# Lakeshore Transportation Studies

## Schedule B Municipal Class Environmental Assessment Study

Credit River Active Transportation Bridge Study

Project File Report

*City of Mississauga*

Version Control:
*Rev00: August 2022*
*Rev01: January 2023*
*Final: February, 2023*

# Contents

# Tables



# Figures

# Appendices

**Appendix A:** Lakeshore Road Connecting Communities Transportation Master Plan (2019 TMP)

**Appendix B:** Public Consultation

- **Appendix B.1:** PIC 1 What We Heard Report
- **Appendix B.2:** PIC 2 What We Heard Report
- **Appendix B.3:** Design Workshop Public Feedback Report
- **Appendix B.4:** Agency Comments and Meeting Minutes
- **Appendix B.5:** Indigenous Consultation Record

**Appendix C:** Technical Reports

- **Appendix C.1:** Natural Environment Assessment Report
- **Appendix C.2:** Arborist Report
- **Appendix C.3:** Construction Air Quality Assessment Report
- **Appendix C.4:** Environmental Noise Assessment Report
- **Appendix C.5:** Fluvial Geomorphology Assessment Report
- **Appendix C.6:** Limited Phase 1 ESA Report
- **Appendix C.7:** Stage 1 Archaeological Assessment Report
- **Appendix C.8:** Cultural Heritage Report
- **Appendix C.9:** Criteria for Evaluating Marine Archaeological Potential (A Checklist for Non-marine Archaeologists)
- **Appendix C.10:** Geotechnical Investigation Report

**Appendix D:** Property Impacts

*This page is intentionally left blank.*

# List of Acronyms

| | |
|---|---|
| AA | Archaeological Assessment |
| AADT | Average Annual Daily Traffic |
| AAF | Avoidance Alternatives Form |
| ANSI | Areas of Natural and Scientific Interest |
| APC | Automatic Passenger Count |
| APECs | Areas of Potential Environmental Concern |
| AT | Active Transportation |
| AVL | Automatic Vehicle Location |
| BHR | Built Heritage Resource |
| BLOS | Bicycle Level of Service |
| BMP | Best Management Practices |
| CAAQS | Canadian Ambient Air Quality Standards |
| CCCEAP | Considering Climate Change in the Environmental Assessment Process |
| CHL | Cultural Heritage Landscape |
| CI/ASCE | Construction Institute/American Society of Civil Engineers |
| CTC | Credit Valley-Toronto and Region-Central Lake Ontario |
| CVC | Credit Valley Conservation |
| DBH | Diameter at Breast Height |
| DFO | Department of Fisheries and Ocean |
| EAA | Environmental Assessment Act |
| EBA | Event-Based Area |
| EPR | Environmental Project Report |
| ESA | Environmental Site Assessment |
| ESC | Erosion and Sediment Control |
| FOC | Fiber Optic Cable |
| GGH | Greater Golder Horseshoe |
| GHG | Greenhouse Gas |
| GIS | Geographic Information System |
| GPL | General Purpose Lane |
| HDI | Haudenosaunee Confederacy |
| HIA | Heritage Impact Assessment |
| HVA | Highly Vulnerable Aquifer |
| IAA | Impact Assessment Act |
| ICIP | Investing in Canada Infrastructure Program |
| ICLR | Institute for Catastrophic Loss Reduction |
| IDF | Intensity Duration Frequency |
| IGF | Information Gathering Form |
| IPZ | Intake Protection Zone |
| ISA | International Society of Arboriculture |
| ISO | International Organization for Standardization |
| LCV | Long Combination Vehicles |
| LID | Low Impact Development |
| LIO | Lands Information Ontario |
| LOS | Level of Service |
| LRTP | Long Range Transportation Plan |
| MCM | Ministry of Citizenship and Multiculturalism |
| MCFN | Mississaugas of the Credit First Nation |
| MTCS | Ministry of Tourism, Culture and Sport |
| MNRF | Ministry of Natural Resources and Forestry |
| MTO | Ontario Ministry of Transportation |
| NHIC | Natural Heritage Information Centre |
| NSA | Noise Sensitive Area |
| OBA | Ontario Butterfly Atlas |
| OGS | Oil/grit Separator |
| OLA | Outdoor Living Area |

| | |
|---|---|
| **OP** | **Official Plan** |
| OPSS | Ontario Provincial Standard Specification |
| ORAA | Ontario Reptile and Amphibian Atlas |
| OSAP | Ontario Stream Assessment Protocol |
| OTM | Ontario Traffic Manual |
| PCAs | Potentially Contaminating Activities |
| PIC | Public Information Centre |
| PIEVC | Public Infrastructure Engineering Vulnerability Committee |
| PLOS | Pedestrian Level of Service |
| PPS | Provincial Policy Statement |
| PSN | Public Section Network |
| PSW | Provincially Significant Wetlands |
| PTTW | Permits to Take Water |
| QEW | Queen Elizabeth Way |
| RCP | representative concentration pathways |
| RGA | Rapid Geomorphic Assessment |
| ROP | Regional Official Plan |
| ROW | Right of Way |
| RSAT | Rapid Stream Assessment Technique |
| RSSP | Road Safety Strategic Plan |
| SAA | Strategic Analysis Area |
| SAR | Species At Risk |
| SCC | Species of Conservation Concern |
| SGRA | Significant Groundwater Recharge Area |
| STS | Sustainable Transportation Strategy |
| SUE | Subsurface Utility Engineering |
| SWH | Significant Wildlife Habitat |
| SWHTG | Significant Wildlife Habitat Technical Guide |
| TAC | Technical Advisory Committee |
| TIS | Traffic Impact Study |
| TMC | Turning Movement Count |
| TMP | Transportation Master Plan |
| TRCA | Toronto and Region Conservation Authority |
| TSP | Transit Signal Priority |
| TSS | Total Suspended Solids |

# Executive Summary

## ES.1 Introduction

### Study Purpose

The City of Mississauga completed the Lakeshore Connecting Communities Transportation Master Plan (TMP) and Implementation Study in 2019 ('2019 TMP'), which followed the master planning process and satisfied Phase 1 (Identify Problem and Opportunity) and Phase 2 (Identify and Evaluate Alternative Solutions to the Problem and Opportunity) of the Municipal Class Environmental Assessment (EA) process. The 2019 TMP recommended a non-vehicular crossing connecting Front Street and Queen Street East. In response, the City of Mississauga has initiated a Schedule B Municipal Class EA (herein referred to as the 'Study'), with the following key objectives:

- Complete all background technical studies required to implement the Active Transportation bridge crossing of the Credit River north of Lakeshore Road
- Develop a range of bridge alternatives for evaluation, with considerations to all aspects of the environment
- Select a preferred solution through a transparent decision-making process
- Engage stakeholders and members of the public throughout the process

**Problem/Opportunity Statement**

The Problem and/or Opportunity Statement has been carried forward from the 2019 TMP to serve as the basis for this Active Transportation (AT) Bridge Study, it is as follows:

*"Lakeshore Road intersects a mix of established and developing communities. Preserving and enhancing the community's character and sense of place is important. By 2041, the Lakeshore Communities will grow by approximately 56,000 people and 16,500 jobs. Without any improvements to the transportation network in the Lakeshore Communities congestion will worsen for all road users. The existing pedestrian and cycling network are discontinuous and can be better integrated into the overall network. The existing transit service will require additional capacity in the future and a greater degree of transit priority. With limited road capacity, greater reliance on transit, walking, and cycling is required. This requires making these methods of travelling more attractive."*

### Pre-Planning Activities

The completion of the 2019 TMP forms a large portion of the pre-planning activities undertaken for this Study. This Study will summarize and reference findings from the 2019 TMP as needed throughout the report. Additionally, this Study will be providing existing conditions documentation unique to the AT Bridge Crossing Study area, including:

- Transportation conditions for pedestrians, cyclists, transit, and motorized vehicles as it relates to the AT Bridge Crossing
- Cultural/Heritage resources as it relates to the AT Bridge Crossing
- Natural Environment resources as it relates to the AT Bridge Crossing

All documentation pertaining to pre-planning activities can be found in the *Lakeshore Road Connecting Communities Transportation Master Plan*, *Final Report (2019 TMP)* enclosed in **Appendix A.**

### Municipal Class Environmental Assessment Process

Municipal infrastructure projects are subject to the Ontario Environmental Assessment Act (EA Act). The Class Environmental Assessment is an approved self-assessment process under the EA Act for a specific group or "class" of projects. This Study is carried out in accordance with the Schedule B Municipal Class EA planning process, and includes Phases 1 and 2:

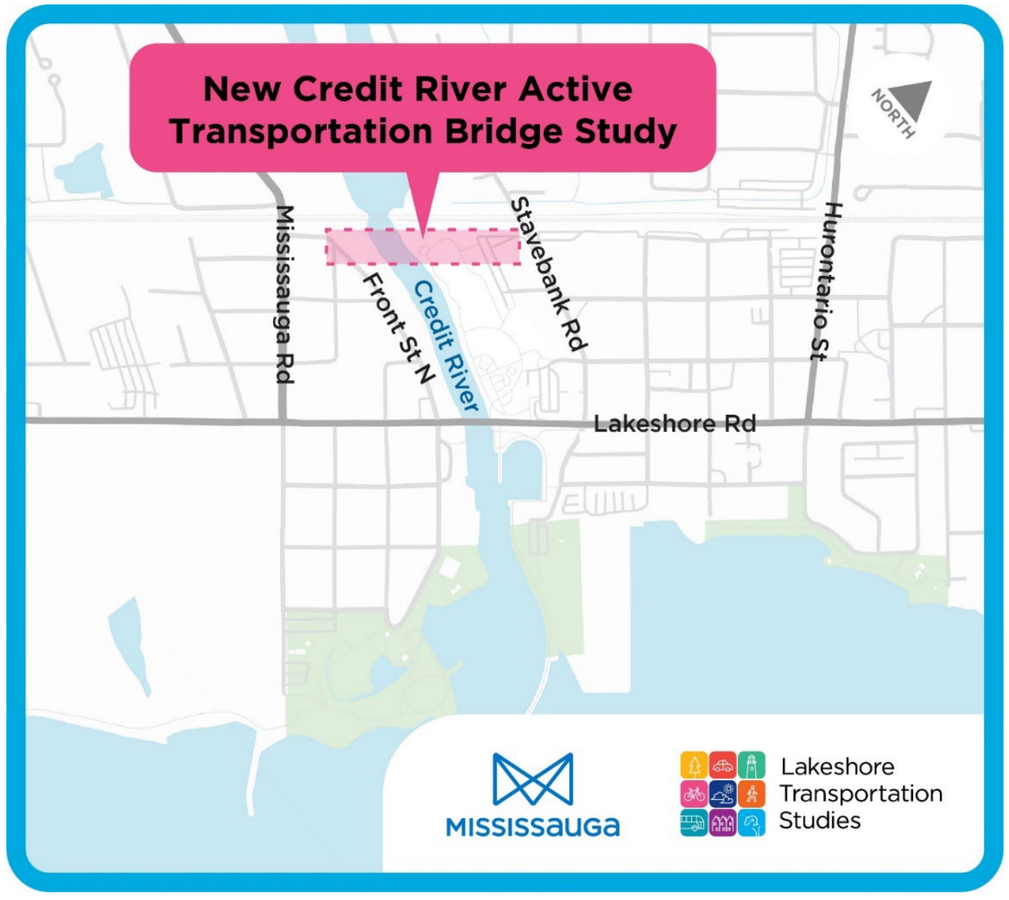
- Phase 1 consists of identifying the problem or opportunity.
- Phase 2 involves identifying reasonable alternatives to the problem or opportunity, compiling an inventory on the natural, social and economic environment, evaluating each alternative and recommending a preferred alternative that will address the problem, and provide any measures necessary to mitigate potential environmental impacts. Public and agency consultation is required at this stage before the preferred solution is selected to ensure all possible impacts are identified and assessed as part of the evaluation process.

Once the Preferred AT Bridge Solution is selected and confirmed by Council, the final Project File Report (PFR) is made available for public review during a 30-calendar day period. A Notice of Completion is submitted to review agencies and the public at this time.

### Study Area

The Study area for the proposed New Credit River AT Bridge is shown in Figure ES- 1. It is situated south of the existing GO rail bridge and spans from the intersection of Mississauga Road and Front Street N to Memorial Park, crossing the Credit River. This Study area represents the area upon which potential impacts from the project were assessed.

**Figure ES- 1 Active Transportation Bridge Study Area**




## ES.2 Consultation and Engagement

Public and stakeholder consultation on matters that may affect the environment is required for a Schedule B Class EA under the Environmental Assessment Act. Following the processes of a Schedule B Class EA, proponents must contact agencies and members of the public that may potentially be impacted by the study to give them the opportunity to raise any comments or concerns regarding the study, alternative solutions, and designs.

Key consultation activities and engagement methods used throughout the AT Bridge Study include the following, which are further explored in **Section 2** of this PFR:

- Mailing of a Notice of Study Commencement and Public Information Centre (PIC) 1 to property owners and tenants in proximity to the study area and potentially impacted Indigenous groups identified by the Ministry of Environment, Conservation and Parks (MECP).
- Mailing of a Notification for PIC 2 to property owners and tenants in proximity to the study area and potentially impacted Indigenous groups identified by the MECP.
- 2 Technical Advisory Committee (TAC) meetings were held to provide project updates and gather feedback, one prior to each PIC.
- Two rounds of virtual PICs and an additional virtual design workshop as well as an online public survey were held to inform the public of project updates and gather feedback.
- All Indigenous groups involved in the consultation process were circulated a copy of the natural environment, arborist, cultural heritage, and archaeological reports, and were invited to provide comments.
- Circulation of the draft Project File Report and its appendices to various agencies for review and commenting as identified through the *Environmental Assessment Government Review Team Master Distribution List* provided by the MECP.

See **Appendix B** for all public consultation documentation.

# ES.3 Existing Conditions

## Land Uses

The Study area is surrounded by land uses including residential, commercial, open space, and parking (Figure ES- 2).

**Figure ES- 2 Land Use Context**


Significant land use characteristics in proximity to the study area include:

- The Port Credit Community - the study area of the AT Bridge is situated within the Port Credit Community and is known regionally as a scenic waterfront destination with high residential density and mixed use.
- Port Credit GO Station Southeast Area - Comprised of 12 properties totaling approximately 5.04 acres (2.04 hectares) which are located east of Hurontario Street, south of the CN Railway and Queen Street, east of Helene Street and north of High Street.
- Port Credit Community Node (CN) - The Port Credit CN character area is generally bounded by the rail corridor to the north, Lake Ontario to the south, Mississauga Road N and Front Street S to the west, and Rosewood Road and Elmwood Avenue S. to the east.

## Official Plans and Policies

The most relevant planning, land use and transportation policies that were reviewed as part of the AT Bridge Study include:

*City of Mississauga Official Plan (OP) (2020)*

The AT bridge is located within and adjacent to several designated land uses and designations, including:

- The Port Credit GO Station Southeast Area Master Plan
- Community Node (Schedule 2 of Mississauga Official Plan, Figure 3-2)
- Major Transit Station Area (Port Credit GO Station)

Schedules 1 to 9 of the Official Plan identify Corridors, Intensification Areas, and Transit Terminals, Natural heritage Systems, Parks and Open Spaces, Utilities Areas, and Educational Facilities within the study boundaries.

*City of Mississauga Cycling Master Plan (2018)*

The Master Plan identifies several recommended updates to the existing cycling network, including upgrades to the existing cycling network as well as new proposed routes within and adjacent to the AT Study area.

## Population and Employment

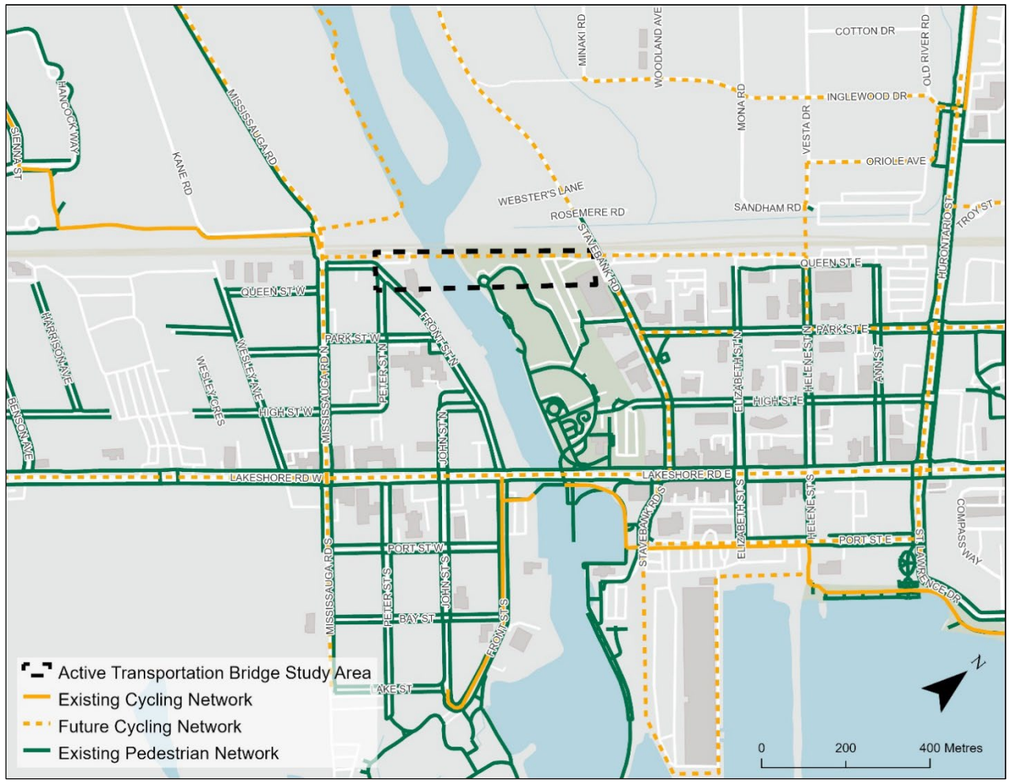
The total population within the Study area of the AT Bridge is 54 (2016) and is expected to reach 73 by 2051. Employment within the Study area is currently at 54 (2016) and is expected to reach 70 by 2051.

## Transportation

The pedestrian and cycling network within the Study area of the AT Bridge is illustrated in Figure ES- 3. On the west of the Credit River, the sidewalk network is continuous and connects to the future AT Bridge path on Front Street and Mississauga Road. On the East

side of Credit River, a multi-use path runs along the bank of the river and connects to Stavebank Road.

**Figure ES- 3 Existing Pedestrian and Cycling Network**




The road network within the Study area consists mainly of local, minor collector, major collectors, and regional major collectors (Figure ES- 4 and Table ES- 1).

