMSF and Cathedral Park, in addition to other treed areas within the influence zone of construction, and the survey area includes suitable vegetative areas located within a minimum of a 50 m setback from the limits of disturbance.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Wildlife Habitat (1)	Destruction/disturbance of wildlife habitat. Wildlife mortality during construction.	HCA, MNRF	LRT Corridor, OMSF	Construction disturbance to adjacent habitat and communities. Work on the OMSF site may disturb migratory birds. Displaced trees that are habitat for migratory birds and common urban mammals. Direct removal of available habitat for resident species. Artificial lighting can change animal behaviour (i.e. nocturnal foraging, migration movements, light attraction or repulsion, social interaction. Animal vehicle conflicts can occur creating the potential for incidental killing or harm to local and resident wildlife species.	During construction, the requirements of the Migratory Birds Regulations (MBR) under the *Migratory Birds Convention Act (1994) must be adhered to.* Adherence to *Ontario Fish and Wildlife Act*, which prohibits the destruction or taking of nests or eggs of wild birds. Implement timing constraints so that no vegetation or buildings suitable for migratory birds will be removed during the nesting and breeding season (April 1 to July 15). Which states that no tree cutting can take place from April 1 to August 31 in any given year. Implement migratory bird prevention and protections measures (tarping, etc.) A nest search must be conducted if working within the above timeframe. Conduct a general site visit prior to April 1 in the first year of construction to inspect structures (bridges/buildings) scheduled for alteration or removal. If nesting is likely, the Contractor must install bird nesting preventative measures before April 1. The measures must remain in place until July 15. Minimize habitat removal through minimizing access, staging, storage and grading footprints. Avoid harassment to wildlife species during all stages of construction. Construction zones should be walked at a slow pace to flush any animals out of the area prior to silt fence instillation. Workers should be trained on the potential for mammal species to move through the project area and should remain vigilant and alert to the presence of wildlife in the work area. Install temporary erosion and sediment control measures, including after storm events, and repair as required. Any dewatering effluent (if dewatering is required) as a result of the proposed works will be treated (i.e. filter bags, sediment traps) as needed to ensure it does not transport excess sediment into vegetated areas. Ensure construction areas are delineated by fencing (i.e. silt fence) to exclude wildlife from entering the work areas. All construction vehicle movement should be at a slow pace to avoid trampling.	The effects of the proposed B-Line LRT on wildlife species are anticipated to be minimal, as extensive vegetation clearing and building removal is not required.	A detailed Species at Risk assessment should be undertaken during the detailed-design component of the study for Chimney Swift, Bats and Barn Swallows. Monitoring of the migratory bird prevention measures will occur during the critical nesting season (April 1-July 15). If any wildlife species, including nesting birds, are encountered during construction, a qualified biologist will be contacted immediately. If removals occur outside of the migratory bird nesting window, then undertake a pre-clearing nesting bird survey by a competent avian biologist. Routinely inspect sediment and erosion control measures, including storm events, and repair as required. MNRF should be contacted directly to discuss threatened, endangered or extirpated species protected under the ESA that are observed within the limits of disturbance to ensure that activities remain compliant with the Act. Furthermore, the Ministry requests reporting all sightings of rare species (animals and plants), natural and wildlife concentration areas in Ontario to the Natural Heritage Information Centre (NHIC), using the Rare Species Reporting Form to the NHIC. For information on how to report these sightings, please refer to the following website; https://www.ontario.ca/page/report-rare-species-animals-and-plants.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Wildlife Habitat (2)	Barriers to wildlife movement	HCA, MNRF	LRT corridor, OMSF	The new guideway crossing Highway 403, and the existing Queenston Road structure, are elevated over the Chedoke Creek Valley, thereby minimizing potential barriers in the major wildlife corridors.	None required.	Since the proposed LRT infrastructure and operation will be within the existing Main Street–King Street corridor, the barrier effects already exist and will not increase during operation of the proposed service.	None required.
	Disturbance to significant Wildlife species	HCA, MNRF	LRT corridor, OMSF	No rare, threatened or endangered wildlife identified in within the study area, except chimney swift and peregrine falcon, which are accustomed to street level disturbance during the breeding season and should not be adversely affected by the RT line construction or operation. B-Line not expected to displace existing buildings which are suitable habitat for chimney swifts and common nighthawks.	Implement migratory bird prevention and protection measures, as above.	No net impacts.	A detailed Species at Risk assessment should be undertaken during the detailed-design component of the study for Chimney Swift and Bats. Monitor bird prevention and protection measures during construction.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Groundwater	Potential effects on groundwater during construction	HCA, MOECC	LRT corridor	Shallow groundwater levels may be temporarily affected if dewatering is required for excavation. Temporary reduction of groundwater flow to surface water bodies and wetlands due to construction dewatering. Contaminated soil and groundwater may be encountered. Mobilization and discharge of contaminated groundwater (likely encountered) due to construction dewatering. Groundwater contamination may occur from excavation (leaching of contaminants into groundwater), construction equipment and or associated spills; especially in groundwater vulnerable areas (i.e. aquifer areas, near shoreline) and intake protection zones. Groundwater contamination due to contaminated soil stockpiling (if any generated from excavation)	Potential impacts to groundwater will be managed in accordance with *O.Reg. 153/04*, as amended, and the City of Hamilton's Contaminated Site Management Program for Municipal Works manual. Construction methods will reduce the potential for excessive groundwater taking at excavation sites (e.g., use of sheet pile enclosures). Limit dewatering duration and volumes as minimal as possible. Groundwater sampling should be conducted prior to discharge to access baseline groundwater quantities. Discharge water should be treated prior to discharge if contamination/ exceedance s detected. If extracted water is to be directed to the natural environment (i.e. creeks, ditches), proper erosion and sediment control measures should be implemented. Educate and train staff on procedures and protocols to avoid spills. Refuel equipment and vehicles on spill pads and/ or in designated areas. Store and handle hazardous materials properly to prevent from releasing into the natural environment. Remove and dispose waste materials by licensed contractors. Construction equipment should be maintained in good working order with appropriate safety and emergency measures. Utilize MOECC soil management best practices, including developing soils management plans for the project. Avoid stockpiling contaminated soil in groundwater highly vulnerable areas. Cover contaminated soil piles during rain events (to prevent contaminates/ leaches from releasing into the ground. Dispose contaminated soil off-site (at a licenced waste facility as soon as possible using licenced contractors.	No extensive soil or groundwater impacts are anticipated.	A groundwater monitoring program is required to be developed during detailed design. The monitoring program shall include both groundwater level and water quality monitoring. Contingency plans will be developed to address groundwater contamination, including a spills response plan. Construction dewatering discharges are often conveyed to the City's storm and/or sanitary sewer infrastructure. If dewatering discharges are conveyed to the City's storm and/ or sanitary sewer infrastructure an agreement with Hamilton Water's Environmental Monitoring and Enforcement Group would be required to ensure that the discharged water complies with the City of Hamilton Sewer Use Bylaw. It is recommended that the City and its contractors contact the Superintendent, Environmental Monitoring and Enforcement Group in Hamilton Water, or send an email request to sewerusebylaw@hamilton.ca for more information to better understand discharges to the City's infrastructure.
Contaminated Sites	LRT construction works encountering contaminated soils and groundwater	HCA, MOECC	LRT corridor	There are properties within the study area that have the potential to contribute to environmental contamination.	Where removal of potentially contaminated soil must take place, soils will be tested for those chemicals that may have been used or dumped within the area, and will be handled in accordance with Part XV.I of the *Environmental Protection Act* (EPA) and *Ontario Regulation 153/04*, Records of Site Condition. MOECC District Office will be contacted if contaminated sites are positively identified. The City of Hamilton's Contaminated Sites Management Program manual will be applied to the project, including health and safety special provisions (hazard assessment, training, air monitoring, use of personal protective equipment, site control and decontamination).	Proposed mitigation and safety precautions should address the project impacts relative to contaminated soil and groundwater impacts, as well as airborne contaminants.	Phase 1 Environmental Site Assessment and potentially Phase 2 Environmental Assessments will be undertaken during detailed-design, if required. Implement the City's Contaminated Sites Management Program procedures for training on encounter of contaminated materials and engage in standard general on-site and perimeter air monitoring, as well as non-routine monitoring, which will be applied to this project.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Stormwater	Increases in impervious surface area and resultant changes in stormwater quantity and quality	HCA, MOECC, City	OMSF site The grade separation, flyover of Highway 403 which will connect the alignment from Main Street West to King Street West, and at King Street just east of Gage Avenue where the LRT tracks will go under the CP tracks	A stormwater detention pond at the OMSF will be designed to accommodate peek flow.	Site plan approval will be required for the OMSF, based on relevant criteria (Ontario Ministry of the Environment Stormwater Management Planning and Design Manual, 2003) addressing stormwater quality and quantity controls. An erosion and sediment control plan is required to satisfy the criteria of Erosion and Sediments Control Guidelines for Urban Construction (Greater Golden Horseshoe Area Conservation Authorities, December 2006) The following control measures are recommended during construction: Erosion protection to be provided around all storm manholes, sanitary manholes and catch basins; Erosion control structures should be monitored regularly with sediment being removed when accumulation reach a maximum of 1/3 of the height of the silt fence; All erosion control structures should remain in place until all disturbed ground surfaces have been re-stabilized either by paving or restoration of vegetative ground cover; The contractor must remove sediments from the municipal roadway and sidewalks at the end of each work day; New storm sewer or stormwater detention facility at McMaster A single construction entrance be utilized with a “mud mat” installed to minimize the amount of sediment transported off the site on construction vehicle tires; All disturbed areas not scheduled for construction within 30 days be stabilized and seeded immediately. Slopes greater than 5:1 be stabilized until geogrid or an erosion control blanket, and seeded or sodded as soon as possible; and During construction, slopes should be maintained with a dense cover of grass.	Proposed mitigation treatment should be able to address the project impacts relative to both water quality and quantity concerns.	A separate Storm Water Management (SWM) study will need to be undertaken to prepare the detailed stormwater management required for the OMSF. Inspection for the OMSF to be completed weekly and after an event greater than 13mm, and submitted regularly to the City and the HCA. During the development of the stormwater management plan and detailed-design, the Hamilton Conservation Authority (HCA) should be consulted; in order to review proximity and potential impacts to buried watercourse at the OMSF location.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Noise and Vibration (1)	Noise and vibration effects during construction phase	MOECC, City, Residents, Business Operators	LRT corridor, OMSF	Increased noise and vibration levels during construction due to construction activities. Increased noise from OMSF operations Increased noise from additional activity at bus terminals	Although the specifics of the construction equipment have yet to be determined, provincial and municipal guidelines provide basic restrictions and recommendations with regard to construction noise and vibration. Comply with the noise limit outlined in NPC-115 guidelines. Ensure proper and regular maintenance of construction equipment. Use of noise abatement equipment on machinery (i.e. mufflers). The City of Hamilton By-Law No. 03-020 prescribes appropriate period for construction activities, which is between the hours of 7:00a.m. and 7:00p.m. Noise by-law exemption will be obtained prior to construction in periods prohibited by the noise by-law, if required. Trucks should adhere to Transport Canada regulation 1106 as this provides stricter limits than NPC-118. All construction equipment used for this project, except for equipment used less than once per day (i.e. re-bar delivery) should use broadband backup alarms instead of tonal backup alarms. All equipment used during nighttime (2300-0700) construction, regardless of size, should use broadband backup alarms. For the OMSF, policies with respect to allowable noise levels from equipment, rooftop noise attenuation and possible physical noise attenuation on the site may be required, subject to detailed design of the facility For the bus terminals, physical noise attenuation may be required to protect adjacent residential properties, and wil be identified during detailed design.	Noise level increase during construction is temporary and can be mitigated. Noise levels from operation in and around the bus terminals and the OMSF can be mitigated through standard attenuation measures, subject to detailed design	The OMSF will require a detailed noise and vibration study in support of an Environmental Compliance Approval for that site. A more detailed noise and vibration impact assessment of the final alignment, including the effects of special trackwork using the proposed vehicle's actual noise emissions (manufacturer's data). A more detailed noise assessment of the traction power substations and bus terminals, as well as the OMSF. An assessment and mitigation strategy for construction related noise and vibration. Noise and vibration monitoring during the construction period, including regular site visits, to measure construction sound and vibration levels and continuously reduce/improve the impact. Active briefing and review of contractors' practices and operations to ensure they continue to adhere to the requirements. A complaints protocol will be developed to monitor and investigate complaints.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Noise and Vibration (2)	Changes in noise levels greater than 5 dBA in operations phase	MOECC, City, Residents	LRT corridor, OMSF	No noise sensitive areas will be subject to noise increases greater than 5 dBA during the LRT operation. With minor exceptions (west and east ends), noise sensitive locations in the LRT corridor will experience reductions in sound levels ranging from 1-2 dB at night to 1-8 dB during the daytime. This is primarily a result of LRT vehicles replacing buses and other motorized vehicles in the corridor. Adjacent roads receiving traffic diverted from the LRT corridor may experience noise increases of 1-3 dB.	None required.	In many areas in the downtown core along the LRT route. The project will result in a noticeable and sometimes significant reduction in road noise due to the diversion of traffic onto other parallel streets.	Although the City of Hamilton does not currently have a post-construction transit noise monitoring policy, noise monitoring can be conducted once the project is completed to provide an indication of the actual sound levels along the LRT route. Monitor and investigate complaints resulting from operations of the LRT.
	Noise and vibration effects during construction phase	MOECC, City, Residents, Business Operators	Buildings within 20m of LRT corridor, OMSF	At distances of more than 20m from the nearest track, the vibration levels from the LRT system will meet the applicable guidelines. For residential receptors located closer than 20m, particularly in the Downtown core, vibration guideline levels will be exceed if no special isolation measures are incorporated in the trackbed design.	It is assumed that there will be a basic level of vibration isolation installed throughout the system. This will include encapsulated rail (rail embedded in a rubber casing to dampen vibration). Various levels of upgraded vibration isolation will be considered (e.g., improved encapsulated rail systems or floating slab track) during the detailed-design phase.	Vibration can be reduced to acceptable levels.	Implement construction vibration limits confirmed during detailed design Monitor vibration levels during operations phase.
Air Quality (1)	Degradation of air quality during construction phase	MOECC, City (Clean Air Hamilton), Residents, Business Operators	LRT corridor, OMSF	Construction activities can generate air pollutants (equipment exhaust emissions, dust). Potential exposure of workers and the adjacent populations to airborne contaminants during excavation of soil.	Application of dust suppressants (including consideration of non-chloride suppressants); reduced travel speeds for construction vehicles; implement a no idling policy; efficient staging of activities; minimize haul distances; consideration of installation of solid barriers; and covering of stockpiles. Where construction involves excavation of potentially contaminated soils, the tendering process will include requirements for testing of the soils prior to excavation and ongoing monitoring during the excavation, if the initial testing indicates that monitoring is warranted (in compliance with City of Hamilton Contaminated Sites Management Program manual). The City of Hamilton's Contaminated Sites Management Program manual will be applied to the project, including health and safety special provisions (hazard assessment, training, air monitoring, use of personal protective equipment, site control and decontamination).	Effects are temporary and can be mitigated.	Implementation of an emissions management plan during construction, including the City's Contaminated Sites Management Program procedures for standard general on-site and perimeter air monitoring, as well as non-routine monitoring.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Air Quality (2)	Degradation of air quality during operations phase	MOECC, City (Clean Air Hamilton), Residents, Business Operators	LRT corridor, adjacent arterial roads and OMSF	Segments of the B-Line LRT corridor, where volumes of other motorized traffic will be reduced, are expected to experience an improvement in air quality. A few areas that currently have relatively high daily traffic volumes and may experience increases in traffic due to diversion of traffic from the LRT corridor. The operations at the OMSF will include activities and equipment that have the potential to generate air pollutant emissions, including sandblasting, spray painting welding, wheel truing, sand handling systems, compression air blow-downs, steam cleaning boilers and emergency generators.	All activities capable of generating significant airborne particles (i.e. traction motor blow downs, steam cleaning, sandblasting, sand handling, wielding, wheel truing) should be subject to general ventilation or localized capture systems that are equipped with particle filtration. Comply with provincial regulations (*Ontario Environmental Protection Act* and *Regulation 419/05*), so that off-site concentrations of air contaminants emitted remain below the provincial standards at all times. Prepare an emission summary and dispersion modelling report (ESDM), together with an application for environmental compliance approval (ECA), to be submitted to the Ontario Ministry of Environment and Climate Change (MOECC).	Net improvement in air quality is expected to result in a benefit of $2 Million annually, based on reductions (7.5%) in a number of pollutant levels by weight.	Due to overall net benefits, a project- specific monitoring program during the operations phase is not proposed A dust management plan will be developed during detailed design. During construction observation of visible emissions will be treated as a case where immediate action must be taken. Dust generation will be visually monitored to proactively achieve the goal of reducing impacts to local air quality. The City of Hamilton will continue to assess area wide air quality under its current monitoring program (through Clean Air Hamilton). Continuous monitoring for particulate matter (PM10 and PM2.5) and NOx is recommended at two locations (downtown and at the MSF), including three months of pre-construction monitoring and up to a year of monitoring during construction.