**Table ES- 1 Roads in Study Area**

| Road Name | Classification |
|---|---|
| Front Street (Mississauga Road to Lakeshore Road) | Local/Minor Collector |
| Queen Street East (Stavebank Road to Hurontario Street) | Minor Collector |
| Mississauga Road (Queen Elizabeth Way to Lakeshore Road) | Major Collectors (Scenic Route) |
| Stavebank Road (Pinetree Crescent to CN Railway) | Regional Major Collectors (Scenic Route) |

**Figure ES- 4 Existing Road Network**

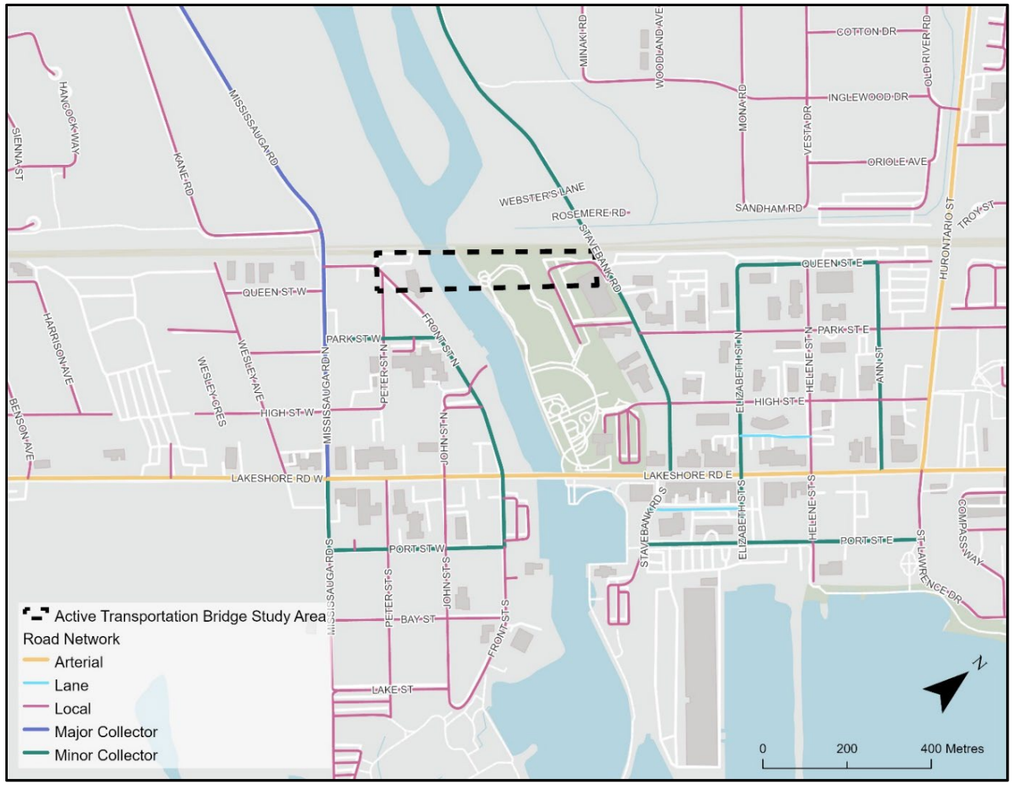
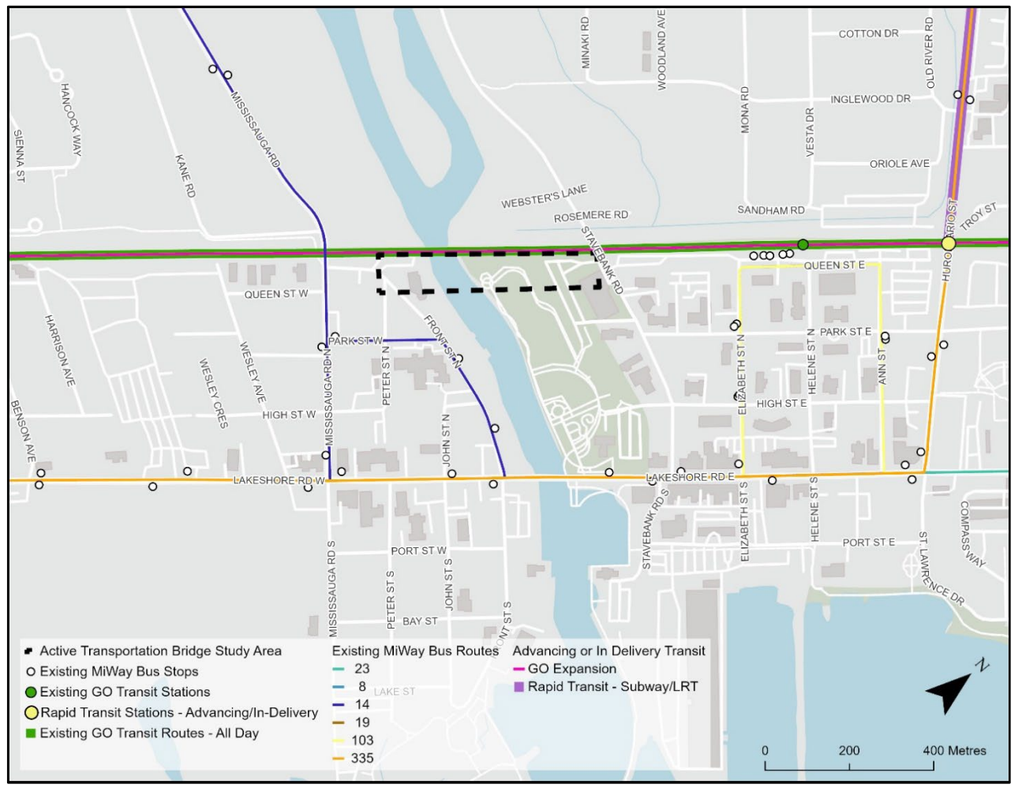



Figure ES- 5 and Table ES- 2 summarizes the existing and planned transit services within the vicinity of the Study area.

**Table ES- 2 Existing and Planned Transit Services within Study Area**

| Route / Service | Description |
|---|---|
| Route 14 - MiWay | Runs along Mississauga Road and Park Street West |
| Route 103 - Miway | Runs along Lakeshore Road East, Elizabeth Street North, Queen Street East, Ann Street |
| Lakeshore Express- MiWay | Runs along Lakeshore Road and Royal Windsor Drive between East Avenue and Winston Churchill Boulevard |
| Hurontario LRT- Metrolinx | Runs along Hurontario St, with a terminal stop at the Port Credit GO station |
| Lakeshore West (Port Credit GO Station) – GO Transit | Runs along rail corridor on north-side of Study area |
| Lakeshore West (Port Credit GO Station) – GO Transit | GO Transit anticipates an increased frequency of service along the Lakeshore West train line |

**Figure ES- 5 Study Area Transit Network**

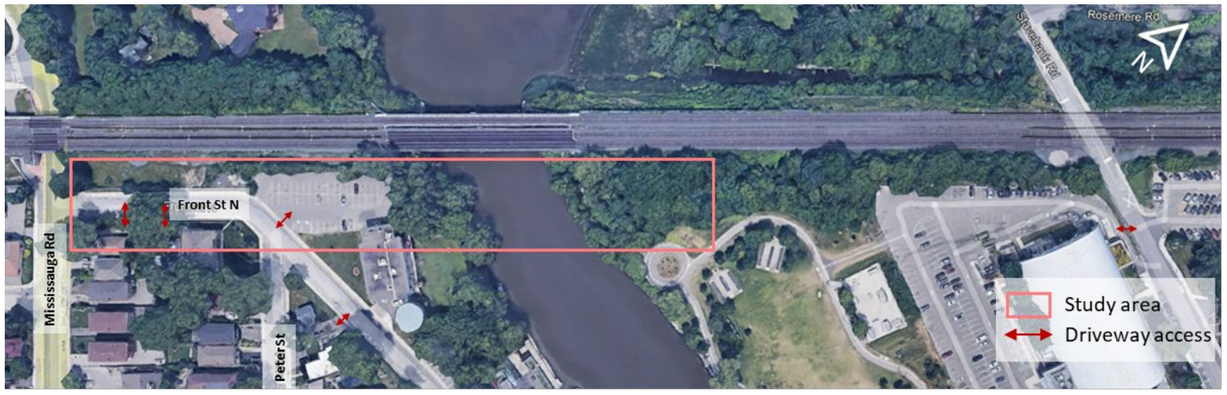



**Parking and Driveway Access**

On the west side of the Credit River, there is a private parking lot owned and used by the Royal Canadian Legion (the Legion) and a muicipal parking lot along Front Street N that is shared between the Legion and the Missisauga Canoe Club. On the east side of the Credit River, there is a public parking lot at 40 Stavebank Road that accommodates the users of the Port Credit Memorial Arena, Port Credit Figure Skating Club, Port Credit Memorial Playground, and the local skatepark.

On the east side of the Study area, there is access off Stavebank Road into the Port Credit Memorial Area parking lot. On the west side of the Study area, there is access off Front Street into the Legion's parking lot and two driveways of private residential properties (Figure ES- 6).

**Figure ES- 6 Driveway Access**



## Natural Environment

### Terrestrial Environment

Three terrestrial communities and one aquatic community were documented based on field assessments conducted in 2021 (Table ES- 3).

**Table ES- 3 Vegetation Communities**

| Ecological Land Classification Community Type | Location |
|---|---|
| CUW1: Mineral Cultural Woodland (0.14 ha) | West side of Credit River |
| FOD7: Dry- Fresh Deciduous Forest (0.61 ha) | East side of Credit River |
| CUM1-1: Mineral Cultural Meadow (0.13 ha) | Along rail bridge west of cultural woodland |
| OA: Open Aquatic | Credit River |

Of the native vegetation communities found within the Study area none are considered to be rare and are ranked as either S4 or S5. The natural environment of the Study area has been impacted by Metrolinx works since the field assessments conducted in 2021, these impacts are consequently not noted in the findings of this report. Updated impacts to be confirmed during the detailed design phase of the project.

Of the 167 vascular plant species identified within the Study area, 52% of species are considered native or naturalized within the province; 45% are considered non-native, introduced, or a cultivar; and 3% were unclassified.

Of the 105 species identified within the background review, 13 species at risk (SAR) and 3 species of conservation concern (SCC) were noted to potentially occur within the Study area. The SAR and SCC species were assessed to identify the habitat potential within the Study area. Breeding bird surveys conducted in June 2021 confirmed the presence of 21 species, which included two SAR within the Study area. No SCC were observed within the Study area.

### Aquatic Environment

Upstream of Lakeshore Road East to a railway overpass, the Credit River flows as a defined watercourse within a narrow natural corridor through a highly urbanized environment. The water flows south toward Lake Ontario. Both banks contain a very narrow band of vegetation consisting of trees and shrubs. Between the two overpasses there is a canoe club with docks in the river on the west bank. The east bank has undergone channel hardening along the length of the Port Credit Memorial Park. The channel is sparsely shaded by overhead deciduous trees and overhanging shrubs in the understory along the banks.

The Credit River is a warm water system which contains a variety of cyprinid species as well as sport fish. Fisheries data from CVC indicated 52 species in the Credit River, including the American Eel which is listed as endangered under the ESA and the Atlantic Salmon which is listed as extinct under SARA.

### Natural Heritage Features, Wildlife, and Habitat

Significant natural heritage features and functions include those listed in the Provincial Policy Statement (PPS) (MMAH 2020), the Natural Heritage Reference Manual (NHRM) (MNR 2010), the Significant Wildlife Habitat Technical Guide (SWHTG) (MNR 2000) and the SWH Ecoregion 7E Schedules (MNRF 2015). Reference was also obtained from the natural heritage system from the City's Official Plan (City of Mississauga 2021). The findings of the site investigations were cross-referenced with the criteria provided in these documents in order to identify the presence of or potential presence of significant natural heritage features.

The following significant features were present within the Study area

- Areas of Natural and Scientific Interest (ANSIs)
- Significant Valleylands and Corridors
- Provincially Significant Wetland (PSW)
- Significant Woodlands
- Linkages and Corridors

The wildlife habitat assessment was based on vegetation communities and incidental wildlife observations documented during the site investigations as well as data collected from the background review. The results of the assessment indicated the potential for candidate SWH and included the following:

- Bat Maternity Colonies
- Turtle Wintering Area
- Bald Eagle and Osprey Nesting/Foraging/Perching
- Rare Wildlife Species
- Amphibian Movement Corridors

29 SAR were identified as potentially occurring within the Study area based on background review and site investigations. The results of the assessment indicated that 24 SAR species were unlikely to inhabit the area based on the lack of appropriate habitat, three SAR species have potential to occur within the Study area, while two species were confirmed within the Study area.

See Figure ES- 8 and Figure ES- 9 for all significant natural features noted above.

More details on the terrestrial and aquatic environments and natural environmental resources in the Study area can be found in the *Natural Environment Assessment Report* in **Appendix C.1.**

## Tree Inventory

An International Society of Arboriculture (ISA)-certified arborist conducted the tree inventory and assessment on June 2, 2021. All trees 10 cm or greater in diameter at breast height (DBH) within 10 m of the proposed AT bridge alignment were included in the inventory.

126 trees were collected within 10 m of the proposed crossing alignment. This includes 17 different genus and 23 different species. Additional details on the investigations and findings associated with tree inventory are provided in the *Tree Inventory Report* in **Appendix C.2**. A number of trees in the Study area have been impacted by Metrolinx works since the tree inventory conducted in 2021, these impacts are consequently not noted in the findings of this report. Further tree inventory will be required during the detailed design phase to confirm any new impacts.

## Air Quality

Figure ES- 7 shows the identified sensitive receptor locations within 500 meters of the Study area. Within the buffer are mainly residential houses west of Port Credit Railway Bridge, with a mixture of commercial buildings and residential houses on the east side. Five churches and four education facilities also qualified as sensitive receptors.

Additional details on the air quality investigations and findings with are provided in the *Air Quality Report* in **Appendix C.3.**

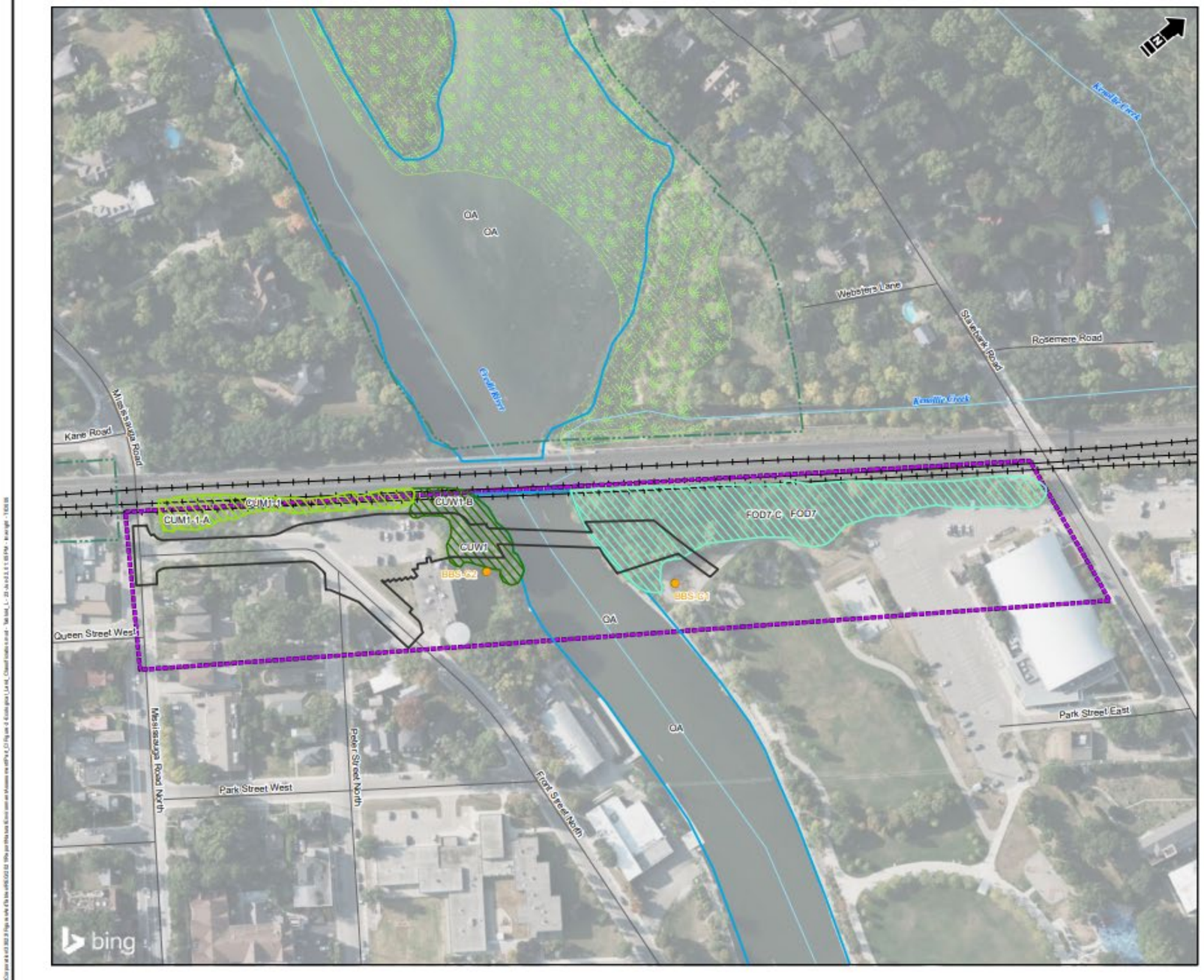
## Noise & Vibration

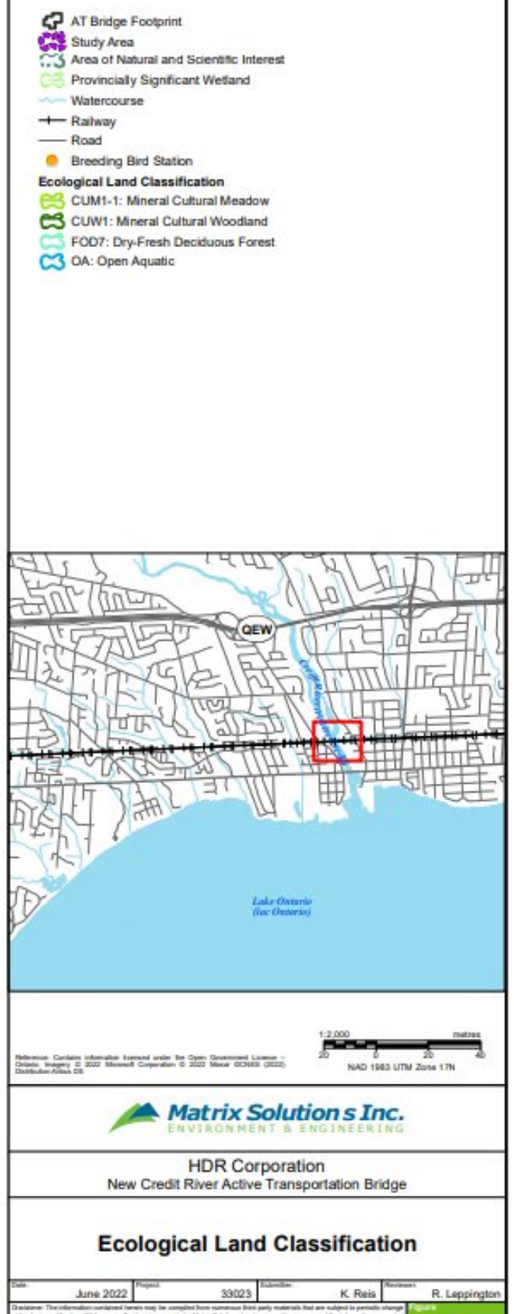
The potential environmental transportation noise impacts of the proposed undertaking have been assessed, including both operational and construction noise considerations.