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
CULTURAL ENVIRONMENT							
Built Heritage and Cultural Landscapes	Displacement or disturbance of Built Heritage Resources (BHR) or Cultural Heritage Landscapes (CHL)	MTC, City	LRT corridor	Potential impacts to BHR and CHLs	Cultural Heritage Evaluation Reports (CHER) are recommended for impacted properties of potential cultural heritage value. Vibration studies associated with construction and operation activities should be undertaken to confirm that there will not be adverse impacts to resources.	Potential displacement and disruption to some cultural heritage resources avoidance and design modifications are not considered practical. Preservation of BHR/CHL through documentation.	During detailed design commitments exist to complete further heritage assessment work for any additional properties of 40 years of age and older where direct or indirect impacts are identified. Additional CHERs may be completed to review and confirm the cultural heritage value or interest of the properties. The Queenston Traffic Circle cultural heritage resource will be further documented during detailed design (per the 2011 EPR commitments). Where required, Heritage Impact Assessments (HIA) will also be completed during detailed design to protect heritage properties where possible and to identify ways in which impacts to any of these attributes can be mitigated (based on MOECC feedback). Conservation plans (building and façade stabilization measures; development of appropriate setbacks) should be developed based upon the results of vibration studies associated with construction and operation activities.
Archaeology	Possible impacts to areas with potential for identification of archaeological resources	MTC, City	LRT corridor, OMSF	The Main, King and James Street rights-of-way do not retain archaeological site potential due to previous disturbances. Soil disturbances associated with grading, excavation and placement of fill may result in the loss of archaeological resources. The project may affect areas with archaeological potential outside the existing right-of-way (“vacant lots”; the pipeline at the intersection of Main Street and Ottawa Street by deep trenching).	A Stage 2 Archaeological Assessment should be conducted on lands determined to have archaeological potential. If the proposed undertaking is to impact the pipeline at the intersection of Main Street and Ottawa Street by deep trenching, Stage 3 mitigation and/or excavation will be required.	Potential adverse effects to known or potential archaeological resources would be avoided or mitigated.	Complete all required AA (Stage 2 and Stage 3 if recommended by the Stage 2AA) as early as possible in the planning stages of the project. Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, the proponent must cease alteration of the site immediately and engage a licensed archaeologist to carry out archaeological fieldwork in compliance with *Section 48(1)* of the *Ontario Heritage Act*. Any person discovering human remains must immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Government Services.
NEW							