Recommendations based on the assessment can be found in Section 6.5 of this report, and the full *Environmental Noise Assessment Report* can be found in **Appendix C.4.**

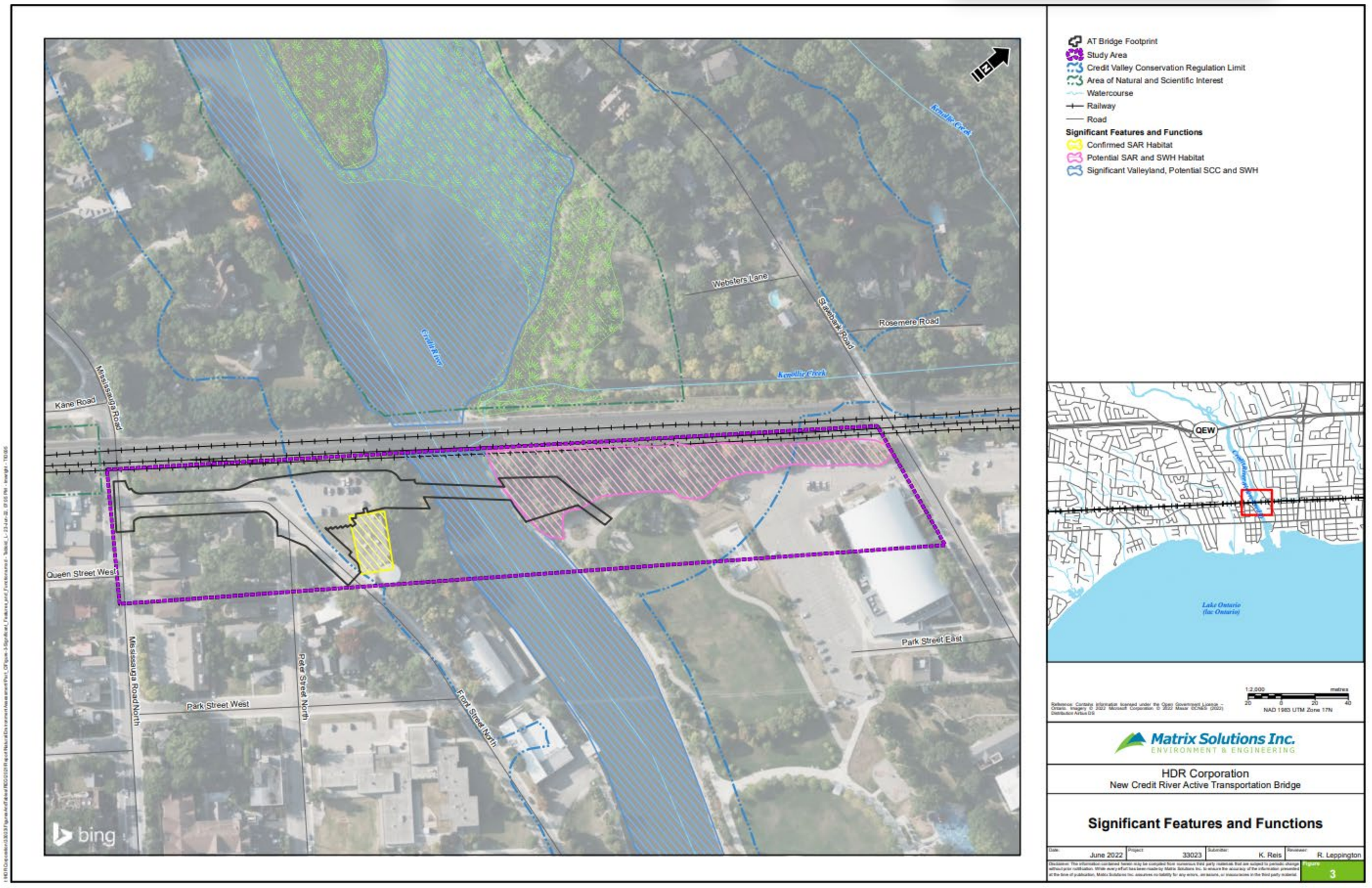
**Figure ES- 7 Sensitive Receptor Locations**

## Figure ES- 8 Ecological Land Classification



## Figure ES- 9 Map of Significant Features and Function



## Geotechnical Environment

As part of the geotechnical investigation, a total of ten (10) boreholes were drilled for the current investigation on both sides of the Railway Crossing at Credit River, Mississauga. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method.

Asphalt thickness as observed at boreholes ranges from 80 mm to 280mm; granular base thickness ranges from 250mm to 500mm. Silty sand and gravelly sand were encountered at two boreholes (BH-01 and BH-02) on the east side of Railway Crossing in the deposit underneath the peat material. Silt was encountered at BH-03 at west side of Railway Crossing deposit underneath the fill material. Silty clay till deposit was found in all boreholes except BH-02.

Two boreholes (BH-03 and BH-04) were drilled on the grass area at west side of Railway Crossing at Credit River and encountered a 150 mm thick topsoil layer at the surface. Fill material was encountered below the topsoil or pavement and consists of sandy silt to silty sand and was generally present in a very loose to compact state. Clayey silt with peat, clayey peat, silty sand with peat were encountered at two boreholes (BH-01 and BH-02) at east side of Railway Crossing. Four (4) boreholes (BH-05 to BH-09) were drilled on the road and car parking surface. BH-07 and BH-10 were drilled on the grass area and encountered a 0 to 100 mm thick topsoil layer at the surface. Fill material was encountered below the pavement structure or topsoil in majority of the boreholes and was heterogeneous and consisted of clayey silt, sandy silt to silty sand and gravelly sand and was generally present in a compact state / soft to stiff consistency. Underneath the fill material, silty sand and sandy silt soil deposits were present.

The grey shale bedrock encountered in all boreholes belongs to Georgian Bay Formation. The assumed shale bedrock surface was found at depths varying from 7.6 to 14.2 m below the existing grade.

At the time of drilling, groundwater was observed in all boreholes except BH03, BH-06 and BH-09. Two (2) monitoring wells were installed within bedrock at all boreholes for the longer-term monitoring of groundwater level.

Additional details on the geotechnical investigations and findings with are provided in the *Geotechnical Investigations Report* in **Appendix C.10.**

## Fluvial Geomorphology

### Hydrological Context

The base level of the Credit River is set by water levels in Lake Ontario. In the last century (1918-2019), mean monthly water levels of Lake Ontario have fluctuated over a range of approximately 2.1 m or 73.8 to 75.9 m elevation (DFO 2021). The annual cycle in Lake Ontario water levels has been fairly consistent from the mid-1990s to 2016. The maximum mean monthly flow in the record occurred in 2019 at approximately 75.9 m elevation (DFO 2021). Using a HEC-RAS model of the Credit River provided by the CVC, existing peak flow rates in the vicinity of Lakeshore Road are summarized in Table ES- 4. Regulatory floodline mapping provided by the CVC indicatesthat the floodline is contained within the main river channel south of the train bridge to Lake Ontario (Figure ES- 10).

**Table ES- 4 Credit River Peak Flow Rates**

| Watercourse | 2-year $m^3/s$ | 5-year $m^3/s$ | 10-year $m^3/s$ | 25-year $m^3/s$ | 50-year $m^3/s$ | 100-year $m^3/s$ | Regional $m^3/s$ |
|---|---|---|---|---|---|---|---|
| **Credit River** | 120.00 | 222.90 | 290.50 | 368.60 | 468.20 | 557.10 | 732.60 |

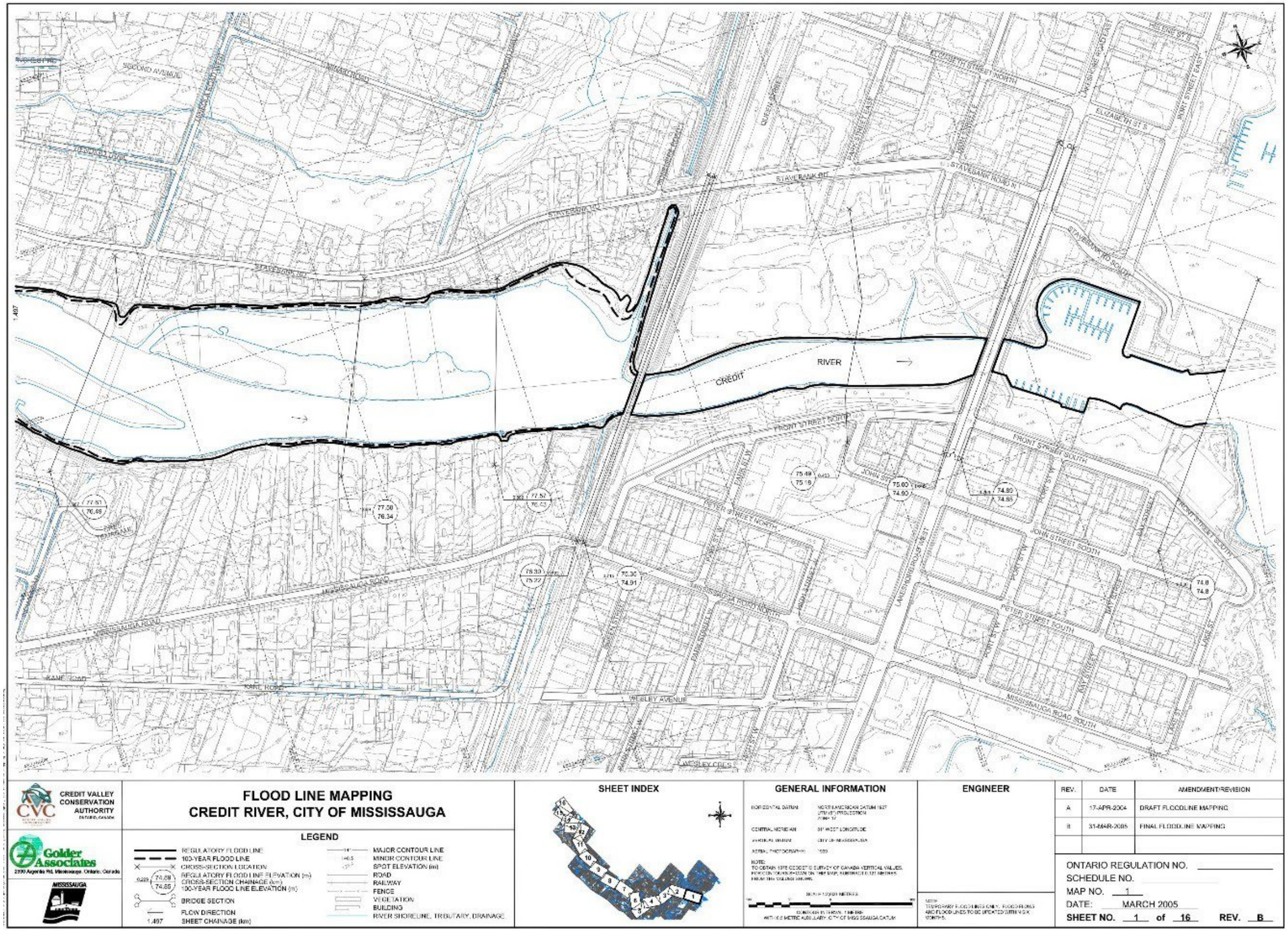
### Geomorphic Field Assessment

The riverbanks are well-vegetated surrounding the CN rail bridge, with marsh habitat located upstream of the rail bridge along the east side. Both banks are continuously armoured with various types of bank protection except for the forested part of the south bank, which is not armoured. Types of bank protection include armourstone, boulders, gabion basket, and concrete. At the location of the proposed new AT Bridge, the south bank is steep, approximately 7 m high, and has a simple profile. Downstream of the proposed crossing footprint to the canoe club, the bank has a similar total height but has a two-stage profile, with a steeper 2 to 3 m high segment at the bottom and a gentler slope above. Erosion and exposed bank materials were noted on the lower 2 to 3 m of the bank.

In practical management terms, the river is being managed as a port, and engineering controls on bank erosion are being maintained through the great majority of the study reach. Excessive sedimentation on the riverbed is being managed with periodic dredging for navigability. Near the lake, the banks and shoreline are artificial.

Additional fluvial geomorphic investigations and findings are provided in *Fluvial Geomorphology Assessment Report* in **Appendix C.5.**

**Figure ES- 10 Floodline Mapping of the Credit River Near Lakeshore Road (CVC, 2015)**



## Drainage and Stormwater Management

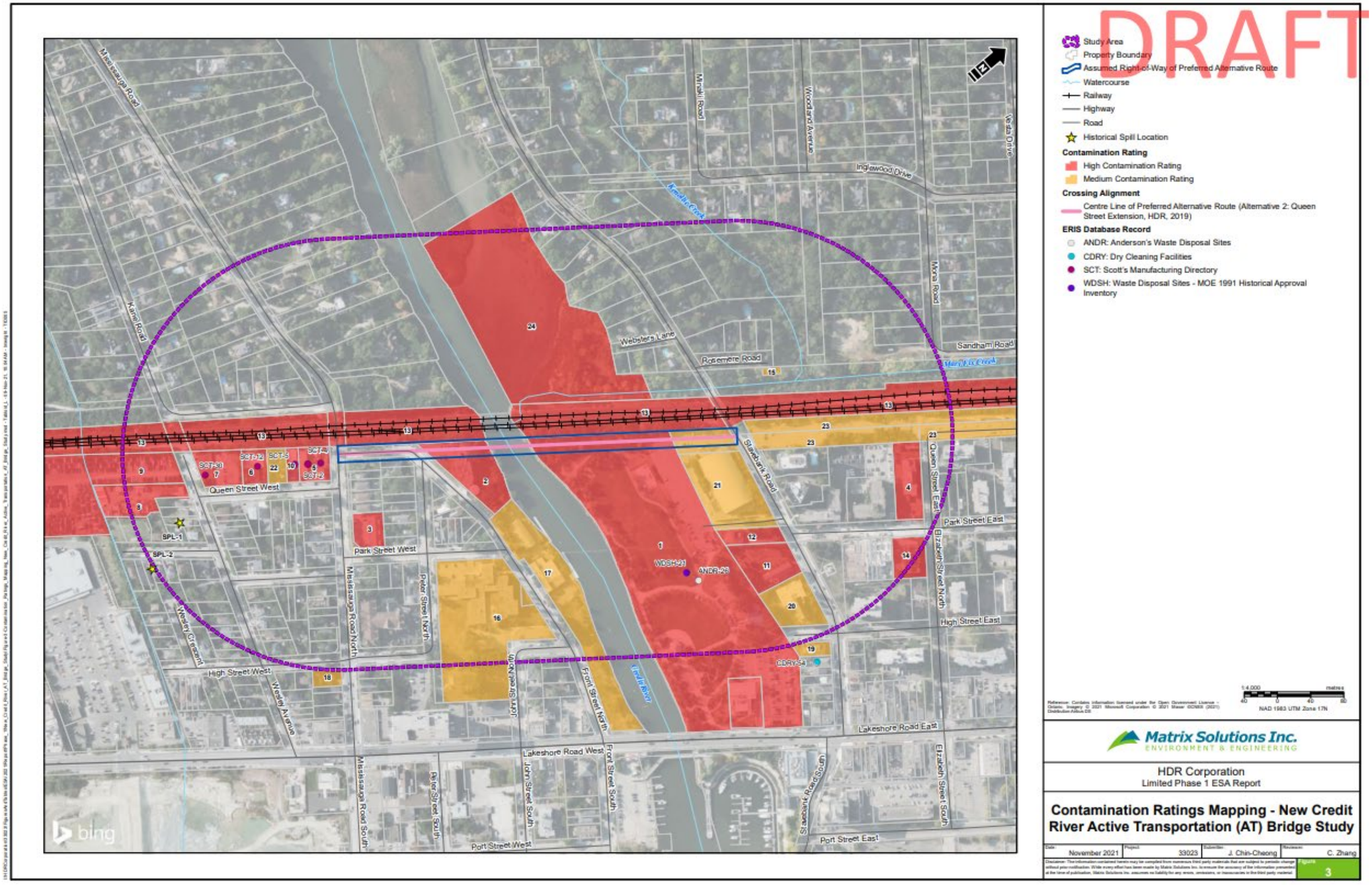
Front Street primarily is an urbanized cross-section. The roadway is drained by a network of catchbasins and storm sewers, and discharge to the Credit River.

## Contamination

A Phase 1 ESA was conducted to identify current and historical potentially contaminating activities (PCAs) and areas of potential environmental concern (APECs) within the Study area. The Limited Phase I ESA includes a review of historical records available for the properties within the Study area and documents observations made from a drive-by, windshield site visit of the properties within the Study area from public roadways and lands. Fifteen (15) properties and/or areas within the Phase 1 Study area are identified as having a “high” potential for soil and groundwater contamination, nine (9) properties and/or areas within the Study area as having a “medium” potential for soil and groundwater contamination, and the remaining properties in the Study area were rated as having a “low” potential for contamination. In addition, two significant spill records (representing two spill locations) are also considered as having a “high” potential for soil and/or groundwater contamination. See Figure ES- 11 for all potential properties and/or areas of contamination.

Additional Phase 1 ESA findings can be found in the *Phase 1 ESA Report* in **Appendix C.6.**

## Figure ES- 11 Map of Potential Property with Potential Contamination



## Archeological Assessment

A Stage 1 Archeological Assessment was prepared to identify any potential archaeological impacts within the Study area, in accordance with the *Ontario Heritage Act* and the *2011 Standards and Guidelines for Consultant Archaeologists* (S & G). The Stage 1 background study determined that while 15 previously registered archaeological sites are located within one kilometer of the Study area, none are within 50 meters. The property inspection confirmed that the majority of the Study area did not have archaeological potential on account of previous deep soil disturbance events associated with the stabilization of the Credit River shoreline, construction of Port Credit Memorial Area, Port Credit Memorial Park, and the Port Credit Royal Canadian Legion Branch 82 (Figure ES- 13). Due to the Study area's overlap with the Credit River, it's archaeological potential was evaluated following the Ministry of Citizenship and Multiculturalism (MCM)'s Criteria For Evaluating Marine Archaeological Potential checklist and it was determined that a Marine Archaeological Assessment should be completed once construction impacts to the Credit River have been identified during detailed design. Additionally, a Stage 2 test pit survey is required for the Study area in order to confirm the extent of existing disturbances.

A full *Stage 1 Archaeological Assessment*, can be found in **Appendix C.7**

## Cultural Heritage Assessment

An existing conditions and preliminary impacts assessment was prepared to identify and inventory any known and potential building heritage resources (BHRs) and cultural heritage landscapes (CHLs), identify existing conditions of the Study area, provide a preliminary impact assessment, and propose appropriate mitigation measures. The results of background historical research and a review of secondary source material indicate a Study area with a suburban land use history dating back to the early nineteenth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are six known BHRs and three known CHLs within the Study area (Figure ES- 14). No additional BHRs or CHLs were identified during field review.

A full *Cultural Heritage Report* can be found in **Appendix C.8.**

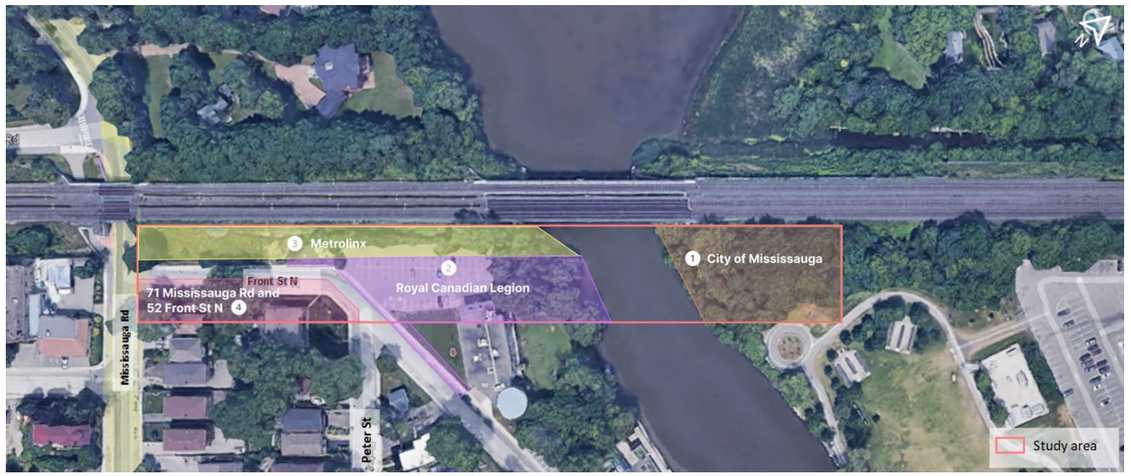
## Property

The properties encompassed in the Study area and would potentially be impacted by the implementation of the AT bridge are listed in Table ES- 5 and shown in Figure ES- 12.