Factor	Environmental Issue/Concern	Concerned/Interested Party	Location	Potential Construction/Operations Impact/Effect	Mitigation Measures	Potential Net Effect/Impact	Monitoring/Future Work/Contingency
Geotechnical	Subsurface and groundwater conditions are required as part of hydrogeology investigations.	Metrolinx, City, IO	LRT corridor, OMSF	Depending on the site-specific subsurface conditions and subgrade inspection, proper frost mitigation measures should be implemented to minimize any frost related maintenance issues, should they be identified.	The following geotechnical borehole testing should be conducted during detailed-design. Monitoring wells for every 1/3 boreholes; Well development prior to testing; Water quality sampling of every monitoring well; Slug testing of every second monitoring well; and, A short-term pumping test for each of the excavations for deep structures (if any).	Findings may impact stormwater and contamination mitigation measures.	Hydrogeology investigation requires further testing of geotechnical boreholes during detailed-design. Adherence to Infrastructure Ontario (IO) AFP-Geotechnical, Hydrogeology, Environmental Due Diligence Technical Requirements (2016).

CONSULTATION PROCESS

Table of Contents

List of Tables

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5. CONSULTATION PROCESS

This chapter provides details on the consultation that was conducted during the Hamilton LRT 2017 EPR Addendum. Stakeholder consultation formed an integral component of the Hamilton LRT 2017 EPR Addendum, regarding communication of the proposed changes being addressed through the Addendum. The consultation process was designed to follow the requirements of the Transit Project Assessment Process (TPAP) (*Ontario Regulation 231/08* under *Ontario's Environmental Assessment Act*).

Within the context of the City of Hamilton and Metrolinx's communications program on its LRT initiative, the public, regulatory agencies, aboriginal communities, and other interested parties have been provided with the opportunity to review and comment on the Hamilton LRT 2017 EPR Addendum project.

5.1. Overview of the Consultation Approach

Consultation activities were both active and passive, comprising:

- Project websites that provided the opportunity for any interested individuals or organizations to provide comments, as well as to have their contacts added to the mailing list:
    - Hamilton.ca/LRT
    - Metrolinx.com/HamiltonLRT
    - MetrolinxEngage.com
- A mailing list that was developed at the start of the current Addendum process, after requesting permission to include those who had previously signed up in 2011, as per the *2014 Canadian Anti-spam Legislation*;
- Stakeholder meetings since May 2016 held with more than 75 stakeholder and community groups including Chambers of Commerce, Business Improvement Areas (BIAs), Ward meetings, neighbourhood associations, school boards, advisory groups and other major organizations. The LRT Team has also participated in several community events including Supercrawl, Concession Street Fest 2016, Gore Park Summer Promenade, and hosted lunch and learn sessions;
- Meetings that were held specifically related to the High-Order Pedestrian Connection;
- Two series of Public Information Centres (PICs) that were held in September 2016 (seven meetings) and January 2017 (three meetings). The January meetings were supplemented by three Community Update presentations in communities outside of the LRT corridor; and
- The Community Connector program, which is a new outreach strategy that ensures the nearly 1,300 residences and businesses that are situated directly on the LRT corridor to be engaged and informed.

The public, regulatory agencies, aboriginal communities, and other interested parties were able to choose their level of involvement through the following means including, but not exclusive to, public open houses, online sources, face-to-face meetings, presentations to stakeholder groups (i.e. senior groups, neighborhood groups, Conservation Authorities, Aboriginal communities and First Nations representatives, and Property owners).

Consultation that has been completed leading up to and including the Notices of Hamilton LRT 2017 EPR Addendum are summarized in this chapter. Additional opportunities for providing input into the project decision-making process, following publication of this Hamilton LRT 2017 EPR Addendum, are also identified.

The objective of the consultation during the Hamilton LRT 2017 EPR Addendum was to consult on the proposed project developments and the potential impacts and corresponding mitigation measures.

5.1.1. LRT Project Team

During this study, technical working teams comprising of specialists from within various departments at the City of Hamilton, and representatives from Metrolinx, the Regional Transportation Agency in the Greater Toronto and Hamilton Area (GTHA), has met frequently and shaped development of the project. These service representatives have reviewed and commented on the project and helped to shape its development. Numerous staff and information reports have gone before City Council.

Staff workshops were conducted throughout the process of refining the alignment, with multi-department participation from planning, public works, transit, transportation, and others. More than 240 comments were part of a process of 10 incremental versions of the alignment. These comments were directed at minimizing property requirements, protecting City standards, ensuring traffic and pedestrian safety, land use planning issues and such.