**Table ES- 5 Properties within Study Area**

| ID | Property Address | Ownership |
|---|---|---|
| 1 | Port Credit Memorial Park | City of Mississauga |
| **2** | 35 Front Street N | Port Credit Royal Canadian Legion |
| **3** | GO Train Rail corridor | Metrolinx |
| **4** | 71 Mississauga Road and 52 Front Street N | Private residential<br>*Properties only subject to impacts during construction, no permanent impacts anticipated* |

**Figure ES- 12 Properties within the Study Area**

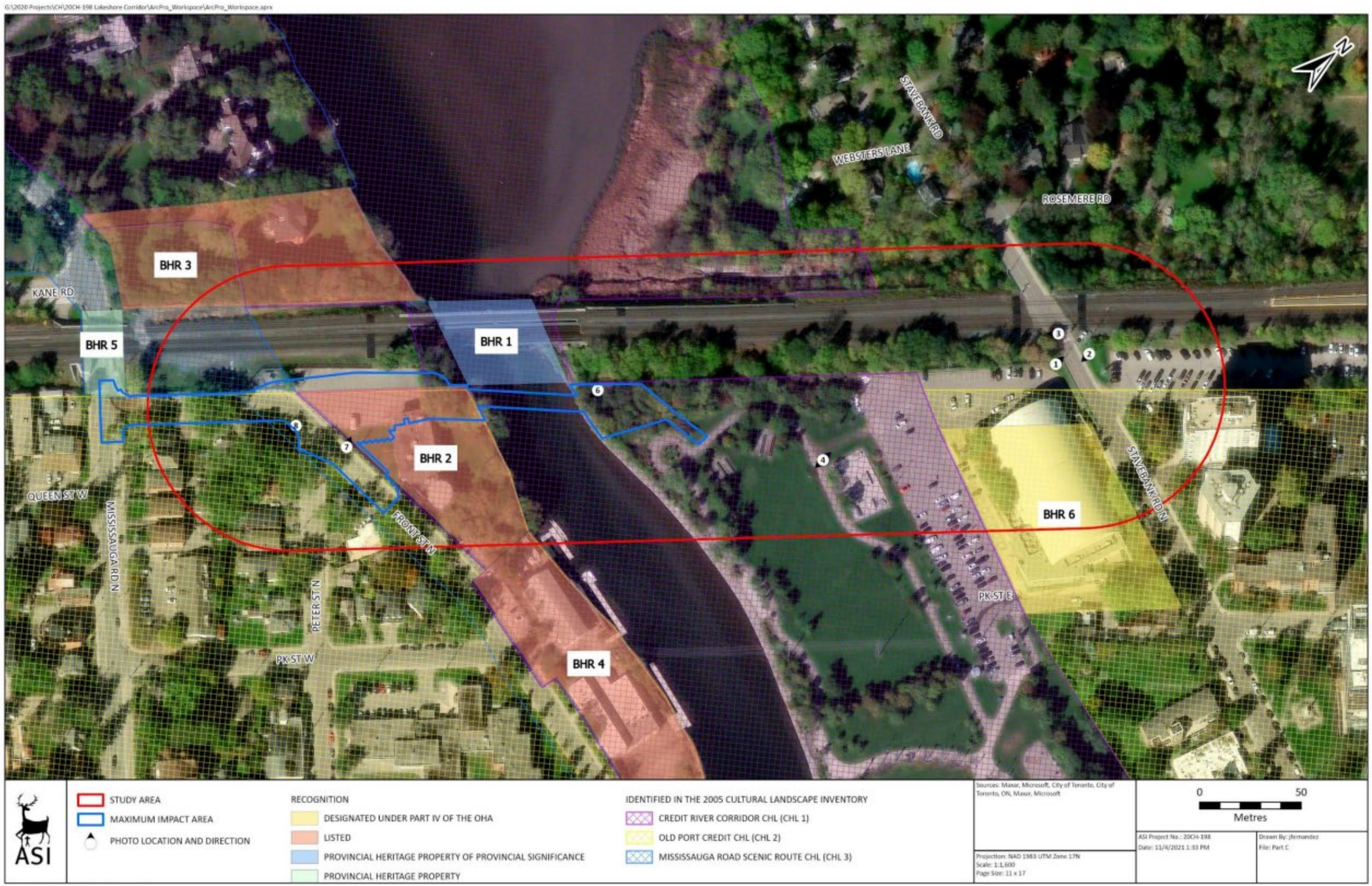



## Utilities

A utility request was submitted by HDR in December 2021 to the utility companies within the Study area to identify any existing and planned utility facilities that may be impacted by this Study. Seven utility companies confirmed they have existing infrastructure in the Study area, two confirmed they do not have any existing infrastructure, and one refused to provide information. Locates would be required during the detailed design phase to confirm the exact location of utilities.

## Figure ES- 13 Stage 1 Assessment Results

## Figure ES- 14 Location of identified BHRs and CHLs



## ES.4 Alternative Solutions and Evaluation Process

### Development of Alternative Solutions

Phases 1 and 2 of the 2019 TMP identified a non-vehicular (or active transportation only) crossing located at Site 2, connecting Front Street and Queen Street east as the preferred solution. Figure ES- 15 illustrates the process undertaken to further develop the preferred solution for the AT Bridge.

#### Long List Screening

Table ES- 6 presents the two alignments and four bridge types that were identified and evaluated at a high-level, in addition to the 'Do Nothing' alternative.

**Table ES- 6 Summary of Long List Screening**

| Alignment | Applicable Bridge Type | Screening | Rationale |
|---|---|---|---|
| **Do Nothing** | n/a | **Carry Forward** | Carried forward as a basis for comparison per the EA process. |
| **Alignment 1 – Front/Queen (Figure ES- 16)** | Alternative 1: Conventional Bridge | **Screened Out** | In-water piers have a significant environmental impact; due to the environmental sensitivity of the area and the expressed objection to in-water piers by the Credit Valley Conservation, Alternative 1 is not a viable option. This option has minimal opportunity for an aesthetic design compared to the other options. |
| | Alternative 3: Prefabricated Truss Bridge | **Carry Forward** | Given the length and width of the bridge a Through Truss bridge is a viable option and does not require in-water piers. |
| | Alternative 4: Signature Bridge | **Carry Forward** | A network tied arch bridge can span the length of the river and is a visually appealing option. |
| **Alignment 2 – Metrolinx GO Bridge (Figure ES- 17)** | Alternative 2: Expand GO Bridge | **Screened Out** | Upon more detailed analysis it was found that the existing bridge could not be widened structurally to meet the desired width for the active transportation components. Furthermore, Metrolinx did not support any encroachment into their ROW, and expressed that the GO rail corridor is to be protected and used exclusively as a rail corridor. |

**Figure ES- 15 Evaluation Process in context of Schedule B Class EA**

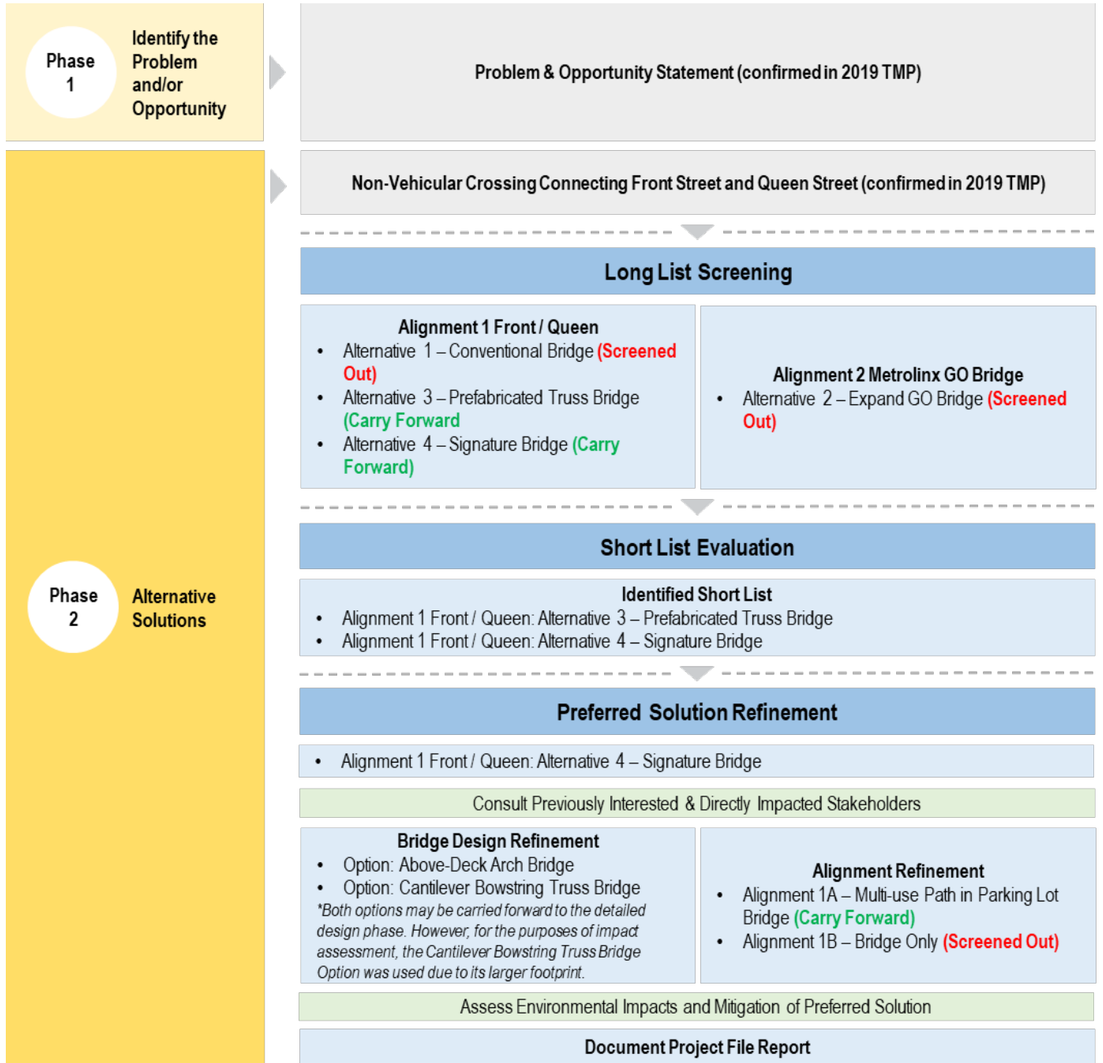


**Figure ES- 16 Alignment 1- Front/Queen**

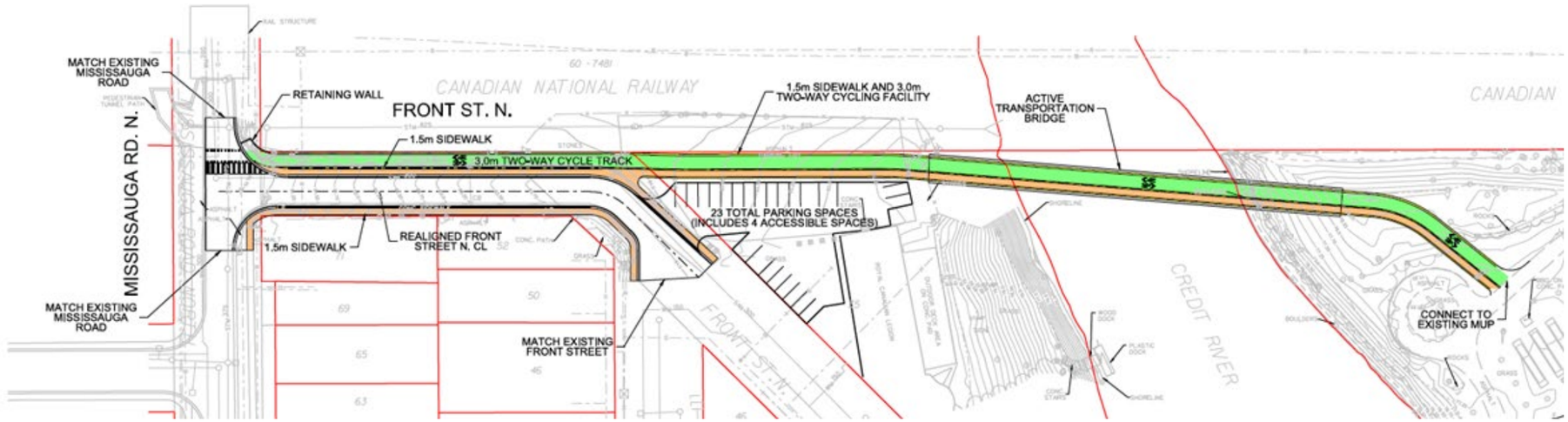
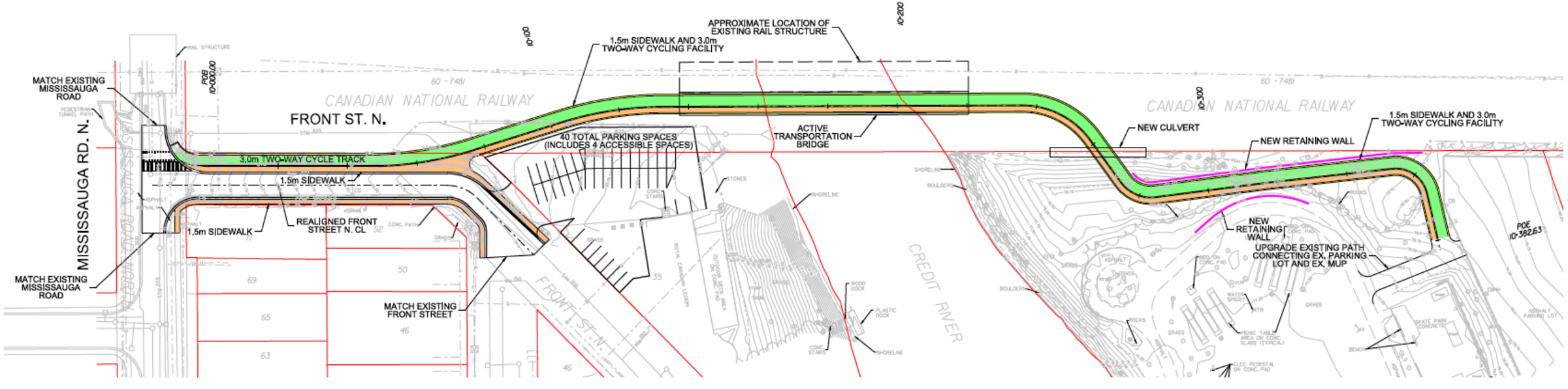



**Figure ES- 17 Alignment 2 - Metrolinx GO Bridge**



## Short List Evaluation

### Evaluation Framework

Following the screening of the long list alternatives, the evaluation framework in Table ES-7 was used to guide the evaluation of the shortlisted alternatives, which are Alignment 1: Alternative 3 (Prefabricated Truss Bridge) and Alignment 1: Alternative 4 (Signature Tied Arch Bridge). A Do-Nothing alternative was also included in the evaluation to represent a scenario where a bridge crossing is not implemented; this alternative is carried forward as part of the Environmental Assessment process and used as a basis for comparison

### Description of Short List Alternatives

A Truss Bridge is a common bridge type where the load bearing structure is composed of a series of trusses in triangular units. Truss bridges are an economical choice, and are typically prefabricated and pre-designed off-site, and assembled on-site in a relatively short amount of time. A Signature Tied Arch is an arch bridge with inclined hangers where hangers intersect other hangers at least twice. Signature bridges are custom designed to meet context-specific requirements and bears a higher cost. The benefit of this alternative is that it has a strong aesthetic quality that provides an opportunity to communicate a unique community identity.

See Figure ES- 18 and Figure ES- 19 for examples of a Prefabricated Truss Bridge and a Signature Tied Arch Bridge that were included in the short list evaluation.

**Figure ES- 18 Example of Pedestrian Truss Bridge**

**Figure ES- 19 Example of Tied-Arch Bridge**

**Table ES- 7 Evaluation Framework**

| Group | Bridge (Part C) Outcomes | |
|---|---|---|
| Mobility | Walking Experience | Pedestrian LOS |
| | | Pedestrian Network Connectivity |
| | Cycling Experience | Cycling LOS |
| | | Cycling Network Connectivity |
| | Equity | Physical Accessibility |
| Environment | Habitat / Wildlife | Designated Natural Areas Incl. Provincially Significant Wetlands (PSW), Environmental Sensitive Areas (ESA), Areas of Natural and Scientific Interest (ANSI) |
| | | Wildlife, Vegetation, Aquatic Species and Habitat and Species at Risk |
| | Hydrology/ Hydraulics | Impact to hydrology condition (incl. floodplain) of the Credit River |
| | | Drainage and Stormwater |
| | Air | Air Quality |
| | Soil | Soil quality and potential for contamination |
| Public Health & Safety | Public Health | Supports active communities |
| | Safety | Emergency Response |
| | | Pedestrian Safety |
| | | Bicycle Safety |
| Quality of Place & Prosperity | Aesthetics | Visual Impact |
| | Public Realm | Noise and Vibration |
| | | Public Space / Public Realm |
| | Cultural Environment | Built Heritage Features |
| | | Archeological Features |
| | Resilience & Sustainability | Flexibility to accommodate network disruption |
| | | Resiliency or Vulnerability of the Project to Changing Climatic Conditions |
| Affordability & Constructability | Capital Cost | Utility Relocation |
| | | Environmental Mitigation |
| | | Construction |
| | | Property |
| | Operational Cost | Life Cycle Cost Requirements |
| | Constructability | Staging and Construction Complexity |
| | | Geotechnical Considerations |

### Evaluation Results

A ranked colour scale was used to demonstration how the alternatives perform relative to another (Figure ES- 20). Table ES- 8 below provides an overall summary of the evaluation of the short list and identifies Alternative 4: Signature Bridge as the preferred alternative solution.

**Figure ES- 20 Evaluation Colour Scale**

| Worst | Worse | Comparable | Better | Best |
|---|---|---|---|---|

**Table ES- 8 Evaluation Summary**

| Group | Outcomes | Do Nothing | Alternative 3: Prefabricated Truss Bridge | Alternative 4: Signature Bridge (Tied Arch) |
|---|---|---|---|---|
| Mobility | Walking Experience | No improvements made to pedestrian LOS or connectivity | • Improvements made to pedestrian LOS: new bridge crossing provides 1.9 m pedestrian sidewalk<br>• Pedestrian connectivity improved: new bridge crossing provides link to transit hub at Port Credit GO Station | |
| | Cycling Experience | No improvements made to cycling LOS or connectivity | • Improvements made to cycling LOS: new bridge crossing provides 3.0 m wide bi-directional cycling facility<br>• Cycling connectivity improved: new bridge crossing provides link to transit hub at Port Credit GO Station | |
| | Equity | No improvements made to equity in mobility | • Equity in mobility improved through the provision of an active transportation crossing | |
| Environment | Habitat / Wildlife | No impact to habitat/wildlife | • No impact to designated natural areas<br>• Permanent vegetation removal is required – restoration and mitigation plan to be included in detailed design<br>• Potential habitat loss is anticipated – restoration and mitigation plan to be included in detailed design<br>• Estimate of 70 trees will be removed – restoration and mitigation plan to be included in detailed design<br>**A number of trees in the Study area have been impacted by Metrolinx works since the tree inventory conducted in 2021, these impacts are consequently not noted in the findings of this report. Further tree inventory will be required during the detailed design phase to confirm any new impacts. The impact noted here will likely be less as a result of work already undertaken.* | |
| | Hydrology/ Hydraulics | No impact to hydrology/hydraulic conditions | • Lateral migration of the river is not expected to occur<br>• No change in water surface elevation<br>• No negative impact on flood levels under the full range of storm events is expected | |
| | Air | Potential for long-term poor air quality due to increased congestion due to absence of attractive active transportation facilities | • No impact to air quality from use of the bridge | |
| | Soil | No impact to soil quality | • Geotechnical mitigation is expected for both bridges | |
| Public Health & Safety | Public Health | • No changes to existing pedestrian safety<br>• Does not support active communities<br>• No change in ability for emergency vehicles to cross the Credit River | • Pedestrian safety is improved as new crossing provides a mode-separate option to cross the Credit River<br>• Supports active communities through the provision of an attractive alternative transportation facility<br>• No change in ability for emergency vehicles to cross the Credit River | |
| Quality of Place & Prosperity | Public Realm | No impact to existing views | • Likely to impede existing views. Less flexibility in design. | • Likely to impede existing views. A signature bridge allows for more flexibility in design. |
| | | No impact on noise and vibration | • No operational noise and vibration impact | • No operational noise and vibration impact |
| | | Does not support public space/public realm improvements | • Supports public space/public realm improvement by providing an alternative option for active transportation | |
| | Cultural Environment | • No impact to built heritage resources and cultural heritage landscapes | • No direct impact to built heritage resources and cultural heritage landscapes<br>• Both bridge types hold the same potential for archaeological impacts | |

| Group | Outcomes | Do Nothing | Alternative 3: Prefabricated Truss Bridge | Alternative 4: Signature Bridge (Tied Arch) |
|---|---|---|---|---|
| | | • No impact to archeological resources | | |
| | | Does not support climate change objectives | • Both bridge alternatives support climate change objectives by providing new pedestrian and cycling facilities to the overall transportation network. | |
| Affordability & Constructability | Preliminary Cost Estimate | No construction | $4.4M | $5.5M |
| | Capital Cost | • Utility relocation not required<br>• Environmental mitigation not required<br>• No property costs | • Costs associated with utility relocation required<br>• Costs associated with environmental mitigation efforts required<br>• Property is required from the Royal Canadian Legion parking lot | |
| | Operational Cost | Costs related to infrastructure and operation maintenance not required | • Moderate level of maintenance and operations required for snow clearance, painting, and coating. | • Higher level of maintenance and operations required; in addition to snow clearance, painting and periodic inspection of arches (if any) is required. |
| | Construction Complexity | No construction is required | • Parking lot access is required to be maintained for the Royal Canadian Legion<br>• Construction duration is estimated to be one construction season plus a few months the following season to reinstate landscaping<br>• Temporary traffic mitigation/detours may be required on Front Street and the Mississauga Road/Front St intersection<br>• Moderate to major construction complexity may be explored: potential requirement for in-water pier/ falsework during construction, and barge-work to minimize disturbance to waterbed | |
| | | Geotechnical consideration not required | • Prefabricated truss bridge may require additional foundation works | • A signature bridge may have lower costs associated with foundation works compared to the Truss Bridge |
| **Overall Summary** | | The Do-Nothing alternative does not address the problem/opportunity statement and does not support active transportation goals and objectives in the area. | This alternative supports the area's overall active transportation goals and objectives and performs comparatively to Alternative 4 in terms of level of impact. Given the economic savings in using a prefabricated structure, the prefabricated truss bridge provides less flexibility and opportunity for aesthetic design. | This alternative supports the area's overall active transportation goals and objectives and performs comparatively to Alternative 3 in terms of level of impact. With a moderate increase in cost ($1.1M more than Alternative 1), a signature bridge allows for greater aesthetic design input that can reflect community context and promote greater visual integration in the surrounding environment. |
| **Overall Recommendation** | | **NOT PREFERRED** | **LESS PREFERRED** | **MOST PREFERRED** |

### Bridge Design Refinement

Feedback received from the second PIC identified that the public wanted more opportunities to provide input on the design elements of the AT Bridge. Subsequently, an additional virtual design workshop and survey was held during which the renderings of two signature bridge options, an above-deck arch bridge and a bowstring truss bridge, were presented to the public for additional feedback.