5.1.2. Stakeholder Contacts

A mailing list was created at the beginning of the Hamilton LRT EPR project to identify directly affected property owners, government agencies, interest groups, other key stakeholders, and residents who were interested in receiving project information. The list of stakeholders consulted is dynamic and has been expanded to incorporate new stakeholders during the course of the Hamilton LRT 2017 EPR Addendum. A registered letter was sent to some property owners notifying them that Metrolinx will likely need to purchase their property for the Hamilton LRT project.

5.1.3. Community Connector Program

The Community Connector program is a new outreach strategy, to ensure the nearly 1,300 residences and businesses that are situated directly on the LRT corridor are engaged and informed. In teams of two, they provide project information, and record questions and feedback related to Hamilton LRT, allowing project staff to respond accordingly. This work on the corridor has allowed the Hamilton Team to establish and strengthen valuable relationships with those most impacted by this project. By seeking feedback twice a year for the duration of the project, the local community has the opportunity to engage in meaningful dialogue that helps to inform construction mitigation, business support and future communications planning. Nearly 1200 completed surveys were generated through two rounds of canvassing in 2016, and all visits promoted additional engagement opportunities at the September and January public meetings.

Registered mail notices were also sent out to all property owners along the corridor, to ensure they were aware of the public meetings.

5.2. Public Open Houses and Online Consultation

Two series of Public Information Centres (PICs) were held during the Hamilton LRT 2017 EPR Addendum.

5.2.1. Public Open House and Online Consultation #1

This phase commenced in August 2016, concurrent with the Notice of Public Information Centre #1 (PIC #1). This notice was extended to technical agencies and Aboriginal stakeholders, as well as the general public. A registered letter was sent to some property owners notifying them that Metrolinx will likely need to purchase their property for the Hamilton LRT project. The Notice was mailed to property owners directly on the corridor via registered mail, and to all residences and businesses with a 30m buffer via regular postage.

The Official Government Notice was published beginning August 25, 2016, in the Hamilton Spectator, the Hamilton Community News (English) and L'Express (French). The notice stated that Metrolinx and the City of Hamilton identified the need to revise the project to:

- Address design modifications to the Hamilton LRT 2011 EPR (the B-Line) alignment;
- Complete the assessment of a spur line (the A-Line) along James Street North connecting the new West Harbour GO Station and potentially down to the City's redeveloping Waterfront area; and
- Complete the assessment of an Operations, Maintenance and Storage Facility (OMSF) where light rail vehicles would be maintained and stored.

The City of Hamilton and Metrolinx invited stakeholders to attend Public Information Centre #1 to learn about a number of new developments and improvements to the project and to provide their input on the preliminary plans and specific project elements. An email address was also provided for stakeholders that had project-related questions or would like to be added to the project mailing list, at LRT@hamilton.ca. Significant email correspondence occurred with stakeholders and interested members of the public in the weeks leading up to and following both series of meetings.

Owners of potentially affected properties were notified by registered letter, during the week of August 22, 2016.

PIC #1 Venues, Dates and Format

Seven (7) Public Information Centres in open house format were held in September 2016. The purpose of these PICs was to provide information about the project and to receive public feedback. PICs were held:

- Monday, September 12, 2016, from 5:00pm to 8:00pm, at McMaster Innovation Park, Atrium, 175 Longwood Road South;
- Tuesday, September 13, 2016, from 3:00pm to 5:00pm, and 6:00pm to 8:00pm, at Hamilton City Hall, Council Chambers and Lobby, 71 Main Street West;
- Wednesday, September 14, 2016, from 5:00pm to 8:00pm, at LIUNA Station, Continental Room, 360 James Street North;
- Thursday, September 15, 2016, from 5:00pm to 8:00pm, at Dr. John Perkins Centre, Atrium, 1429 Main Street East;
- Tuesday, September 20, 2016, from 5:00pm to 8:00pm, at Battlefield House Museum, Jackson House Cellar, 77 King Street West, Stoney Creek;
- Wednesday, September 21, 2016, from 5:00pm to 8:00pm, at Sackville Hill Seniors Recreation Centre, Fireside Lounge, 780 Upper Wentworth Street; and
- Thursday, September 22, 2016, from 5:00pm to 8:00pm, at Dundas Town Hall, Second Floor Auditorium, 60 Main Street Dundas.

The open house format was interactive and included one-on-one interaction among attendees and City, Metrolinx and Consulting staff. Display panels were set up which provided information about the project. All attendees were greeted at the entrance and asked to sign in to provide an email address to receive project updates. Approximately 860 people attended the September Open Houses. The survey form handed out to the public is included in this document.

PIC #1 Materials

Hard copies of all PICs materials were made available for review at Hamilton City Hall (71 Main Street West) at the main floor information desk between 8:30am and 4:30pm Monday to Friday beginning September 12, 2016 and ending October 6, 2016. Information produced in association with the project was also available at Hamilton.ca/LRT and Metrolinx.com/HamiltonLRT and MetrolinxEngage.com. Appendix D includes the materials for the September PIC #1 within the consultation report.

Accessibility, Translation and TTY Typewriter Service

Individuals with accessibility or French translation requirements were requested to email LRT@hamilton.ca or call (905) 546-2424, ext. 6385 no later than September 6, 2016. The Bell Canada Relay Service was also available to assist in placing a call from persons who use a TTY/teletypewriter.

Social Media Promotion

Events, including follow-up reminders for comments were also advertised and promoted via Twitter. City staff sent 23 separate tweets that, in aggregate, were viewed more than 113,000 times, retweeted 198 times and "liked" 124 times. Links to the website and online survey contained in the tweets were clicked 292 times.

5.2.2. Public Open House and Online Consultation #2

For the Public Information Centre #2 (PIC #2) the official notice was published on January 9, 2017, in the Hamilton Spectator and the Hamilton Community News (English) as well as L'Express (French). All agency, technical and aboriginal stakeholders and properties within 45m of the corridor were notified by letter during the week of December 12, 2016. Letters to all properties within 45m of the corridor were also issued in the same week. Members of Parliament and Members of Provincial Parliament were notified by letter during the week of December 19, 2016.

The focus of PIC #2 was to identify modifications to the project design and present the environmental effects of the proposed changes to the project and the proposed mitigation.

PIC #2 Venues, Dates and Format

Three Public Information Centres in open house format were held in January 2017. PICs were held:

- Monday, January 16, 2017, from 4:00pm to 8:00pm, at Dr. John Perkins Centre, Atrium, 1429 Main Street East;
- Tuesday, January 17, 2017, from 4:00pm to 8:00pm, at David Braley Health Science Centre – Health Campus, 2nd Floor Auditorium, 100 Main Street West; and
- Wednesday, January 18, 2017, from 4:00pm to 8:00pm, at McMaster Innovation Park, Atrium, 175 Longwood Road South.

The open house format was interactive and included one-on-one interaction among attendees and City, Metrolinx and Consulting staff. Display panels were set up which provided information about the project. All attendees were greeted at the entrance and asked to sign in to provide an email address to receive project updates. Approximately 420 people attended the January Open Houses. The survey form handed out to the public is included in this document.

PIC #2 Materials

From January 16, 2017 to February 3, 2017 hard copies of all PICs materials were available for review at Hamilton City Hall (71 Main Street West) at the main floor information desk between 8:30am and 4:30pm Monday to Friday. Information produced in association with the project was also available at Hamilton.ca/LRT and Metrolinx.com/HamiltonLRT and MetrolinxEngage.com. Appendix D includes the materials for the JAnuary PIC #2 within the consultation report.

Accessibility, Translation and TTY Typewriter Service

Individuals with accessibility or French translation requirements were requested to email LRT@hamilton.ca or call (905) 546-2424, ext. 6385 no later than January 12, 2017. The Bell Canada Relay Service was also available to assist in placing a call from persons who use a TTY/teletypewriter.

Social Media Promotion

Notice of PIC #2 was circulated on Twitter, between January 11 to January 31, 2017. Tweets were either promotional or informing users of the event. There were 23 tweets, resulting in 91,232 impressions, 210 retweets, 198 likes and 197 clicks to links.

5.2.3. Summary of Written Comments Received from Public Open Houses

PIC #1 Responses

Approximately 350 completed PIC # 1 comment sheets have been received during or following PIC #1. Of these, about 200 were from written comment forms submitted through the Public Information Centres (PICs), and about 150 were received through the online forms. A small number of additional written forms were also submitted; in some cases the comments and response are duplicated, while in others, the responses included additional comments. Similarly, some individuals responded to both the written and online forms. These were reviewed and duplications eliminated. The breakdown of comment forms received from each PIC venue is shown in Table 5-1.

PIC #1 Response Summaries

Several questions related to specific elements of the alignment, including:

- Suggestions to add or move a stop;
    - About one-third of respondents selected locations to serve Gage Park (Delta, Gage Avenue, Gage Park);
    - Other popular stop locations included Bay Street and Locke Street. Implied extensions to the LRT, noted by requests to University Plaza in Dundas or Eastgate Square, were also reflected along with an additional stop between McMaster and Longwood;
    - Results from the interactive board on this topic reflected similar results; and
    - In response, the LRT Team decided to restore the Gage Park stop, and maintain local routes on Main Street West.

- Suggestions to add or move a stop, or add an intersection pedestrian crossing (IPS);
    - A large percentage of respondents indicated a desire to keep crossings at existing signalized intersections and IPSs, and many just indicated a preference for more crossings without specific locations; and
    - In response to these comments and the results of the interactive board, IPS crossings were added at Pearl Street, Walnut Street and Graham Street.
- Consideration of alternative layouts for the McMaster stop – side- or centre-running. A small majority preferred the side-running option, which was selected in part from this feedback, but also because it was operationally more effective, and permitted changes to the Main West intersection configurations to maintain a degree of neighbourhood access; and
- Consideration of alternative layouts for the Longwood intersection – with or without left turn at Paradise Road. A majority of respondents preferred the option of a left-turn at Paradise without a U-turn at Longwood. While this introduces an additional signal and LRT crossing, it also simplifies the Longwood configuration and signal phasing. On balance, the Project Team opted to recommend the public's preferred options.

Other questions related to features to be considered for the corridor, including:

- Bike lanes on Main Street West. This question elicited the highest response of any question, and most favoured the bike lane option. However, operational requirements for Main Street West, with the LRT, and the availability of alternative parallel routes, led the Project Team to recommend maintaining three eastbound traffic lanes with two westbound traffic lanes, precluding the option for a bike lane in this corridor; and
- Preference and priorities for streetscape elements. Respondents rated various streetscape elements in a very narrow range, indicating a general preference for as many amenities and as much streetscaping as possible. These comments will be reflected in the design of the broader streetscape plan.

Respondents were also given the opportunity for open-ended responses (including opposition to the project). Each comment was reviewed to assess the general nature of the comment, to identify specific questions and concerns, and to formulate a response. These comments were used to inform the refinement of the project prior to PIC #2 in January 2017, and responses to questions were addressed in the specific sections of this Hamilton LRT 2017 EPR Addendum and its appendices. A detailed log of all PIC #1 input, including the written comments and questions, is included in the Public Consultation Report (Appendix D).

Table 5-1: Breakdown of PIC #1 Comments Received

PIC # 1 Venue / Location	PIC Date	Attendance	Written Comments Received
West: McMaster Innovation Park	September 12	140	41
Downtown: City Hall	September 13	172	44
North: LIUNA Station	September 14	116	22
East: Dr. John Perkins Centre	September 15	83	10
Stoney Creek: Battlefield House Museum	September 20	94	7
Mountain: Sackville Hill Seniors Recreation Centre	September 21	115	27
Dundas: Dundas Town Hall	September 22	141	26
Returned by mail			19
	Total	**861**	**196**
Online		153	153
	Total	**1014**	**349**

Note: Since there is no random selection among participants or online respondents, no response values can be considered statistically representative of the community.

PIC #2 Responses

In total, 250 completed PIC # 2 comment sheets have been received during or following PIC #2. Of these, about 65 were from written comment forms submitted through the Public Information Centres (PICs), and about 185 were received through the online forms. A small number of additional written forms were also submitted; in some cases the comments and response are duplicated, while in others, the responses included additional comments. Similarly, some individuals responded to both the written and online forms. All these comments were reviewed and duplications eliminated. The breakdown of written comment forms received from each PIC venue is shown in Table 5-2.

PIC #2 Response Summaries

The online and hand-written comments were logged, reviewed and responses provided for inclusion in this Hamilton LRT 2017 EPR Addendum (see Appendix D). Generally, these fall into the following categories:

- General support for the project, without relevant EA-related comments (18 responses)
- General opposition to the project, without relevant EA-related comments (22 responses)
- Cycling and active transportation concerns (126 responses)
    - Removal of cycle lanes
    - Need for more lanes
    - See notes below
- Traffic and circulation concerns (21 responses)
    - Disruption to traffic
    - impact on adjacent streets
- Need for improved bus service (19 responses)
    - Replace LRT with buses
    - Improve mountain service
    - Concern for continuity of service in corridor
- Need for two-way Main Street (13 responses)
- A-Line (12 responses)
    - Most supporting conversion to BRT
    - Few opposed to BRT
- Parking and loading (11 responses)
- Commuter Parking (10 responses)
    - Need for terminal parking
    - Suggestions for specific properties to use
- Construction (8 responses)
    - Disruption
    - Economic impact on business
- Stop spacing (7 responses)
    - Principally in west end from Longwood to McMaster
    - Support for Gage Park addition

- Eastgate (7 responses)
    - Short-term extension to Eastgate
- Bay Street Stop (5 responses)
    - Support for additional stop
- Property impacts (4 responses)
    - Impact on heritage properties
    - Impact on affordable housing
- Other (41 responses)
    - Alternative route or technology suggestions
    - Lack of attention to 403 ramps
    - Covered high-order pedestrian connection
    - Lane geometry

Cycling and Active Transportation Concerns

The online survey was targeted by the cycling community to demonstrate concern over the potential loss of and changes to elements of the bike network. Approximately 60 percent of 186 online responses included comments about the cycling lanes – and most of these dealing exclusively with cycling and a perceived shift away from active transportation options in the corridor. About one-quarter of these responses were more or less identical – providing comment on the removal of the proposed Main West cycle lanes since PIC #1 (which are not included in the City's Cycling Master plan), the lack of improvements to the Highway 403 crossing, the potential removal of bike lanes on Dundurn Street and York Boulevard, the absence of north-south connecting routes in the LRT plan and the implications of all of these changes on the wider cycling network.

A further one-quarter of the responses expressed concern over some of the same specific elements or more general concern, indicating that the proposed changes to the network could affect their support for the LRT plan.

A further one-quarter of the responses indicated their continued support for the plan, but expressed concern for some or all of the same elements. The responses in both of these groups followed a very similar model, indicating that these too were part of a coordinated campaign from within the cycling community.

The remaining one-quarter of the cycling responses were more general and did not reflect being part of a coordinated campaign. Many of these responses were also part of a set of broader concerns.

Table 5-2: Breakdown of PIC #2 Comments Received

PIC # 2 Venue / Location	PIC Date	Attendance	Written Comments Received
East: Dr. John Perkins Centre	January 16	120	17
Downtown: David Braley HSC	January 17	106	15
West: McMaster Innovation Park	January 18	193	28
Returned by mail			6
	Total	**419**	**66**
Online			184
	Total	**419**	**250**

Note: Since there is no random selection among participants or online respondents, no response values can be considered statistically representative of the community.

5.3. Supplemental Public Meetings

The first round of PICs included extensive coverage with a total of seven across the City.

PIC #2 comprised three meetings (downtown, east and west), to ensure broad geographical coverage across the route. To extend this coverage throughout the community, a series of three additional community meetings were held in other areas outside of the corridor:

- Wednesday, January 11, 2017, from 7:00pm to 9:00pm, at Sackville Seniors Recreation Centre, 780 Upper Wentworth Street, Hamilton;
- Tuesday, January 24, 2017, from 7:00pm to 9:00pm, at Dundas Town Hall, 2nd Floor Auditorium, 60 Main Street, Dundas; and
- Thursday, January 26, 2017, from 7:00pm to 9:00pm, at Cardinal Newman Catholic Secondary School, Lecture Hall, 127 Grays Road, Stoney Creek.