The above-deck arch bridge features lookout and seating areas on the south side of the bridge and could be designed to accommodate either a multi-use path or separate pedestrian and cyclist lanes.

In addition to the lookout and seating areas on the south side of the bridge similar to the above-deck arch bridge, the bowstring truss bridge also features public seating along the pedestrian walkway throughout the length of the bridge. Under this design, pedestrians and cyclists would be fully separated by a barrier.

See Figure ES- 21 and Figure ES- 22 for sample renderings of both bridge alternatives.

**Figure ES- 21 Conceptual Renderings of Above-Deck Arch Bridge**

**Figure ES- 22 Conceptual Renderings of Bowstring Truss Bridge**

## Alignment Refinement

Alignment 1 was presented to a key stakeholder, the Royal Canadian Legion, on March 4, 2022. The legion did not support this alignment due to the significant impacts it would have on their parking lot. Two additional sub-alternative alignments were developed to mitigate impacts to the Legion.

- **Alignment 1A – Multi-use Path (MUP) in Parking Lot (**Figure ES- 23**):** This alignment would have a separated cycling and pedestrian path that transitions to a 3.0 m shared multi-use path (MUP) that would span across the Legion's parking lot Thirty-four parking spaces can be accommodated in the main Legion parking lot, with the potential of additional parking spaces in other proposed parking zones in the Legion's proximity

- **Alignment 1B – Bridge Only (**Figure ES- 24**):** This alignment would have **no** path connecting the bridge to Front Street; pedestrians and cyclists would have to travel through the Legion's parking lot to access the bridge, consequently negatively impacting pedestrian and cyclist safety and comfort seeing that there is no safe connection through the parking lot

**Preferred Alignment**

In keeping with the goals and objectives of the AT Bridge, Alignment 1A was selected as the preferred alignment.

Alignment 1A was presented to the Legion on August 4, 2022 and received initial support from the Legion representative in attendance. The Legion reflected that they preliminarily prefer Parking Zone 3 over Parking Zone 2, as it has fewer impacts on their front yard. The project team revised the parking arrangement to accommodate 45 parking spaces in total, at the Legion's request. An addition 22 parking spaces in Parking Zone 4 can be incorporated at a later time if required. See Figure ES- 25 for a revised Alignment 1A.

**Figure ES- 23 Alignment 1A – Multi-Use Path (MUP) in Parking Lot**

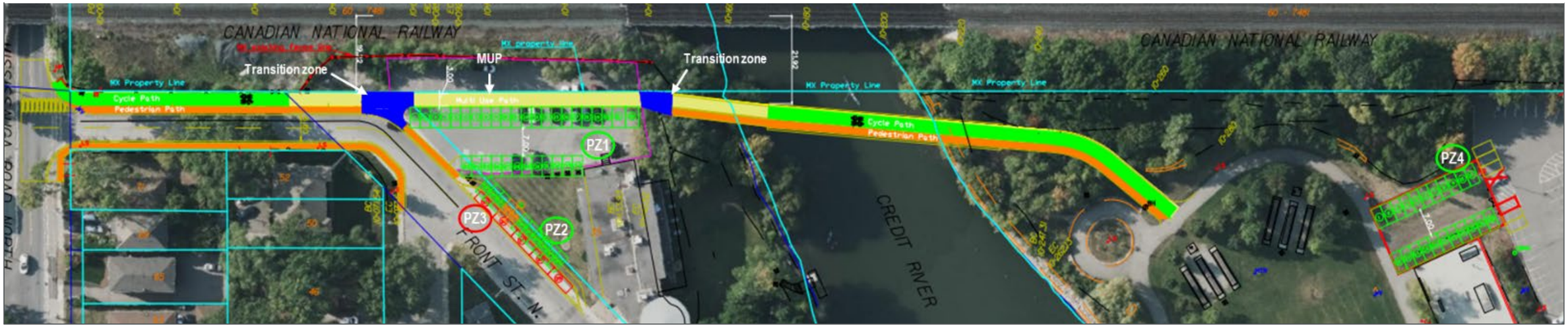



**Figure ES- 24 Alignment 1B – Bridge Only**

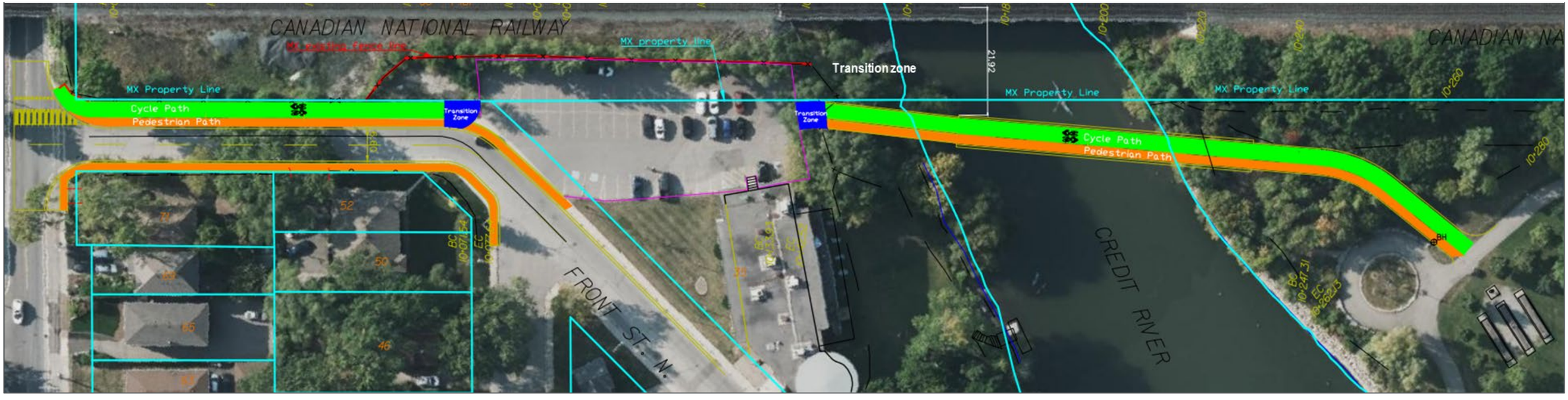
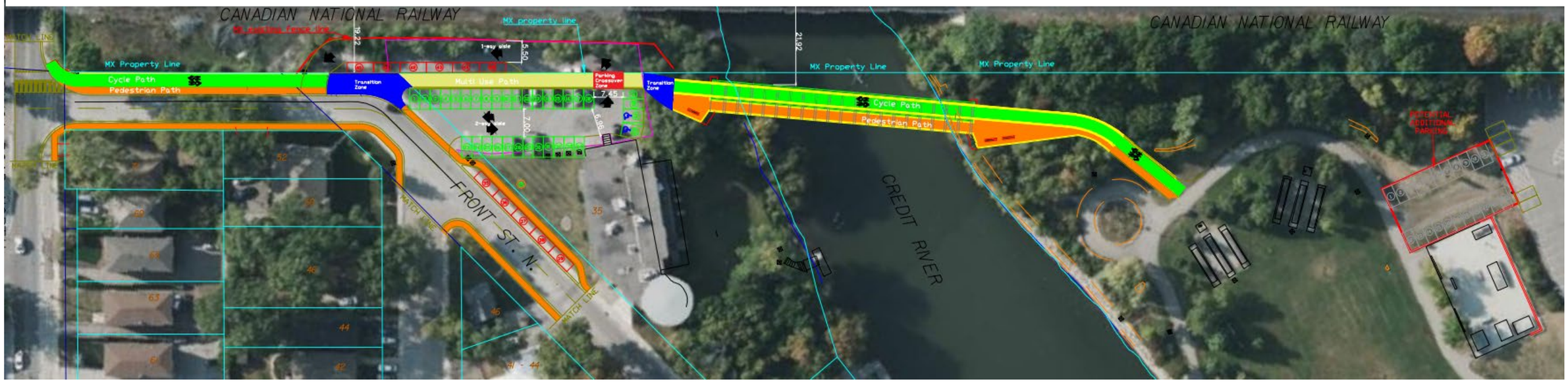


Figure ES- 25 Revised Alignment 1A




## ES.5 Preferred Alternative Solution

### Description of the Preferred Alternative Solution

Based on the evaluation of alternative solutions, the preferred alternative for the new AT bridge is a signature bridge that would span across the Credit River, connecting the existing multi-use path near the Port Credit Memorial Arena to Front Street adjacent to the Lakeshore West GO Rail tracks. During the drafting of this PFR, a preferred signature bridge option between the tied-arch bridge and the through-truss budge had not yet been confirmed. The footprint of the two bridge designs is identified to be similar, with the through-truss bridge having a slightly larger footprint. Therefore, the Through-Truss bridge was used for the purposes of impact assessment to ensure that all potential impacts are captured. Revised Alignment 1A shown in Figure ES- 25 is the preferred alignment for the bridge.

A preliminary general arrangement plan and profile drawing was developed for the through-truss bridge and used to progress the impact assessment (Figure ES- 26).

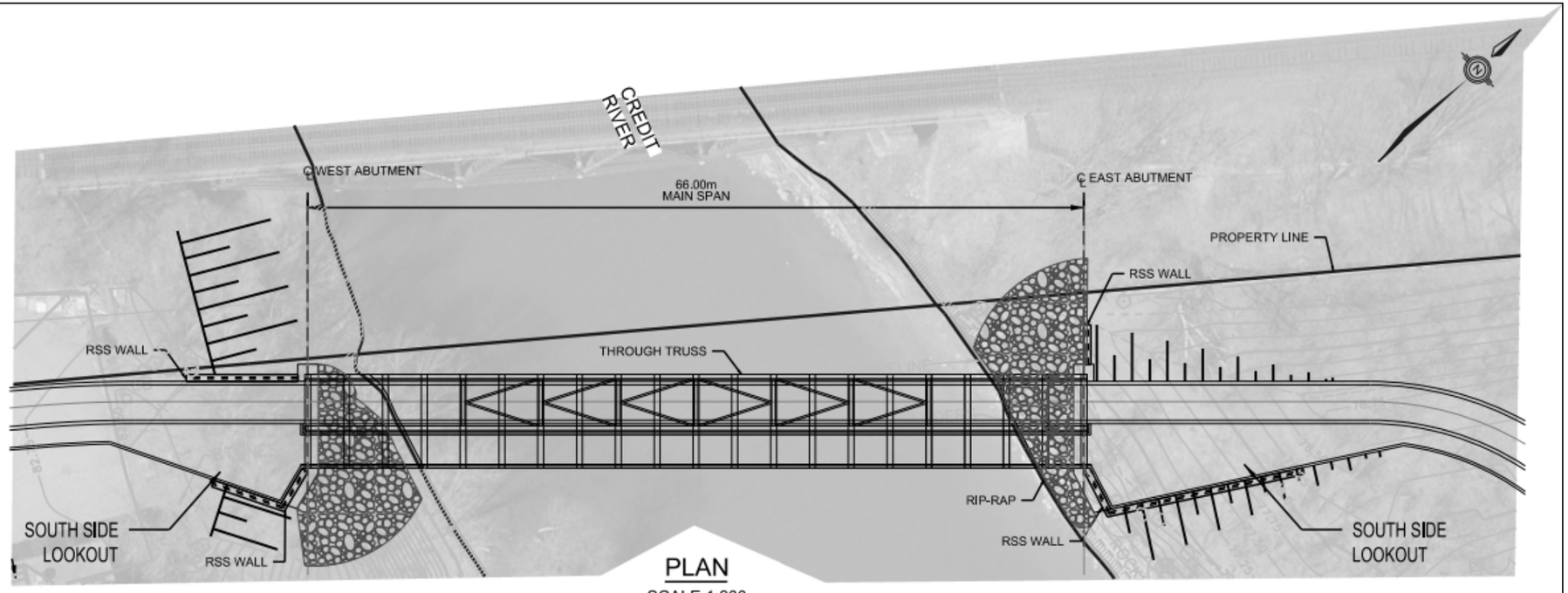
### Structural Design

While details on the structural design of the preferred signature bridge should be confirmed through detailed design, the following design parameters are to be followed for both design options:

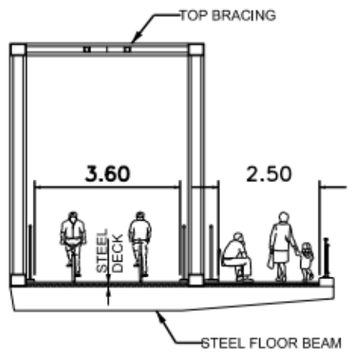
- Minimum 5.5 m wide deck to accommodate either a multi-use or separated cycling and pedestrian paths
- Bridge length of 66.0 m
- Bridge deck with of 8.0m (to be determined based on total width of all elements in detail design)
- Vertical clearance from water of 5.5 m (+/- 1.25 m)
- Standard safety and accessibility standards
- Sustainable design practices will be considered where possible.

For the through-truss bridge option, the cantilevered pedestrian pathway outside the structure should have a minimum clear width of 2.5 m and a preferred width of 3.0 m to allow for seating.

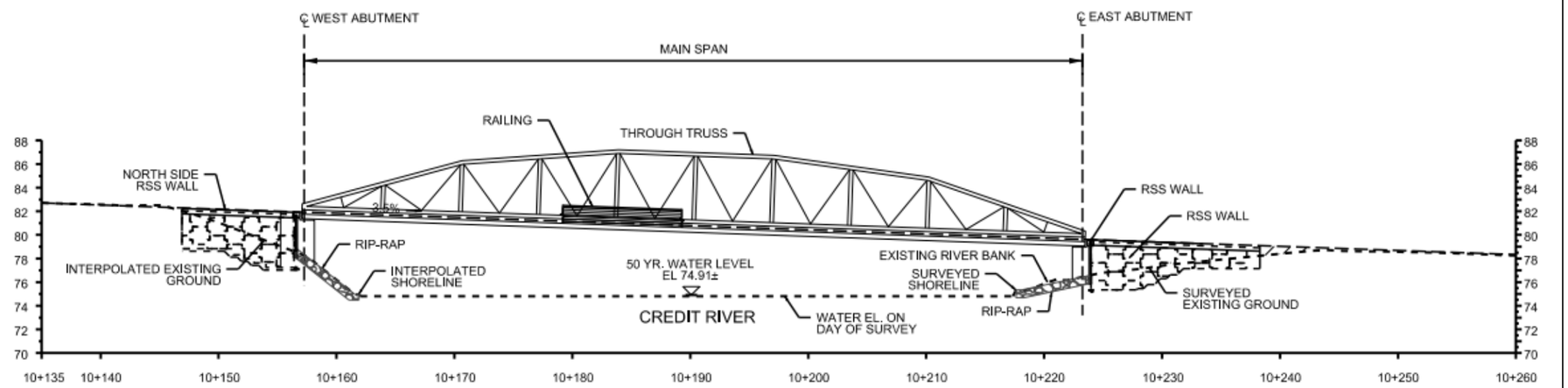
**Figure ES- 26 Plan and Profile of the Through-Truss Bridge**




PLAN
SCALE 1:200




TYPICAL
SUPERSTRUCTURE




PROFILE ALONG PROPOSED BRIDGE CENTERLINE
SCALE 1:200

## Design Criteria

The geometric design for this bridge project shall be designed in accordance with the approved design criteria, standards, manuals, and guidelines. The design criteria established for the AT Bridge are listed in Table ES- 9.

**Table ES- 9 Design Criteria**

| Criteria | Proposed Standard |
|---|---|
| Design Code | • Canadian Highway Bridge Design Code-CHBDC (CSA S6-19)<br>• MTO Structural Manual, 2016 |
| Vertical Clearance | • 5.3 m per the Geometric Design Standards for Ontario Highways Policy clause C.4.4.3.1 |
| Live Load | • Pedestrian Live Load per CHBDC Clause 3.8.9.<br>• Maintenance Vehicle Load per CHBDC clause 3.8.11 for bridge width greater than 3 m. |
| Barrier | • Barrier Load to be considered per CHBDC clause 3.8.8.2.<br>• Minimum barrier height is 1.37 m per CHBDC Table 12.8.<br>• Barrier to be designed per CHBDC clause 12.4.4 and 12.4.5.<br>• Handrails to be placed 1050 mm above top of deck. |
| Wind Load | • Per CHBDC clause 3.10.<br>• Wind load on live load specified in clause 3.10.2.4 will be ignored |
| Snow Load | • To be considered per Ontario Building Code |
| Thermal Load | • To be considered per CHBDC clause 3.9.4, if applicable. |
| Load Combinations | • The following load combinations will be considered in addition to the load combinations specified in CHBDC clause 3.5.1:<br>• SLS1+1.0S<br>• ULS2+0.5S<br>• ULS3+0.5S<br>• Full ULS factored dead loads plus 1.5S<br>• Where S is the snow accumulation load according to the Ontario Building Code |
| Deflection | • Maximum SLS deflection due to the pedestrian live load does not exceed 1/600 of the span.<br>• The maximum SLS deflection of cantilever arms due to pedestrian live load shall not exceed 1/350 of the cantilever length.<br>• The horizontal deflection shall not exceed 1/600 of the length of the span. |
| Vibration | • To be considered per Clause C3.4.4 of the Commentary to the CHBDC |
| Construction Stages | • Construction stages shall be considered in the design. |
| Aesthetics | • Bridges require to have a medium or high level of aesthetic consideration.<br>• Bridges with chain link fencing should not be considered. |
| Pathway Grades | • Desired grades meeting the 5% maximum. |
| Bicycle Lane Width | • 1.5 m (minimum) – 2.0 m (desired)<br>• *1.2 m (minimum) may be considered in a low-volume, low speed constrained corridor |
| Multi-Use Path Width | • 3.0 m (minimum) – 4.5 m (desired) |
| Pedestrian Clearway Width | • 1.5 m (minimum)<br>• 1.8 m (desired to allow for two wheelchairs to pass)<br>• 2.0 m (recommended upper limit) |
| Side Clearance from Bridge Railing | • 0.5 m |
| Mode separation, if applicable | • 0.3 m (minimum) – 0.5 m (desired)<br>• A linear boundary between the two facilities should be provided with tactile characteristics for visually impaired pedestrians. |

See **Section 5.2** for detailed design criteria and sources.

## Typical Cross Section

Two types of pedestrian and cyclist facilities are considered: separated and shared. Based on applicable design standards, it is recommended that the active transportation bridge be designed with separated facilities for the following key reasons:

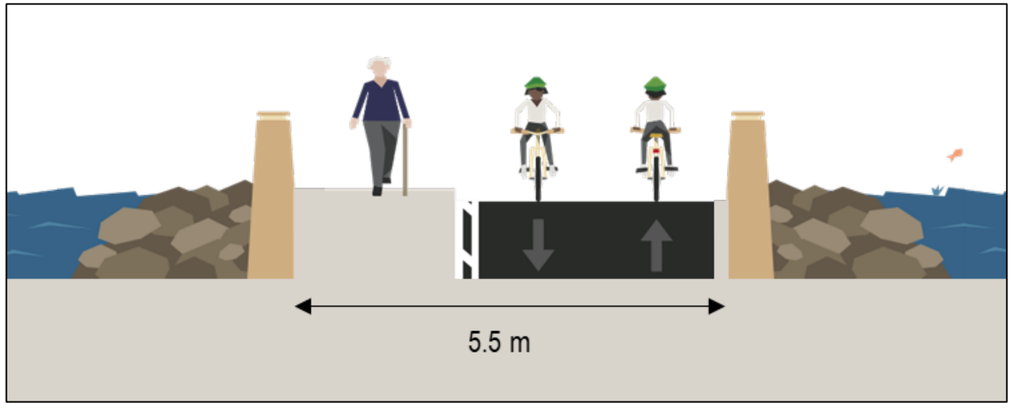
- Flexibility to accommodate desired shared facility design and a modified minimum separated facility
- Integration with existing trails and planned active transportation facilities within the adjacent network that are also separated facilities
- Limit impact to sensitive features (minimize deck width)
- Minimize cost and complexity of the bridge (minimize deck width)

Figure ES- 27 shows the recommended typical cross section and width carried forward to conceptual design.

Note the following considerations:

- A 0.3 m painted buffer between the cycling and pedestrian facility is shown in the figure
- Side clearance from bridge railing is between 0.3 m – 0.4 m

Figure ES- 27 Recommended Minimum Typical Cross Section




Following the bridge design workshop, the following typical section was developed for use in impact assessment:

- Two lookouts on the south side of the bridge
- 66.00 m main span
- 2.50 m sidewalk with seating
- 3.60 m two-way cycling facility

## ES.6 Impacts, Mitigation Measures, and Monitoring

The impact assessment for this Study has taken a conservative approach to ensure that all potential impacts and mitigation measures are captured. As such, impact assessment is based on an assessment footprint that includes both alternative solutions: **Alignment 1A - Multi-use Path (MUP) in Parking Lot**, and **Alignment 1B – Bridge Only.**

### Transportation and Access

Using the traffic volumes data from 2019, an intersection analysis conducted on the intersection of Mississauga Road and Front Street presented that the intersection does not warrant traffic signals under existing traffic conditions but may warrant traffic signals by 2041. No permanent impacts on driveway and parking lot access are anticipated, bridge construction and the realignment of a small section of Front Street may temporarily impact access to properties in the area. Pedestrian and cyclist connectivity in the Port Credit area is expected to be improved as a result of the AT Bridge.

### Natural Environmental Impacts and Mitigation Measures

The greatest potential impacts are associated with the removal of vegetation within the significant valleylands of the Credit River as well as near-water works and potential effects of localized groundwater table drawdown due to dewatering activities. This work could include the removal of SAR trees or SAR bat habitat, destruction or harm to fish and fish habitat, and impacts to nearby PSW areas. The span of the AT bridge will include both permanent and temporary removal of vegetation along the west side (CUW1) and east side (FOD7) of the Credit River. The greatest potential impacts to the natural heritage features and functions are the removal of trees within the FOD7 habitat, working within proximity to confirmed Barn Swallow habitat, as well as the proximity of construction to the Credit River and PSW/ANSI feature.

The natural environment of the Study area may have been further impacted by Metrolinx works since the field assessments conducted in 2021, these impacts are consequently not noted in the findings of this report. Updated impacts to be confirmed during the detailed design phase of the project.

Recommended mitigation measures include (but are not limited to):

- Timing windows/working in the dry
- Best construction practices
- Prevention of wildlife mortality and disturbance, prevention of terrestrial disturbance, erosion and sedimentation control, as well as residual impacts after mitigation.
- Development of a tree preservation plan and replanting plan for disturbed areas

Detailed impacts and mitigation recommendation for construction and operational effects to the natural heritage features within the Study area are provided in detail in the *Natural Environment Assessment* in **Appendix C.1**.

### Tree Impact

Based on the proposed alignment, construction access, and laydown areas, it was estimated that of the 126 trees that were inventoried, 59 trees would require removal, and 18 trees would be potentially injured, while the remaining 49 trees would not be impacted. Additionally, a number of trees in the Study area have already been impacted by Metrolinx works since the tree inventory conducted in 2021, these impacts are consequently not noted in the findings of this report.

Protective barriers can be used throughout the Study area to provide sufficient protection of trees during the construction phases of the project. The minimum amount of pruning should be conducted to avoid negative effects to the structure and integrity of the tree.

Following the Ecosystem Offsetting Guideline (2020) provided by the CVC, an estimated compensation of 701 trees is required for the Study area. A tree preservation plan has been created showing the recommended placement of tree protection fencing for the Study area.

Additional mitigation measures and recommendations can be found **Appendix C.2**.

## Air Quality

From an air quality perspective, it is recommended that precautionary and mitigation approaches be considered when operating in close proximity to the identified sensitive receptor locations. The greatest potential for impacts would occur on dry and/or windy days, particularly when the winds are blowing from the west through northwesterly to north directions. During such meteorological events, consideration should be given to limiting or postponing operations that create fugitive dust emissions. As per guidance from the MECP, it is recommended that non-chloride dust suppressants be applied for all excavation, drilling and unpaved vehicle track movements to minimize fugitive dust. Regular cleaning of the construction site and vehicles and maintenance of equipment should be undertaken.

Additional mitigation measures and recommendations can be found in **Appendix C.3.**

## Noise and Vibration

Both operational and construction noise impacts have been considered. The conclusions and recommendations are as follows:

- There will be no perceivable operational noise impacts from any of the possible trail/bridge location options from the use of the proposed bridge because only bicycles and pedestrians will be using the new structure. Options located further to the north will lessen any possible extremely minor noise impacts from the use of the new facility.
- Construction noise impacts are temporary in nature but may be noticeable at times in nearby residential Noise Sensitive Areas.
- To minimize the potential for construction noise impacts, it is recommended that certain provisions be written into the contract documentation for the contractor

Additional mitigation measures and recommendations can be found in **Appendix C.4.**

## Geotechnical Impacts

Based on the findings of the geotechnical investigation and borehole information, bridge design-related geotechnical discussion and recommendations are provided for topics including:

- Soil parameters
- Foundations
- Approach embankments
- Earth pressures and retaining structures
- Excavation and dewatering
- Cycling path/car parking pavement
- Pipe bedding and support
- Design review, monitoring and inspection

Additional details on the geotechnical recommendations are provided in the *Geotechnical Investigations Report* in **Appendix C.10.**

## Fluvial Geomorphic Impacts

The preliminary bridge design is not anticipated to have direct impacts on the form of the channel through the crossing. Indirect effects could result from changes in hydraulics during flows above the 50-year water level due to bank protection works, however these are anticipated to be minor. As well, potential changes in lake levels over the design life of the bridge should be considered at detailed design.

The south abutment will be constructed on the face of the south bank within the local erosion hazard area. To address potential erosion risks in this location, river and geotechnical engineering will be required at detailed design to ensure that the south bank is stable and that it ties in with the rail bridge upstream and existing erosion control works downstream. This will be particularly important under future conditions when the stabilizing influence of tree roots are lost due to tree removals.

To mitigate potential impacts of the proposed works, the following considerations should be made at detailed design:

- Confirm water levels and velocities near the proposed AT Bridge
- Confirm hydraulic conveyance is met under all flood conditions and lake water levels

- Complete river and geotechnical engineering of the south bank through the bridge is stable, and that it ties in with the train bridge upstream and existing erosion control works downstream
- Identify the scour hazard limit at the proposed bridge through completion of a scour assessment to determine appropriate bridge footing depths, acceptable based on geotechnical criteria in the engineering design, and erosion hazard policy criteria by CVC and stakeholders
- Confirm the extent and type of bank protection below the proposed bridge and along the unprotected part of the bank based on the results of the geotechnical engineering study, consultation with CVC, and updated hydraulic information
- Confirm land ownership of the bank work area. It is expected that the City will acquire land rights through purchase or easements where necessary to construct and maintain and bank protection works associated with the AT bridge and abutments
- Confirm the alignment of the bridge abutments, path, and the disturbance limits of construction
- A scour assessment and detailed hydraulic conveyance study are also recommended to be completed at detailed design or at earlier stages as the design progress

Additional mitigation measures and recommendations can be found in **Appendix C.5.**

## Drainage & Stormwater Management

A pavement area analysis was conducted to assess the change in impervious area resulting from the proposed improvements to Front Street, the parking lot, and the pedestrian bridge. The increase in impervious area on Front Street is 237 $m^2$, which results in a 10% increase, and the increase in impervious area in the parking area is 221 $m^2$, which results in a 14% increase. This minimal increase is not anticipated to generate a substantial impact to the volume and peak flow of runoff within these areas. Furthermore, due to the proximity to the Credit River, no additional quantity control measures are required.

The increase in impervious area associated with the new pedestrian bridge is 1072 $m^2$. Since the pedestrian bridge will drain directly to the Credit River, and will not be supporting vehicular traffic, it is not anticipated to impact the drainage system on Front Street. Due to the proximity to the Credit River, no additional stormwater management measures are proposed.

The maximum increase in flood levels as a result of constructing the bridge is 0.01 m at a few upstream cross sections, which can be considered as negligible. No change in the water surface elevations was observed at the remaining cross sections within the Study area. The proposed design is not considered to generate a negative impact on flood levels under the full range of storm events.

During detailed design, the hydraulic assessment will be reviewed based on any revisions to the design of the proposed pedestrian bridge crossing. Any additional fill within the floodplain will be minimized, and cut-fill balance calculations will be provided.

## Archeological Impacts

The Stage 1 Archaeological Assessment (found in **Appendix C.7.)** provides the following mitigation measures:

- A Stage 2 test pit survey will be conducted in the Study area in order to confirm the extent of existing disturbances.
- Following comments received from the MCM in October 2022 on an earlier draft of this PFR and its appendices, a *Criteria for Evaluating Marine Archaeological Potential* checklist was completed and it was identified that a Marine Archaeological Assessment shall be completed once construction impacts to the Credit River have been identified during detailed design.
- The remainder of the Study area does not require further archaeological assessment; and
- Should the proposed work extend beyond the current Study area or should changes to the project design or temporary workspace requirements result in the inclusion of previously un-surveyed lands, these lands shall be subject to a Stage 2 archaeological assessment.

Additional mitigation measures and recommendations can be found in **Appendix C.7.**

## Built Heritage Resources and Cultural Heritage Landscapes

Based on the results of the assessment, the following mitigation measures have been developed:

- Construction activities and staging will be suitably planned and undertaken to avoid unintended negative impacts to the identified BHRs and CHLs.
- Indirect impacts to the Port Credit Railway Bridge (BHR 1), 35 Front Street North (BHR 2), the Mississauga Road Railway Bridge (BHR 5), the Old Port Credit CHL (CHL 1), the Credit River Corridor CHL (CHL 2), and the Mississauga Road Scenic Route CHL (CHL 3) are anticipated as a result of their location adjacent to the proposed alignment. To ensure these properties are not adversely impacted during construction, a baseline vibration assessment will be undertaken during detailed design.

- Indirect impacts due to the construction of the AT bridge adjacent to BHR 1 are anticipated to include impacts to the views of the Port Credit Railway Bridge. As the Port Credit Railway Bridge is a Provincial Heritage Property of Provincial Significance and there are indirect impacts anticipated due to construction adjacent the subject resource, a resource-specific heritage impact assessment (HIA) is required as per the *Standards and Guidelines for Conservation of Provincial Heritage Properties* (Ministry of Tourism, Culture and Sport, 2010).
- Indirect impacts to CHL 2 are anticipated to include grading, the installation of a cycling path, pedestrian sidewalk, the reconfiguration of the parking lot at BHR 2, the construction of a parking lot on the east side of the river at 22 Stavebank Road, the removal of some vegetation, and construction of the AT bridge across the Credit River, and property acquisition within the CHL. The construction of the AT bridge is also anticipated to impact view of the Credit River corridor from the surrounding area. The scenic and visual quality of the corridor is one of the identified heritage attributes of the Credit River Corridor CHL. As there are properties within the Credit River Corridor CHL listed by the City of Mississauga and there are indirect impacts anticipated due to construction, a resource-specific HIA will be completed as per the City of Mississauga Official Plan clause 7.4.1.10. In order to reduce indirect impacts to the Credit River Corridor, a resource-specific HIA should be conducted to help inform subsequent design stages.
- Should future work require an expansion of the Study area then a qualified heritage consultant will be contacted in order to confirm the impacts of the proposed work on potential heritage resources.

Additional mitigation measures and recommendations can be found **Appendix C.8**.

## Property Impacts

Property impacts are summarized in Table ES- 10.

**Table ES- 10 Property Impacts**

| Alignment | Impacted Area |
|---|---|
| **Alignment 1A -**<br>**Modified Base Case: Multi-use path (MUP) in Parking Lot** | Property required from the Royal Canadian Legion: ~488.5 $m^2$ |
| **Alignment 1B –**<br>**Bridge only** | Property required from the Royal Canadian Legion: ~234.5 $m^2$ |

Figures detailing the areas of potential property takings are enclosed in **Appendix D.**

## Utilities

Formal definition of impacts on utilities will be determined during detailed design, in consultation with individual utility companies. At this stage, no significant utility impacts/relocations are anticipated.

## Constructability, Staging and Implementation

Construction staging will maintain 2 lanes of traffic (one lane in each direction) including pedestrian movements equal to pre-construction levels during construction on Front Street. If deemed necessary, temporary road or lane closures may be required during construction. Access to the Royal Canadian Legion parking lot would be affected during construction to provide access and a laydown area on the west side of the river. The east side of the river would be used to assemble the bridge. The piling and abutment works would be done at both east and west side of the bridge.

During detailed design, a traffic management plan will be developed to determine how traffic and pedestrian access will be accommodated during construction and how access to properties adjacent to new AT bridge will be maintained. Construction would be likely limited to night-time hours when all trains on the Metrolinx rail corridor are non-operational. Discussions with Metrolinx would be needed during design to determine logistics and restrictions.

## Construction Monitoring and Maintenance Considerations

The impact assessment detailed within this report is based on preliminary design details. Potential impacts and recommended mitigation measures should be revisited at the detailed design stage. See Table ES- 11 for a summary of key monitoring and maintenance considerations during construction.

**Table ES- 11 Summary of Monitoring and Maintenance Considerations During Construction**

| Area | Monitoring and Maintenance Considerations |
|---|---|
| **Trees** | • Tree protection measures, once installed, should be inspected, and approved by the City Forestry Department.<br>• All tree protection measures must remain in place for the entire duration of the project. They will not be removed or altered until authorization is given by the City Development and Design Division. |
| **Natural Heritage Features, Wildlife, and Habitat** | • Timing Windows/Working in the Dry<br>• Best Construction Practices<br>• Prevention of Wildlife Mortality and Disturbance<br>• Prevention of Terrestrial Disturbance<br>• Erosion and Sedimentation Control |
| **Fluvial Geomorphic Impact** | • Requirements for construction monitoring and maintenance to be confirm during detailed design |
| **Air Quality** | • See Section 6.4 for Recommendations on Air Quality Impacts from construction<br>• A record keeping procedure should be implemented by the contractor to track daily information. Records are to be kept by the contractor's designated individual responsible for completing daily site inspections. The designated individual should be trained in the requirements and objectives of the BMPP. All records are to be kept on-site at the site office.<br>• The construction manager should ensure that all formal complaints are recorded, kept on file, and addressed.<br>• Formal complaints should initiate an inspection of the suspected cause of the complaint. Corrective action should be implemented to mitigate the cause of the complaint wherever possible. |
| **Noise and Vibration** | • Construction has the potential to create noise and dust for the adjacent property owners. Construction noise is temporary and will vary periodically during the construction depending on the specific activities being performed. Contract specifications will include provisions to define the allowable work hours, in accordance with local by-laws to minimize impacts to the adjacent landowners in the evenings. However, some considerations will be given to the ability of completing the work in a lesser duration by allowing longer work hours. The impact of construction noise will vary based on the type of equipment used, number of pieces of equipment, time and duration of operation, and the proximity to noise sensitive receivers in question. Construction noise will be kept to a minimum through the use of well-maintained equipment with appropriate noise controls by the contractors.<br>• See Section 6.5 for Recommendations on Noise and Vibration Impacts from construction |
| **Archeological Impacts** | • 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 sec. 48 (1) of the *Ontario Heritage Act*. |
| **Built Heritage Resources and Cultural Heritage Landscapes** | • Identified BHRs should be reviewed by a qualified heritage professional to assess impacts and confirm recommended conservation and/or mitigation measures. |
| **Transportation Access** | • Construction should be staged to maintain local traffic. Any necessary road closures or interruptions to traffic should be kept brief and to a minimum during off-peak hours if possible. There should be close coordination with local property owners and EMS/fire/police operations to minimize impacts |
| **Property Impacts** | • Property owners and tenants may experience temporary interruptions to their property access during construction. To reduce this impact, all property owners will be notified prior to construction and/or in advance of work related to their access. |

| Area | Monitoring and Maintenance Considerations |
|---|---|
| **Utilities** | • The location and alignment of existing municipal services is to be confirmed during Detailed Design, which may result in changes to the identified utility impacts. Formal definition of impacts on utilities will be determined during Detailed Design, in consultation with individual utility companies.<br>• All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary.<br>• During Detailed Design, meetings with utility companies should be held as required where potential impacts to existing or future services are identified. |

## ES.7 Future Commitments, Permits, and Approvals

Table ES- 12 provides details on future works, permits, and approvals anticipated at the detailed design stage.