The Mountain Community Update, held January 11, was the first of three informal community meetings that supplemented formal public consultation. Approximately 40 people attended this meeting, which followed a presentation-style format with Q&A session. Paul Johnson, City of Hamilton led the presentation, supported by Andrew Hope, Metrolinx. Questions and concerns at this meeting centered mainly around timing of the Operations and Maintenance (O&M) Agreement and potential impact to Hamilton taxpayers, decision to terminate line at Queenston, fare integration, community benefits, mistrust of Provincial government, alignment and LRT being an antiquated technology.

The second informal community meeting was held in Dundas on January 24. Approximately 90 people were in attendance. General discussion centered around cost overruns, O&M Agreement, future decisions regarding the A-line LRT Spur, project budget, local bus connections, preferred alignment and Tim Hortons Field stadium delays.

The third and final community update was held in Stoney Creek on January 26. Approximately 75 people were in attendance. As anticipated, major concerns from this community centered around the decision to terminate the B-line LRT at Queenston, moving the Eastgate Square extension to Phase II of the project. Other questions and comments included LRT as a technology choice, cost overruns and project budget, O&M Agreement, fare revenue and local bus connections.

5.3.1. Additional Consultation Re: High-Order Pedestrian Connection and Streetscaping

In addition to information presented at the Public Information Centers, separate sessions were held with stakeholders to specifically address input for the High-Order Pedestrian Connection as well as the broader considerations for streetscaping in the corridor.

Internal workshops with City of Hamilton staff and external workshops with stakeholders were held:

- Monday, June 27, 2016, from 9:00am to 4:00pm, at Tim Hortons Field, 64 Melrose Avenue North; and
- Monday, December 12, 2016, from 1:00pm to 8:00pm, at Hamilton City Hall, 71 Main Street West.

A meeting with the Downtown BIA Board of Directors was held on June 16, 2017 to specifically address issues related to the High-Order Pedestrian Connection.

Additional meetings with respect to the streetscaping elements were held with the:

- Chair of the International Village BIA: Thursday, July 14, 2016, at 12:00pm, at 12 Ferguson Ave, BIA Board Room;
- Kirkendall Neighbourhood Association: Tuesday, July 26, 2016, at 7:00pm, at Aberdeen Tavern; and
- Board of Directors - International Village BIA: Wednesday, August 10, 2016, at 9:15am, at 12 Ferguson Ave, BIA Board Room.

5.3.2. Summary of Comments Received on the High-Order Pedestrian Connection

Based on an initial assessment of options, the Project Team presented a summary of the alternatives and a preference for a James Street alignment to the Downtown BIA Board members. From that discussion, and further assessment of potential benefits and costs, a decision was made to select Hughson Street as the preferred route for the pedestrian connection, and further work proceeded on that basis.

The workshops developed and strengthened concepts and priorities related to:

- Supporting a safe, comfortable, and convenient experience through place-making and design;
- Specify design materials that are simple and clean but in keeping with the design language of the LRT corridor and Gore Park and high quality to ensure durability;
- Develop the alignment as “one civic space” with reduced curb profiles and a series of enhanced places along the alignment that create visual interest and respond to existing assets;
- Support intuitive wayfinding to and from the GO Centre and LRT platforms;
- Weather protection was generally not regarded to benefit the pedestrian experience, however the introduction of canopy trees as an unstructured method of weather protection was desired;
- Prioritize pedestrians;
- Introduce raised intersections as both a place-making and traffic calming initiative;
- Limit vehicles on Hughson to local access only;
- Consider the reduction and include cycle lanes of lane widths for the full length of street;
- Promote walking and cycling for first-mile and last-mile trips;
- Implement one-way traffic at southern portion of the street, maintain two-way traffic for courthouse block;
- Understanding pedestrian and cycling movements on parallel and connecting streets;
- Improve the quality of space at the underpass stairway connection on James; and
- Find opportunities for streetscaping improvements along James.

5.3.3. Other Activities

A LRT advocacy group – Hamilton LRT, dedicated to bringing Light Rail Transit to Hamilton, collected over 4,000 LRT support statements since they began a project campaign, which proceeded the Ontario Government Funding commitment. Their website is located at www.hamiltonlightrail.ca.

Staff have responded to over 250 project inquiries and received over 60 community feedback comments since May 2016.

5.3.4. Additional Consultation Re: Operations, Maintenance and Storage Facility, and McMaster Bus Terminal Facility

The Operations Maintenance and Storage Facility (OMSF), as well as the proposed bus facility at the McMaster stop, are proposed for lands owned in whole or in part by McMaster University, in the case of the terminal facility on the main campus and in the case of the OMSF, as part of lands slated for development as part of the McMaster Innovation Park. As such, a series of meetings were held with various representatives of McMaster University and McMaster Innovation Park; the Project Team also regularly engaged with the Kirkendall Neighbourhood Association.

5.3.5. Summary of Comments and Actions for the OMSF and McMaster University

A series of focussed stakeholder meetings were held to discuss:

- Alternative configurations for the McMaster Bus terminal facility, with specific consideration for the current and future use of McMaster lands in the northeast quadrant of Main Street West and Cootes Drive. To address concerns raised by McMaster representatives, and considering technical input from traffic department staff, the Project Team recommended as part of the preferred concept:
    - A traffic circulation plan that limits bus access and egress to a single road intersection with Cootes Drive via College Circle;
    - An LRT platform configuration that is integrated into the north side of Main Street West, allowing more direct access for between the platform and campus; and
    - A bus platform configuration that can accommodate future building development anticipated by McMaster.
- Alternative properties for the OMSF that:
    - Meet the functional requirements of the OMSF;
    - Better maintain specific parcels for preferred future development in the McMaster Innovation Park; and
    - Allow integration of parking for both facilities.

5.4. Property Impacts

Where a high likelihood of property impacts had been confirmed prior to the PIC meetings, Metrolinx sent notification directly to the corresponding property owners. Some affected property owners attended public open houses. Additional meetings were arranged with affected property owners upon request. A complete list is included in Appendix D.

5.5. Other Stakeholders

As part of the consultation process, the Project Team also contacted Aboriginal and Technical stakeholders.

5.5.1. Aboriginal Communities

Aboriginal Communities identified within the project mailing list were contacted by phone or email between July 29 and August 2, 2016. This contact was to advise of the Hamilton LRT 2017 EPR Addendum, and request up to date mailing information for the PIC #1 to be held in September, 2016, and the PIC #1 to be held in January, 2017.

The list of the Aboriginal Communities identified and contacted includes:

- Assembly of First Nations
- Association of Iroquois and Allied Indians
- Hamilton Executive Directors’ Aboriginal Coalition
- Hamilton Regional Indian Centre
- Haudenosaunee Confederacy Chiefs Council
- Haudenosaunee Resource Centre
- Huron Wendat First Nation
- Kawartha Nishnawabe First Nation
- Metis Women’s Circle
- Mississaugas of the New Credit First Nation
- Nipissing First Nation

- Ontario Federation of Indian Friendship
- Six Nations of the Grand River Territory
- The Metis Nation of Ontario

Aboriginal stakeholders were contacted again between October 13 and 14, 2016. This contact was made subsequent to PIC #1, in order to discuss any questions regarding the project and its corresponding timeline, including providing advanced notice that PIC #2 would be held in January, 2017.

Metrolinx held meetings with First Nations groups to brief them on all on-going Environmental Assessment projects, including the Hamilton LRT project. These meeting dates are listed below and meeting minutes included within the Public Consultation Report.

- Six Nations of the Grand River: September 12, 2016;
- Mississaugas of the New Credit First Nation: September 19, 2016; and
- Huron-Wendat Nation: September 27, 2016.

All notices for public consultation events were circulated to Aboriginal Communities through technical agencies mail outs. No comments were received from First Nations Communities during PIC #1.