**Table ES- 12 Summary of Future Commitments, Permits and Approvals**

| Area | Future Commitments, Permits and Approvals |
|---|---|
| **Trees** | • City of Mississauga Tree Removal Permit |
| **Natural Heritage Features, Wildlife, and Habitat** | • Recommended Future Works During Detailed Design:<br>  ○ Snag survey within the FOD habitat should be completed to identify if there are any candidate snag trees<br>  ○ Consultation with MECP with regards to the candidate SAR bat maternity roost habitat, if present.<br>  ○ Consult with MECP regarding works being completed within Category 3 Barn Swallow habitat<br>  ○ Additional screening as required based on the future changes to species' listings or habitat regulations of the ESA.<br>• CVC Permit<br>• DFO Self-Assessment and Request for Review<br>• License to Collect Fish for Scientific Purposes<br>• Wildlife Collector's Authorization<br>• ESA Permit<br>• It is recommended that MECP be consulted during detailed design, approximately 1 year prior to initiation of preparation and construction activities at the site.<br>• The extent and nature of the proposed disturbance, as depicted on detailed design drawings, must be evaluated by MECP before a decision can be made regarding permit requirements.<br>• Additional field work or screening may be necessary to confirm the proposed works will not have an impact on SAR.<br>• Tree restoration plan will be developed during the detailed design stage. |

| Area | Future Commitments, Permits and Approvals |
|---|---|
| | • Groundwater investigations will be required to assess the extent of groundwater drawdown and rebound from dewatering during footing installation. These investigations will further aid in targeting specific timing periods and duration for dewatering from a natural heritage perspective. Dewatering plan will need to address disposal of dewatering discharge as well to avoid impacts such as sedimentation and thermal shock. |
| **Fluvial Geomorphic Impact** | • Alignment of the bridge abutments, path, and the disturbance limits of construction should be reviewed and approved by the CVC<br>• Detailed design should consider the same design principles (CVC 2019b) but may require some adaptation for the low-energy estuary and highly modified urban environment, with consultation with and approval by CVC and other stakeholders.<br><br>*Considerations to be made during detailed design include:*<br>• Confirm water levels and velocities near the proposed AT Bridge<br>• Confirm hydraulic conveyance is met under all flood conditions and lake water levels<br>• Complete river and geotechnical engineering of the south bank through the bridge is stable, and that it ties in with the train bridge upstream and existing erosion control works downstream<br>• Identify the scour hazard limit at the proposed bridge through completion of a scour assessment to determine appropriate bridge footing depths, acceptable based on geotechnical criteria in the engineering design, and erosion hazard policy criteria by CVC and stakeholders<br>• Confirm the extent and type of bank protection below the proposed bridge and along the unprotected part of the bank based on the results of the geotechnical engineering study, consultation with CVC, and updated hydraulic information<br>• Confirm land ownership of the bank work area. It is expected that the City will acquire land rights through purchase or easements where necessary to construct and maintain and bank protection works associated with the AT bridge and abutments<br>• Confirm the alignment of the bridge abutments, path, and the disturbance limits of construction<br>• Additional fill within the floodplain will be minimized<br>• Cut fill balance calculations to be provided<br>• Conduct a comparison of flow velocity for existing and proposed conditions, the proposed work must not increase flow velocities in the watercourse and should minimize channel erosion.<br>• Conduct a detailed bank protection analysis |
| **Air Quality** | • It is recommended that precautionary and mitigation approaches be considered when operating in close proximity to the identified sensitive receptor locations.<br>• The greatest potential for impacts would occur on dry and/or windy days, particularly when the winds are blowing from the west through northwesterly to north directions. During such meteorological events, consideration should be given to limiting or postponing operations that create fugitive dust emissions.<br>• As per guidance from the MECP, it is recommended that non-chloride dust suppressants be applied for all excavation, drilling and unpaved vehicle track movements to minimize fugitive dust. Regular cleaning of the construction site and vehicles and maintenance of equipment should be undertaken.<br>• Considerations should also be given to locating construction staging and storage areas away from identified receptors for both sides of the Credit River. |

| Area | Future Commitments, Permits and Approvals |
|---|---|
| **Noise and Vibration** | • A baseline vibration assessment should be undertaken during detailed design |
| **Archeological Impacts** | • The Study area requires a Stage 2 test pit survey in order to confirm the extent of existing disturbances.<br>• As identified through the MCM's *Criteria for Evaluating Marine Archaeological Potential* checklist, Marine Archaeological Assessment will be completed once construction impacts to the Credit River have been identified during detailed design.<br>• Should the proposed work extend beyond the current Study area or should changes to the project design or temporary workspace requirements result in the inclusion of previously un-surveyed lands, these lands will be subject to a Stage 2 archaeological assessment and any subsequent stages recommended in the Stage 2 archaeological assessment report as early as possible during detailed design.<br>• 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 sec. 48 (1) of the *Ontario Heritage Act*. |
| **Built Heritage Resources and Cultural Heritage Landscapes** | • Complete an HIA per the Standards and Guidelines for Conservation of Provincial Heritage Properties (Ministry of Tourism, Culture and Sport, 2010) for the Port Credit Railway Bridge (Provincial Heritage Property of Provincial Significance)<br>• Complete an HIA per the City of Mississauga Official Plan clause 7.4.1.10 for 35 Front Street North (BHR 2). *However, given that no structures or apparent landscape features of significant CHVI are anticipated to be impacted on the property, it is recommended that the City of Mississauga consider waiving the requirement of a HIA in this case in favour of suitable mitigation measures including post-construction rehabilitation which could include sympathetic plantings where required.* |
| **Transportation Access** | • Detailed traffic management plan to determine how traffic and pedestrian access will be accommodated during construction and how access to properties adjacent to new AT bridge will be maintained |
| **Property Impacts** | • Detailed design plans should include details to describe how temporary accesses will be maintained, and contract specifications should specify the allowable lengths of closures and the notification requirements to property owners.<br>• Property owners who will experience permanent property impacts will be contacted by the City of Mississauga to initiate proceedings and negotiation in acquiring property from the owner at a fair market value.<br>• Permission to Enter Agreements<br>• Metrolinx Work Permit |
| **Utilities** | • The location and alignment of existing municipal services is to be confirmed during detailed design, which may result in changes to the identified utility impacts. Formal definition of impacts on utilities will be determined during detailed design, in consultation with individual utility companies. All utility |

| Area | Future Commitments, Permits and Approvals |
|---|---|
| | information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary.<br>• During detailed design, meetings with be held with utility companies as required where potential impacts to existing or future services are identified.<br>• Detailed utility investigation works shall include:<br>o Detailed subsurface utility investigation<br>o Confirmation of leased ducts and vaults with locates and test pits during future phases of design |
| **Geotechnical Impacts** | • During detailed design, a detailed geotechnical study is recommended for this location to confirm or refine the erosion hazard limit and to inform the design and construction of the bridge abutment foundation, local grading, and potential erosion control works.<br>• Additional boreholes should be completed at the east/north abutment location during Detail Design to supplement boreholes completed during this EA Study, as they were not able to be completed due to site access issues.<br>• All recommendations and future commitments pertaining to the geotechnical environment are listed under **Section 6.6** of this report, guidelines to adhere to and specific permits to obtain are listed below:<br>o The recommended foundation type and bearing capacities based on the borehole information are for preliminary design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. The foundation type is to be confirmed in future phases of the design.<br>o The recommended geotechnical bearing resistance should be updated when the final structure assessment report becomes available.<br>o Foundations must be inspected by the geotechnical expert prior to placing to confirm the founding soil conditions and the bearing capacity.<br>o Section 4.6.5 of CHBDC requires that seismically induced lateral soil pressures on the back of abutment shall be included in design, where appropriate<br>o Proper benching of the existing embankment slope should be implemented if and where abutting into the existing embankments. This can be constructed in accordance with OPSD 208.01 – Benching of Earth Slope.<br>o The materials used for the construction of the embankment fills should consist of approved, acceptable earth fill, i.e., select subgrade materials (SSM) or Granular 'B' – OPSS 1010.<br>o Computation of earth pressures acting against bridge abutments, retaining walls and any wing walls should be in accordance with the Canadian Highway Bridge Design Code, (CHBDC) S6-06.<br>o All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA).<br>o The excavation has to be supported if the excavation walls are not flatted as required by the Regulation 213/91. |

# 1 Introduction

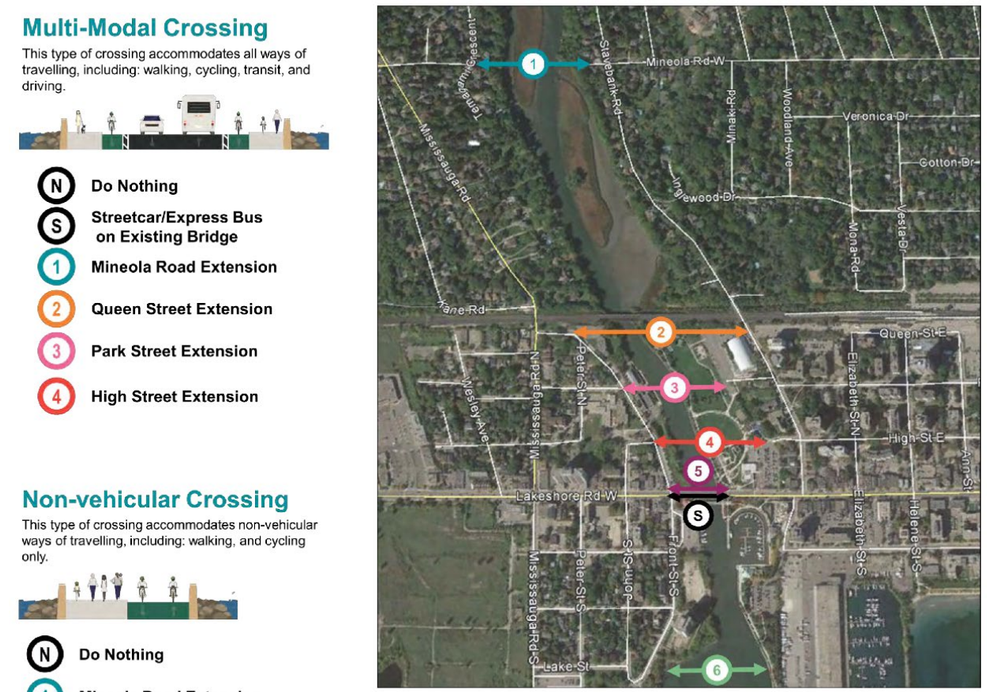
## 1.1 Study Purpose

The City of Mississauga completed the Lakeshore Connecting Communities Transportation Master Plan (TMP) and Implementation Study in 2019 ('2019 TMP'), which followed the master planning process and satisfied Phase 1 (Identify Problem and Opportunity) and Phase 2 (Identify and Evaluate Alternative Solutions to the Problem and Opportunity) of the Municipal Class EA process.

Illustrated in Figure 1-1, the 2019 TMP recommended a non-vehicular crossing located at Site 2, connecting Front Street and Queen Street East. A non-vehicular crossing was recommended to reflect the overall transportation objectives in the study area, which are to strengthen the active transportation network while relieving congestion, and limit potential project impacts on the surrounding natural and built environment. In response, the City of Mississauga has initiated a Schedule B Municipal Class Environmental Assessment (EA) (herein referred to as the 'Study'), with the following key objectives:

- Complete all background technical studies required to implement the Active Transportation bridge crossing of the Credit River north of Lakeshore Road
- Develop a range of bridge alternatives for evaluation, with considerations to all aspects of the environment
- Select a preferred solution through a transparent decision-making process
- Engage stakeholders and members of the public throughout the process

**Figure 1-1 Preferred Credit River Crossing Solution**




Credit River crossing alternative locations

### 1.1.1 Problem/Opportunity Statement

The 2019 TMP developed a vision and a set of guiding principles used to develop the Problem and/or Opportunity Statement. The vision was based on local plans and policies and refined through considerable input and collaboration with the public. The guiding principles were the following:

- Enhance connections to the waterfront
- Create vibrant public spaces
- Design for all ages and abilities
- Promote prosperity for local businesses
- Integrate transportation and land use
- Move people safely and efficiently
- Preserve the natural environment
- Enhance main street features
- Improve quality of life

Based on the set of guiding principles, the Problem and/or Opportunity Statement is as follows:

*"Lakeshore Road intersects a mix of established and developing communities. Preserving and enhancing the community's character and sense of place is important. By 2041, the Lakeshore Communities will grow by approximately 56,000 people and 16,500 jobs. Without any improvements to the transportation network in the Lakeshore Communities congestion will worsen for all road users. The existing pedestrian and cycling network are discontinuous and can be better integrated into the overall network. The existing transit service will require additional capacity in the future and a greater degree of transit priority. With limited road capacity, greater reliance on transit, walking, and cycling is required. This requires making these methods of travelling more attractive."*

This Problem and/or Opportunity Statement has been carried forward to serve as the basis for the Active Transportation (AT) Bridge Crossing to guide project outcomes.

## 1.2 Pre-Planning Activities

The completion of the 2019 TMP forms a large portion of the pre-planning activities undertaken for this Study. Key deliverables from the 2019 TMP that are carried over to this Study including:

- **Problem and/or Opportunity Statement** – carried forward to serve as the basis for the AT Bridge Crossing in defining project outcomes and subsequently, developing an outcome-based evaluation framework.
- **Existing Conditions** – partially carried forward to inform planning and design context for the AT Bridge Crossing. Topics previously covered in the 2019 TMP carried forward to this Study include:
    - Official Plans and Policies
    - Travel demand related pedestrians, cyclists, transit, and motorized vehicles

This Study will summarize and reference findings from the 2019 TMP as needed throughout the report. In addition to the findings from the 2019 TMP, this Study will be providing existing conditions documentation unique to the AT Bridge Crossing Study area, including:

- Transportation conditions for pedestrians, cyclists, transit, and motorized vehicles as it relates to the AT Bridge Crossing
- Cultural/Heritage resources as it relates to the AT Bridge Crossing
- Natural Environment resources as it relates to the AT Bridge Crossing

All documentation pertaining to pre-planning activities can be found in the *Lakeshore Road Connecting Communities Transportation Master Plan*, *Final Report (2019 TMP)* enclosed in **Appendix A.**

## 1.3 Municipal Class Environmental Assessment Process

Municipal infrastructure projects are subject to the Ontario Environmental Assessment Act (EA Act). The Class Environmental Assessment is an approved self-assessment process under the EA Act for a specific group or "class" of projects. Projects are considered approved subject to compliance with an approved Class EA process. The Municipal Class EA (Municipal Engineers Association October 2000, as amended in 2007, 2011 & 2015) applies to municipal infrastructure projects including roads, water and wastewater.

This Study is carried out in accordance with the **Schedule B Municipal Class EA** planning process. The Schedule B process provides a rational approach to consider the environmental and technical advantages and disadvantages of alternatives and their tradeoffs in order to determine a preferred alternative for addressing the problem (or opportunity), as well as consultation with agencies, directly affected stakeholders and the public throughout the process.

The key principles of successful environmental assessment planning include:

- Consultation
- Consideration of a reasonable range of alternatives
- Consideration of effects on natural, social, cultural, and economic environments and technical components
- Systematic evaluation
- Clear documentation; and
- Traceable decision making

The description of a Schedule B classification of projects and activities under the Municipal Class EA is as follows:

- **Schedule B** – Includes projects which have the potential for adverse environmental effects. This includes improvements to, and minor expansions of existing facilities. These projects are approved subject to a screening process which includes consulting with stakeholders who may be directly affected and relevant review agencies.

This study is proceeding as a Schedule B process, in accordance with the requirements of the Municipal Class EA process, which includes Phases 1 and 2.

- Phase 1 consists of identifying the problem or opportunity.
- Phase 2 involves identifying reasonable alternatives to the problem or opportunity, compiling an inventory on the natural, social and economic environment, evaluating each alternative and recommending a preferred alternative that will address the problem, and provide any measures necessary to mitigate potential environmental impacts. Public and agency consultation is required at this stage before the preferred solution is selected to ensure all possible impacts are identified and assessed as part of the evaluation process.

Once the Preferred AT Bridge Solution is selected and confirmed by Council, the final Project File Report (PFR) is made available for public review during a 30-calendar day period. A Notice of Completion is submitted to review agencies and the public at this time.

If concerns are raised during the 30 calendar-day review period that cannot be resolved through discussions with the Municipality, then members of the public, interested groups or technical agencies may request the Ministry of the Environment, Conservation and Parks (MECP) to issue a Part II Order for the project, thereby requiring an elevated scope of study. A Part II Order request requires submission of a written request to the Minister, prior to the end of the 30-calendar day review period, outlining the unresolved issue and requesting the Minister to review the matter.

Part II Order requests are submitted to:

> Minister - Ministry of the Environment, Conservation and Parks
> 77 Wellesley St. West, 11th Floor Toronto, Ontario M7A 2T5
> Fax: 416-314-8452

Copies of the request must also be sent to the Director of the Environmental Approvals Branch at the MECP at the address below:

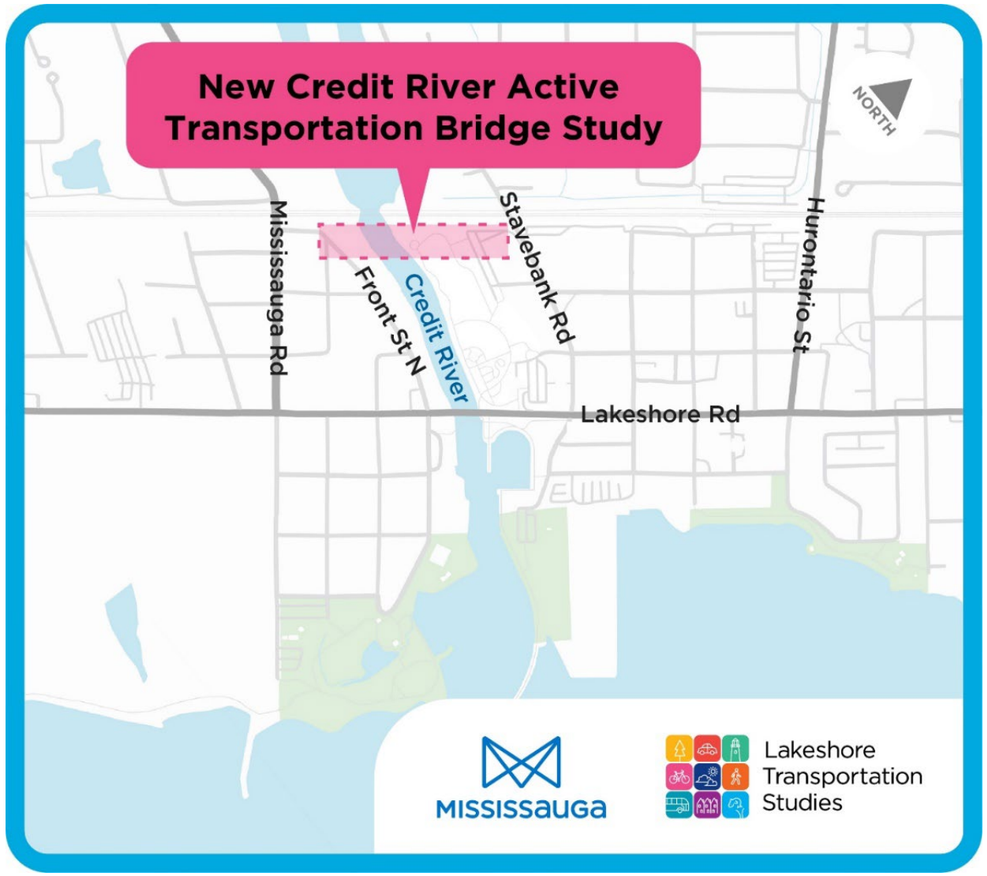
> Attn: Ms. Agatha Garcia-Wright
> Director, Environmental Approvals Branch
> Ministry of the Environment, Conservation and Parks
> Floor 12A, 2 St. Clair Avenue W
> Toronto, ON M4V 1L5

The decision whether a Part II Order is appropriate or necessary rests with the Minister. If no Part II Order requests are outstanding by the end of the 30-calendar day review period, the project is considered to have met the requirements of the Class EA, and the proponent may proceed to design and construct the project subject to resolving any commitments documented in the Project File during the subsequent design phases and obtaining any other outstanding environmental approvals.

## 1.4 Study Area

The Study area for the proposed New Credit River AT Bridge is shown in Figure 1-2. It is situated south of the existing GO rail bridge and spans from the intersection of Mississauga Road and Front Street N to Memorial Park, crossing the Credit River. This Study area represents the area upon which potential impacts from the project were assessed.

**Figure 1-2 Active Transportation Bridge Study Area**




## 1.5 Project Team

The Study is being led by the City of Mississauga Transportation and Work's Department supported by various other City departments. Project direction has been approved throughout the study by a Steering Committee and City Council. The City has retained the HDR consulting team to assist with the Study. Figure 1-3 illustrates the project team.

**Figure 1-3 Project Team**

MISSISSAUGA

HDR

- Overall Study and Design Lead

**Subconsultants**

T2 utility engineers
- Utility relocation

Matrix Solutions Inc. ENVIRONMENT & ENGINEERING
- Natural environment

ASI
- Cultural heritage
- Archeology

MOON-MATZ LTD. Consulting Engineers
- Illumination

SLR
- Air quality
- Noise and vibration

RLB Rider Levett Bucknall
- Cost estimators

dtah
- Streetscape and landscape

Cumming + Company
- Engagement lead and facilitator

# 2 Consultation and Engagement

Public and stakeholder consultation on matters that may affect the environment is required for a Schedule B Class EA under the Environmental Assessment Act. Following the processes of a Schedule B Class EA, proponents must contact agencies and members of the public that may potentially be impacted by the study to give them the opportunity to raise any comments or concerns regarding the study, alternative solutions, and designs.

## 2.1 Key Points of Contact

Table 2-1 summarizes the key public and stakeholder consultation activities carried out throughout the EA process include the distribution of a notice of commencement, two (2) technical advisory meetings, two (2) rounds of virtual open houses, a virtual survey and virtual workshop pertaining to the design elements of the bridge, and lastly, the issuing of the notice of completion.

See **Appendix B** for all public consultation documentation.