5.5.2. Technical Stakeholders

A variety of technical stakeholders were contacted in advance of both PICs (see Appendix D), including:

- Provincial and federal government ministries, departments, and agencies;
- Area municipalities;
- Educational institutions and school boards;
- Healthcare institutions;
- Conservations authorities;
- Energy, utility and transportation companies;
- Emergency services; and
- Other local services.

5.6. Circulation of Draft Environmental Project Report Addendum

In January 2017, the draft Environmental Project Report (EPR) Addendum was provided to representatives from provincial government agencies, and municipal government agencies.

Appendix D provides comment-response tables documenting the list of agencies circulated and comments received during the review of the draft Hamilton LRT 2017 EPR Addendum and how those comments have been addressed.

5.7. Review of Environmental Project Report (EPR) Addendum

In accordance with the Transit Project Assessment Process (TPAP) (*Regulation 231/08* under *Ontario's Environmental Assessment Act*) a Notice of Environmental Project Report (EPR) Addendum was issued alongside the public release of this Hamilton LRT 2017 EPR Addendum. The notice was distributed in accordance with the TPAP following City of Hamilton Council approval.

5.8. Commitment to Future Consultation

The City of Hamilton and Metrolinx will continue to consult with the community regarding future development opportunities throughout the design and construction phases of the project.

In advancing the project, the City of Hamilton and Metrolinx are committed to continuing to take a proactive and measured approach to consultation, taking into account the current views and wishes of Council.

Accordingly, the following activities should be embodied in an ongoing communication strategy:

- Expansion and regular updates of the project websites;
- Maintenance of a stakeholder and interested parties/persons mailing list, to ensure those interested are kept up to date on project developments;
- An open offer, and inclusive approach, to engage with businesses, stakeholders and interested parties as development work on the project progresses. This could include attendance at stakeholder meetings, and participation in forums and events;
- Continuation of outreach to understand Aboriginal Communities' interests, and receive their feedback; and
- Inform Aboriginal Communities of any future relevant Stage 1 and Stage 2 Archaeological Assessment findings.

COMMITMENTS TO FUTURE WORK

Table of Contents

6. COMMITMENTS TO FUTURE WORK

During the 2011 Transit Project Assessment Process, the City of Hamilton worked closely with key stakeholders to address and resolve all issues or concerns identified in the Hamilton LRT 2011 EPR. Additional consultation with key stakeholders was undertaken by the City and Metrolinx as co-proponents, undertaken to review the design changes descried in this Hamilton LRT 2017 EPR Addendum.

Not all concerns were addressed within the context of the Transit Project Assessment process considering the design of the Hamilton LRT, within the parameters covered by the Addendum are prepared at a conceptual level and further details are required to finalize property requirements, planning and initiatives, construction issues and permits/approvals. The commitments recorded within this section of the Hamilton LRT 2017 EPR Addendum are intended to address issues during the design and construction phases of project implementation.

Metrolinx is the sole proponent of the Project following the transfer of implementation responsibility and assumes the commitments contained in this chapter. Metrolinx commitments to future action extend to preliminary and detailed design of the project in the areas affected by this Addendum. Details related to commitments and future work requirements related to mitigation of impacts are discussed in further detail in Section 4 of this report. All mitigation/compensation measures and monitoring requirements described in Section 4 will be transferred as future project commitments.

Commitments identified in the Hamilton LRT 2011 EPR that pertain to sections of the Project not covered by the Addendum remain in effect.

6.1. Permits and Approvals Required for Project Implementation

The Hamilton LRT 2011 EPR outlined a variety of Municipal, Provincial and Federal permits and approvals that may or will need to be secured as part of the detail design process. Those requirements remain in place for this Addendum (see Appendix A).

Planning approvals for the OMSF, which include site plan approval, will be required for building structures and facilities.

6.2. Mechanism for Change to the Approved Plan

The Project presented in this Hamilton LRT 2017 EPR Addendum document is not a static plan, nor is the context in which it is being assessed, reviewed, approved, constructed, and used. Given the potential for changes to the Project resulting from the approvals, detailed-design, and construction processes, it is the responsibilities of the proponent, should changes be required in the Project.

The 2011 TPAP EPR detailed the EPR Addendum process that may need to be followed as elements of the plan change through the detailed design-process. Those requirements remain in place for this Addendum.

6.3. Property Acquisition

The City of Hamilton and Metrolinx will continue to consult with potentially affected property owners to obtain rights to construct the transit project within their lands. The preliminary property requirements will also be confirmed during the detailed-design phase of the study.

6.4. Addendum Process

This Hamilton LRT 2017 EPR Addendum identified the impacts associated with the Project presented in this document, and the property boundaries within which the Project can feasibly be constructed. The layout of project components (i.e. OMSF, stations and stops) are subject to detailed-design and any variations from that shown in this Hamilton LRT 2017 EPR Addendum, unless it results in an environmental impact which cannot be accommodated within the committed mitigation measures, do not require additional approval under *Ontario Regulation 231/08*.

The City of Hamilton and Metrolinx are committed to continuous consultation with the residents of the City of Hamilton, public, property owners and agencies, during the design of the Hamilton LRT alignment, stops, bus terminal, OMSF, and ancillary works. The City of Hamilton and Metrolinx will develop a detailed communication and consultation plan and program designed to mitigate disruption to affected local communities and maximize public support for the Project.

6.5. Environmental and Technical Disciplines

Commitments to future work are documented for the following disciplines below,

- Hydrogeology;
- Contamination;
- Vegetation and Vegetation Communities;
- Wildlife and Wildlife Habitat;
- Fish and Fish Habitat;
- Air Quality;
- Stormwater Management;
- Geotechnical;
- Noise and Vibration;
- Land Use;
- Archaeology;
- Built Heritage Resources and Cultural Heritage Landscapes; and
- Transit and Traffic Management.

6.5.1. Hydrogeology

An overall monitoring plan is required to be developed during detailed design. Temporary or localized plans can be prepared on an as needed basis.

Construction dewatering discharges require an agreement with the Hamilton Environmental Monitoring and Enforcement Group before dewatering discharge is conveyed to the sewer system.

Contingency plans should be developed to handle contaminated soil and/or groundwater (in case encountered) and accidental spills during the construction period to prevent or minimize potential groundwater contamination.

6.5.2. Contamination

Regular and frequent monitoring will be performed in areas where contamination has been identified. The City's contaminated Sites Management Program manual includes procedures for standard general on-site and perimeter monitoring, as well as non-routine monitoring, which will be applied to this project. Phase 1 Environmental Site Assessment and potentially Phase 2 Environmental Assessments will be undertaken during detailed-design, if required.

6.5.3. Vegetation and Vegetation Communities

Environmental site inspections will be required during key construction periods and at key locations to ensure environmental protection/re-vegetation measures are implemented and working and any required remedial action is undertaken. A focused butternut/health assessment survey should be conducted as part of the tree inventory during detailed-design. If species at risk are identified within the influence zone of construction activities, MNRF will be contacted to determine how specimens of such species should be treated.

If any activities will impact ten (10) or fewer Category 2 Butternut trees (see Section 4 for details) then the activity must be registered with the MNRF by submitting a Notice of Butternut Impact Form to the MNRF Registry and completing compensation plantings and monitoring as spelled out in *Ontario Regulation 242/08 (Section 23.7)*. If more than ten (10) Category 2 Butternut trees, or any Category 3 trees will be impacted by any activity then a *17 (2)(c)* permit under the *Endangered Species Act* will be required.

6.5.4. Wildlife and Wildlife Habitat

Monitoring of the migratory bird prevention measures, if required, will occur during the critical breeding/ nesting period (April 1- July 15) to ensure that the measures are effective in restricting nesting on structures scheduled or removal or alteration; thus, eliminating the potential for incidental take. A detailed Species at Risk assessment should be undertaken during the detailed-design component of the study for Chimney Swift and Bats and Barn Swallows.

Little Brown Myotis

A management biologist at the local MNRF district office should be contacted prior to undertaking bat surveys to ensure that they align with the most recent district approved survey protocols. David Denyes is the current Management Biologist out of the Guelph District Vineland office, and can be reached by email at David.Denyes@ontario.ca.

Any forested area that is classified as FOD/FOM/FOC/SWD/SWC/SWM are all considered SAR bat habitat unless proven otherwise (through examination of presence/absence of species by bioacoustic monitoring and presence/absence of suitable cavities for roosting).

If SAR bats are determined to be present, then a *17(2)(c)* permit under the *Endangered Species Act* will be required. Extensive consultation with the MNRF will be required (avoidance alternatives, overall benefit permits). Applying for an Overall Benefits permit typically require a year or more to get approval.

Chimney Swift

Chimney Swift does not require permitting under the ESA but the project must be registered with the MNRF and there are certain steps to take which includes:

- Register the work with the MNRF (Notice of Activity);
- A Chimney Swift Mitigation and Monitoring Plan must be prepared;
- Describe the chimney and your activity (before you begin);
- Estimate the number of chimney swift using the chimney (before you begin);
- List the steps you took to minimize effects on chimney swift;
- Describe what you did to create habitat; and
- The habitat must be monitored for 3 years including information collected during monitoring.

The mitigation and monitoring plan must be prepared before any work begins and this record must be kept for five years after the work has been completed.

Barn Swallows

To minimize disturbance to barn swallows, it is recommended that site alterations within the suitable foraging areas of the OMSF lands be scheduled to avoid critical times when the barn swallow are carrying out key life processes relating to breeding, nesting and rearing. This barn swallow active season usually starts around the beginning of May and ends around the end of August.

6.5.5. Fish and Fish Habitat

To address threats to fish from habitat loss/ degradation and changes to natural flow regimes habitat protection provisions will be implemented per the *Fisheries Act*.

- Design and implement erosion and sediment controls to prevent or reduce sediment discharges to the existing sewer system and natural watercourses, including application of best management practices (i.e. Erosion & Sediment Control Guideline for Urban Construction (2006)); and
- Development and implementation of a spill management plan.

6.5.6. Air Quality

Ontario Regulation 419/05 under the *Environmental Protection Act* requires that every measure be taken to minimize emissions and prohibit visible emissions from escaping beyond the project limits of a construction site. A dust management plan will be developed during detailed design.

A project specific monitoring program during the operations phase is not proposed. The City of Hamilton will continue to assess area wide air quality under its current monitoring program (through Clean Air Hamilton), and it is expected that the Hamilton LRT operations will be captured by this initiative.

Continuous monitoring for particulate matter (PM10 and PM2.5) and NOx is recommended at two locations (downtown and at the MSF), including three months of pre-construction monitoring and up to a year of monitoring during construction.

6.5.7. Stormwater Management

A detailed surface water management plan is required for the Hamilton LRT Project, to be used for monitoring throughout construction. A separate Storm Water Management (SWM) study will need to be undertaken to prepare the detailed stormwater management required for the OMSF site. Inspections should be completed weekly and after an event greater than 13mm of precipitation, and submitted regularly to the City and the Hamilton Conservation Authority (HCA).

During the development of the stormwater management plan and detailed-design, the Hamilton Conservation Authority (HCA) should be consulted; in order to review proximity and potential impacts to buried watercourse at the OMSF location.

6.5.8. Geotechnical

Hydrogeology investigation require further testing of geotechnical boreholes during detailed-design.

Adherence to Infrastructure Ontario (IO) AFP-Geotechnical, Hydrogeology, Environmental Due Diligence Technical Requirements (2016) is further recommended.

6.5.9. Noise and Vibration

A more detailed Noise and Vibration Impact Assessment will be completed during detailed design. Aside from the normal scope of such reviews, the following should be addressed as part of the detailed assessment to confirm and design the vibration mitigation measures.

- Conduct vibration propagation testing of the OMSF site and surroundings to confirm the reduction in vibration with distance;
- Verify the performance of the existing vibration isolation systems provided for the sensitive equipment at CanMET and the McMaster Innovation Park;
- Confirm the vibration design criteria and acceptable levels at the sensitive equipment within CanMET and the McMaster Innovation Park;
- Review the contribution to the air-borne sound levels from the special trackwork;
- Update predictions on volumes, types of buses and sound levels, and finalized layouts to determine the details of the noise control measures. The typical bus and sound level should also be further refined during the detailed design phase;
- Review the exact location of the special trackwork and determine the efficiency of vibration propagation in the soil to choose the vibration isolation measures that may be required,
- Confirm the requirement for a 7.5m high noise barrier along the southern property line of the OMSF; and
- The construction assessment should identify typical sound levels during construction and recommend mitigation measures to help control the noise and vibration impacts during construction.

By-Law No. 03-020 places restrictions on the hours of operation for all construction activity. Special exemptions are required where night construction is to occur. Because of the potential impact on receptors during the nighttime periods, it is recommended that the residents in the area be notified several weeks in advance of pending nighttime construction activities.

6.5.10. Land Use

In addition to monitoring that will occur through the construction liaison committee forum during construction, the City of Hamilton and Metrolinx will establish storefront locations dedicated to receiving public comments and concerns about construction activities and impacts.

With respect to long-term monitoring, planning within the Places to Grow policy environment requires comprehensive programs to monitor the various targets contained within the Growth Plan. Beyond monitoring for Growth Plan purposes, the Urban Hamilton Official Plan identifies monitoring and measuring performance of the Official Plan as critical to determine if:

- The assumptions of this Plan remain valid;
- The implementation of the policies fulfills the overall goals and objectives of this Plan;
- Growth targets listed in *Sections A.2.3 - Growth Management – Provincial and B.2.4.1 - General Residential Intensification Policies*, are being met; and
- The priorities identified in this Plan remain constant or require change.

Official Plan monitoring is carried out through statutory 5-year official plan reviews to evaluate whether the goals and objectives of the plan are being met and remain relevant. The more detailed policy direction is also monitored through secondary plan reviews. The City also actively monitors housing starts to track new development, and monitors intensification to track whether City objectives and Provincial targets are being met. Monitoring of economic activity and investment is done where city programs are in effect. Such monitoring can be established to track economic impacts in the LRT corridor over time.

6.5.11. Archaeology

During detailed design complete all required AA (Stage 2 and Stage 3 if recommended by the Stage 2AA) as early as possible in the planning stages of the project.

Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, the proponent must cease alteration of the site immediately and engage a licensed archaeologist to carry out archaeological fieldwork in compliance with *Section 48 (1)* of the *Ontario Heritage Act*.

The project may affect areas with archaeological potential outside the existing right-of-way (for example “vacant lots”; and should the pipeline at the intersection of main Street and Ottawa Street require deep trenching). During construction, a licensed archaeologist should be on site to monitor earthworks in areas exhibiting archaeological potential.

6.5.12. Built Heritage Resources and Cultural Heritage Landscapes

During detailed design commitments exist to complete further heritage assessment work for any additional properties of 40 years of age and older where direct or indirect impacts are identified. Additional CHERs may be completed to review and confirm the cultural heritage value or interest of the properties.

The Queenston Traffic Circle cultural heritage resource will be further documented during detailed design (per the Hamilton LRT 2011 EPR commitments).

Where required, Heritage Impact Assessments (HIA) will also be completed during detailed design to protect heritage properties where possible and to identify ways in which impacts to any of these attributes can be mitigated (based on MOECC feedback). Based on the results of vibration studies, appropriate conservation plans should be developed, including but not limited to building and/or façade stabilization measures or development of appropriate setbacks.

6.5.13. Transit and Traffic Management

During the detailed-design phases, continued assessment of intersections and traffic conditions will continue to optimize intersection levels of service in accordance with the emerging design.

Approximately 12 to 24 months prior to the start of service, a detailed bus route modification plan will be developed that takes into account current travel patterns and ridership levels, with appropriate modifications to the preliminary recommendations, suited to current needs. Detailed routing, route names and route numbers may be modified at that time.

A comprehensive parking management plan will be developed to minimize or replace any short-term parking loss for individual homes and businesses both in the short-term during the construction stages and in the longer-term, once the project is constructed and operational. As part of the detail-design of the project, delivery and loading arrangements and potential parking replacement solutions will be formulated and discussed with the affected property owners.