**Table 2-1 Summary of Public Consultation Activities**

| Point of Contact | Distribution | Recipients | Purpose |
|---|---|---|---|
| Notice of Commencement | • Mailed to the public on August 31, 2021<br>• Newspaper ad posted in Mississauga News on September 2 and 9, 2021<br>• Emailed to stakeholder agencies on September 2, 2021<br>• Mailed to Indigenous communities on September 9 and 14, 2021 | • Property owners and tenants within 300 m of Lakeshore Road between Winston Churchill Boulevard and the east end of Etobicoke Creek<br>• Stakeholder agencies including:<br>○ City of Toronto<br>○ Toronto Transit Commission (TTC)<br>○ Peel Region<br>○ City of Mississauga,<br>○ Town of Oakville,<br>○ Metrolinx<br>○ Credit Valley Conservation Authority (CVC)<br>○ Toronto Region Conservation Authority (TRCA)<br>○ Alectra utilities<br>○ Telus utilities<br>○ Enbridge utilities<br>○ Rogers<br>○ Bell<br>○ Hydro One<br>○ Indigenous communities including the Six Nations, Haudenosaunee Confederacy, the Huron-Wendat Nation, and the Mississaugas of the Credit | • To notify members of the public in the vicinity of the Study area as well as stakeholder agencies and indigenous communities of the study's commencement and essential information regarding the study including study scope, timelines, and area<br>• Also served to inform recipients of ways to participate in Public Information Centre #1 |
| Technical Advisory Committee Meeting 1 | • An email invite was sent on July 14, 2021 with a link to the virtual meeting<br>• A virtual meeting was held on July 22, 2021 via WebEx | Agencies invited included:<br>• City of Toronto<br>• TTC<br>• Peel Region<br>• City of Mississauga<br>• Town of Oakville<br>• Metrolinx<br>• CVC<br>• TRCA<br>• Alectra utilities<br>• Telus utilities<br>• Enbridge utilities<br>• Rogers<br>• Bell<br>• Hydro One | • To introduce potentially impacted agencies to the scope and area of the study as well as to gather feedback on the proposed presentation materials for Public Information Centre 1. |
| Public Information Centre #1 | • PIC website with study information and feedback questions ran from September 2 to 30, 2021 | • Most PIC website visitors indicated they were residents within the Study area | • To summarize the study objectives and timelines as |

| Point of Contact | Distribution | Recipients | Purpose |
|---|---|---|---|
| | • Live virtual public meeting held on September 28, 2021 via WebEx<br>• A recording of the live virtual public meeting and meeting materials have been posted on the City's website after the PIC was closed | • Attendees of the live virtual public meeting were required to register ahead of time and were emailed a link to the virtual meeting | well as technical work completed to date<br>• To gather public feedback regarding the Study |
| Technical Advisory Committee Meeting 2 | • An email invite was sent on March 3, 2022 with a link to the virtual meeting<br>• A virtual meeting was held on March 16, 2022 via WebEx | Agencies invited included:<br>• City of Toronto<br>• TTC<br>• Peel Region<br>• City of Mississauga<br>• Town of Oakville<br>• Metrolinx<br>• CVC<br>• TRCA<br>• Alectra utilities<br>• Telus utilities<br>• Enbridge utilities<br>• Rogers<br>• Bell<br>• Hydro One | • To provide an overview of the progress made since the first technical advisory committee (TAC) meeting, present content to be shared with the public at virtual Public Open House #2, and to receive feedback related to the Study. The preferred solution for the AT Bridge Study was introduced. |
| Public Information Centre #2 | • PIC website with study information and feedback questions ran from March 21 to April 8, 2022<br>• Live virtual meeting was held on March 30, 2022 via WebEx<br>• A recording of the live virtual public meeting and meeting materials have been posted on the City's website after the PIC was closed | • Most PIC website visitors indicated they were residents within the Study area<br>• Attendees of the live virtual public meeting were required to register ahead of time and were emailed a link to the virtual meeting | • Review feedback from PIC 1<br>• Introduce the evaluation results of the alternative solutions<br>• Introduce the preferred alignment and bridge type |
| Virtual Bridge Design Survey and Workshop | • The online survey ran from April 26 to May 10, 2022<br>• The live workshop was held on May 3, 2022 via Zoom | • Newspaper notices through Mississauga News on April 21, 2022<br>• Notice on City's webpage with link to online survey and registration for virtual workshop meeting up until May 10, 2022<br>• Email notice to Lakeshore Transportation Studies Project Mailing List (individuals who signed up for notification through Lakeshore Transportation Study POH 1 and POH2) on April 19 and April 20, 2022.<br>• Email notice to Indigenous Communities on April 20, 2022<br>• Email notice to City Neighbourhood Associations on April 19 and April 20, 2022<br>• Email notice to City Committees on April 19 and April 20, 2022<br>• Councillor Stephen Dasko of Ward 1 sent out a E-newsletter on May 2, 2022 | • Provide information on the cross-section and design parameters<br>• Gather input on design aspects for the AT bridge to inform the future detailed design<br>• Present preliminary concept sketches for an arch and truss bridge type for discussion. |

| Point of Contact | Distribution | Recipients | Purpose |
|---|---|---|---|
| Notice of Completion | During the drafting of this PFR, a Notice of Completion is planned to be distributed in the following ways:<br>• To be mailed to the public on February 2, 2023<br>• To be posted as a newspaper ad posted in Mississauga News on February 2 and 9, 2023<br>• To be emailed to stakeholder agencies on February 2, 2023<br>• To be mailed to Indigenous communities on February 2, 2023 | The same recipients as those who were circulated the Notice of Commencement. | • To notify the recipients of the Study's completion and that the PFR has become available for a 30-day public review |

## 2.2 Public Information Centre 1

Public Information Centre (PIC) 1 ran from September 2 to September 30, 2021. Due to limitations of the COVID-19 pandemic, PIC 1 was conducted virtually and featured two methods of engagement. Participants could review the study information material and answer feedback questions or provide general comments on the PIC website (lakeshoretransportationstudies.ca) which was available to the public from September 2 to 30, 2021 and/or they could register to attend a live presentation and Q&A session held on the evening of September 28, 2021 via a virtual presentation.

The purpose of PIC 1 was to:

- Describe the problem and opportunity
- Introduce the processes of a Schedule B class EA
- Introduce the recommended crossing location for the new Active Transportation bridge carried forward from the 2019 TMP
- Summarize the technical work completed to date
- Introduce the alternative bridge types and evaluation criteria to be used to assess alternative bridge designs
- Receive feedback and answer questions
- Discuss next step

Various communication mediums were used to invite the public and interested stakeholders to PIC 1, including:

- Distribution of mail notices via Canada Post to all the properties between Winston Churchill Boulevard and Etobicoke Creek (August 31, 2021)
- Newspaper ad posted in Mississauga News (September 2 and 9, 2021)
- Notice of commencement emailed to stakeholder agencies (September 2, 2021)
- Notice of commencement mailed to Indigenous communities (September 9 and 14, 2021)
- Social media updates on the City of Mississauga's Twitter account (September 2 and 23, 2021)

Members of the City of Mississauga and HDR project team were in attendance at the virtual meeting to answer questions, record comments and discuss issues with the public. The PIC website had over 300 users over the duration that it was open to the public and the live meeting had 43 attendees.

Key findings from PIC 1 can be found in the *Public Feedback Report* in **Appendix B.1.**

## 2.3 Public Information Centre 2

PIC 2 ran from March 21 to April 8, 2022. Due to limitations of the COVID-19 pandemic, PIC 2 was conducted virtually and featured two methods of engagement. Participants could review the study information material and answer feedback questions or provide general comments on the PIC website (lakeshoretransportationstudies.ca) which was available to the public from March 21 to April 8, 2022 and/or they could register to attend a live presentation and Q&A session held on the evening of March 30, 2022 via a virtual presentation.

The purpose of PIC 2 was to:

- Review feedback from PIC 1
- Highlight the evaluation results between the alternative bridge types
- Introduce the preferred bridge alignment and preliminary impacts to the surrounding area
- Receive feedback and answer questions
- Discuss next step

Various communication mediums were used to invite the public and interested stakeholders to PIC 2, including:

- Distribution of mail notifications via Canada Post to all the properties between Winston Churchill Boulevard and Etobicoke Creek (March 11, 2022)
- Newspaper ad posted in Mississauga News (March 10 and 17, 2022)
- Notification emailed to stakeholder agencies (March 3, 2022)
- Notification mailed and emailed to Indigenous communities (March 30, 2022)

- Social media updates on the City of Mississauga's Twitter account (March, 2022)

Members of the City of Mississauga and HDR project team were in attendance at the virtual meeting to answer questions, record comments and discuss issues with the public. The PIC website had over 100 users over the duration that it was open to the public and the live meeting had 70 attendees.

Key findings from PIC 2 can be found in the *Public Feedback Report* in **Appendix B.2.**

## 2.4 Credit River Active Transportation Bridge Design Workshop and Online Survey

The Credit River AT Bridge Design Workshop and Online Survey were undertaken to gather input on the vision and the specific design elements to inform the future detailed design of the bridge.

There were two ways to participate:

1. By attending the virtual design workshop hosted by Councillor Stephen Dasko held via a Zoom Webinar on Tuesday, May 3, 2022, from 6:30 p.m. to 8:00 p.m.
2. By visiting the Project Website to complete a survey of AT Bridge design elements. The survey was available 24 hours a day, 7 days a week from April 26 to May 10, 2022.

Notification of the consultation included the following:

- Newspaper notices through Mississauga News on April 21, 2022
- Notice on City's webpage with link to online survey and registration for virtual workshop meeting up until May 10, 2022
- Email notice to Lakeshore Transportation Studies Project Mailing List (individuals who signed up for notification through Lakeshore Transportation Study PIC 1 and PIC 2) on April 19 and April 20, 2022.
- Letters to Stakeholders and Public Agencies
    a. Email notice to Indigenous Communities on April 20, 2022
    b. Email notice to City Neighbourhood Associations on April 19 and April 20, 2022
    c. Email notice to City Committees on April 19 and April 20, 2022
- Councillor Stephen Dasko of Ward 1 sent out a E-newsletter on May 2, 2022

The online survey received 166 responses and the Zoom Webinar had 38 attendants.

Key findings from the virtual survey and design workshop are available in the *Public Feedback Report from Credit River Active Transportation Bridge Design Workshop and Online Survey* in **Appendix B.3**

## 2.5 Agency Consultation

The following agencies received the study Notice of Commencement and invitation to the Technical Advisory Committee meetings, and were requested to provide feedback or information that may support the study process:

- City of Toronto
- TTC
- Peel Region
- City of Mississauga
- Town of Oakville
- Metrolinx
- CVC
- TRCA
- Alectra
- Telus
- Enbridge
- Rogers
- Bell
- Hydro One

In addition to the general technical advisory committee (TAC) meetings, separate introductory and technical meetings were held with the following agencies:

- City of Toronto (June 23, 2021)
- CVC (June 1, 2021)
- MECP (August 12, 2021)
- Metrolinx (October 5, 2021)
- TRCA (June 14, 2021)
- Peel Region (October 15, 2021)

Following the *Environmental Assessment Government Review Team Master Distribution List* provided by the MECP, a draft of this PFR and its appendices were circulated to various agencies for review and commenting.

Agency feedback received is summarized in Table 2-2.

**Table 2-2 Summary of Agencies Feedback Received**

| Agency | Date | Comment | Response |
|---|---|---|---|
| **MECP** | October 2021 | A letter from the MECP including a list of Indigenous communities to be involved in the consultation process | Project team contacted the Indigenous communities listed |

| Agency | Date | Comment | Response |
|---|---|---|---|
| | | | throughout the Study process |
| **Metrolinx** | May 2022 | Metrolinx did not support any alignment that encroaches into their right-of-way as it would impact their current or future use of the right of way. | Project team ensured that the alignment does not encroach into the Metrolinx right-of-way. |
| **Department of Fisheries & Oceans Canada** (DFO) | October 2022 | The DFO suggested a Request for Review be completed at a later stage. | Request for Review added as a future commitment in this PFR. |
| **CVC** | | From the initial review of the draft PFR and appendices, the CVC made some comments regarding the natural environment assessment, tree inventory, and stormwater management/drainage assessment. | Comments are addressed where applicable in the PFR and appendices. |
| **Ministry of Tourism, Culture and Sport** (MTCS) | | From the initial review of the draft PFR and appendices, the MTCS made some comments regarding the cultural heritage assessment, and archaeological assessment conducted as part of this Study | Comments are addressed where applicable in the PFR and appendices. |
| **Ministry of Natural Resources and Forestry** (MNRF) | | From the initial review of the draft PFR and appendices, the MNFR made some recommendations regarding the natural environment assessment | Comments are addressed where applicable in the PFR and appendices. |
| **Metrolinx** | November 2022 | Metrolinx commented that the proponent would need to undergo a third-party process and obtain a work permit prior to construction | Requirements added as future commitments in this PFR |

## 2.6 Interested Parties

The Royal Canadian Legion Branch 82 (herein referred to as the Legion) is located adjacent to the westerly shore of the Credit River and is within the Study area. As such, the proposed AT Bridge may pose property impacts to the Legion. A meeting was held between the project team and the Legion on March 4, 2022, to introduce the preliminary preferred AT Bridge alignment, during this meeting, Legion staff expressed concerns over the potential impacts that the proposed bridge alignment would have on their parking lot.

The project team worked to revise the alignment to minimize the impacts to the Legion's property, and the revised alignment was introduced to the Legion at a subsequent meeting on August 4, 2022. The revised alignment was preliminarily supported by the Legion and the project team committed to further consultation with the Legion during the detailed design phase.

## 2.7 Utilities

Several utility companies invited to join the TAC meetings provided comments in the beginning stages of the Study, including:

- Bell Canada requested for preliminary designs that indicate the potential relocation of utilities
- Telus does not have any infrastructure in the Study area but does have structure on the railway north of Lakeshore Road

To better understand the utility facilities in the Study area, a utility request was submitted by HDR in December, 2021 to the utility companies within the Study area to identify any existing and planned utility facilities that may be impacted by this Study. See Section 3.15 for findings of the utility request.

See **Appendix B.4** for all agency comments, responses, and meeting minutes.

## 2.8 Indigenous Consultation

The project team contacted the Ministry of Environment, Conservation and Parks (MECP) regarding the consultation of Indigenous communities for this Study and subsequently received an official letter from the MECP confirming that the Indigenous communities to be consulted are:

- Huron-Wendat Nation
- Six Nations of the Grand River
- Mississaugas of the Credit First Nation (MCFN)
- Haudenosaunee Confederacy

A Notice of Commencement was mailed to all Indigenous groups and follow up emails were sent two weeks after the notice was mailed. All groups indicated an interest in participating in archeological field work, MCFN and the Haudenosaunee Confederacy also indicated an interest in participating in any field work to be completed for the natural environment assessment.

Project staff responded that all natural environment and cultural heritage field work had been completed prior to receiving a response from the Indigenous groups and that no archeological field work had been planned at the time this report was drafted. Upon request, project staff circulated the draft existing conditions cultural heritage and natural environment reports to all Indigenous groups for review. Comments on these reports were received from Six Nations and MCFN, they were tracked and addressed. The revised reports will be circulated back to the Six Nations and MCFN for review as appendices of this Project File Report.

A meeting was held between the City of Mississauga and HDR project staff as well as representatives of the Haudenosaunee Confederacy regarding the Confederacy's involvement in conducting field work. Project staff confirmed with all other Indigenous groups that they had no further comments on the reports circulated.

All communications with the Indigenous groups throughout the Study were recorded in a table enclosed in **Appendix B.5**.

# 3 Existing Conditions

## 3.1 Land Uses

The Study area is surrounded by land uses including residential, commercial, open space, and parking (Figure 3-1). The following sections detail the significant land use characteristics in proximity to the Study area.

**Figure 3-1 Land Use Context**


### 3.1.1 Port Credit Community

The study area of the AT Bridge is situated within the Port Credit Community and is known regionally as a scenic waterfront destination.

- **East of the Credit River –** South of the rail corridor consists of residential high density and mixed-use land uses. Areas directly adjacent to the waterfront consist mainly of public open space.
- **West of the Credit River** – South of the rail corridor consists mostly of residential high density, and some mixed-use land uses. Areas directly adjacent to the waterfront, along Front Street, consist mainly of public open space.

Included in Port Credit is the Port Credit GO Station Southeast Area, a master planned site with specific redevelopment and land use direction.

### 3.1.2 Port Credit GO Station Southeast Area

The Port Credit GO Station Southeast Area is comprised of 12 properties totaling approximately 5.04 acres (2.04 hectares) which are located east of Hurontario Street, south of the CN Railway and Queen Street, east of Helene Street and north of High Street. The boundaries of the Master Plan reflect those established by the Port Credit Local Area Plan (i.e., Site 12).

### 3.1.3 Port Credit Community Node (CN)

The Port Credit CN character area is generally bounded by the rail corridor to the north, Lake Ontario to the south, Mississauga Road N and Front Street S to the west, and Rosewood Road and Elmwood Avenue S. to the east. The central portion of the corridor generally consists of 2 storey "main street" retail commercial uses, several with residential above. Higher density forms of mixed residential/commercial in the range of 5 to 22 storeys can be found on the western and eastern edges of the corridor, as well as just behind the fronting properties. Community and cultural uses within this area include: the Port Credit Library adjacent the corridor, the Port Credit Harbour Marina, Port Credit Arena, canoe and rowing clubs along the Credit River, and several schools and a number of places of worship. There is also a substantial amount of public parkland and open space, some located adjacent the corridor, but mainly located throughout the area.

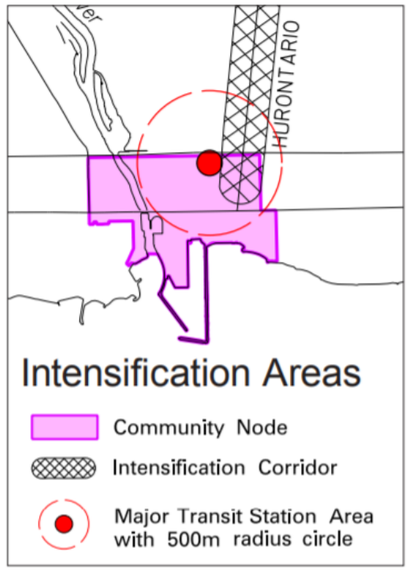
## 3.2 Official Plans and Policies

### City of Mississauga Official Plan (OP) (2020)

Chapter 8 of the City of Mississauga OP provides broad policy support for developing a multi-modal City. The AT bridge is located within and adjacent to several designated land uses and designations, including:

- The Port Credit GO Station Southeast Area Master Plan
- Community Node (Schedule 2 of Mississauga Official Plan, Figure 3-2)
- Major Transit Station Area

**Figure 3-2 Excerpt from Schedule 2 of the Mississauga Official Plan- Intensification Areas within Port Credit**




Schedules 1 to 9 of the Official Plan identify Corridors, Intensification Areas, and Transit Terminals, Natural heritage Systems, Parks and Open Spaces, Utilities Areas, and Educational Facilities within the study boundaries.

Port Credit GO Station is the Major Transit Station Area (MTSA) located within the Study area as identified in the Mississauga OP and as defined in the Growth Plan for the Greater Golden Horseshoe, 2017. Major transit station areas on priority transit corridors (i.e., the Lakeshore West GO Line) will be planned for a minimum density target of 150 residents and jobs combined per hectare.

### City of Mississauga Cycling Master Plan (2018)

According to the Mississauga Cycling Master Plan, the highest demand for cycling in the study corridor is along Burnhamthorpe Road, Waterfront Trail, Lakeshore Road, Eglinton Avenue W, Aquitaine Drive, Thomas Street and McLaughlin Road. Cycling volumes along major corridors represent 1% or less of all travel modes. There is a high demand for cycling where linking destinations to neighbourhood centres is critical, such as in Clarkson, Port Credit, along the Waterfront, and in proximity to GO Stations.

The Master Plan identifies several recommended updates to the existing cycling network within the Plan's Five-year implementation plan, including new proposed routes within and adjacent to the AT Study area (see Figure 3-10):

- Mississauga Road N between Lakeshore Road and Queensway
- Stavebank Road between Lakeshore Road and Queensway
- Queen Street E between Stavebank Road and Helen Street N.
- Credit River Crossing between Mississauga Road and Stavebank Road (this project)

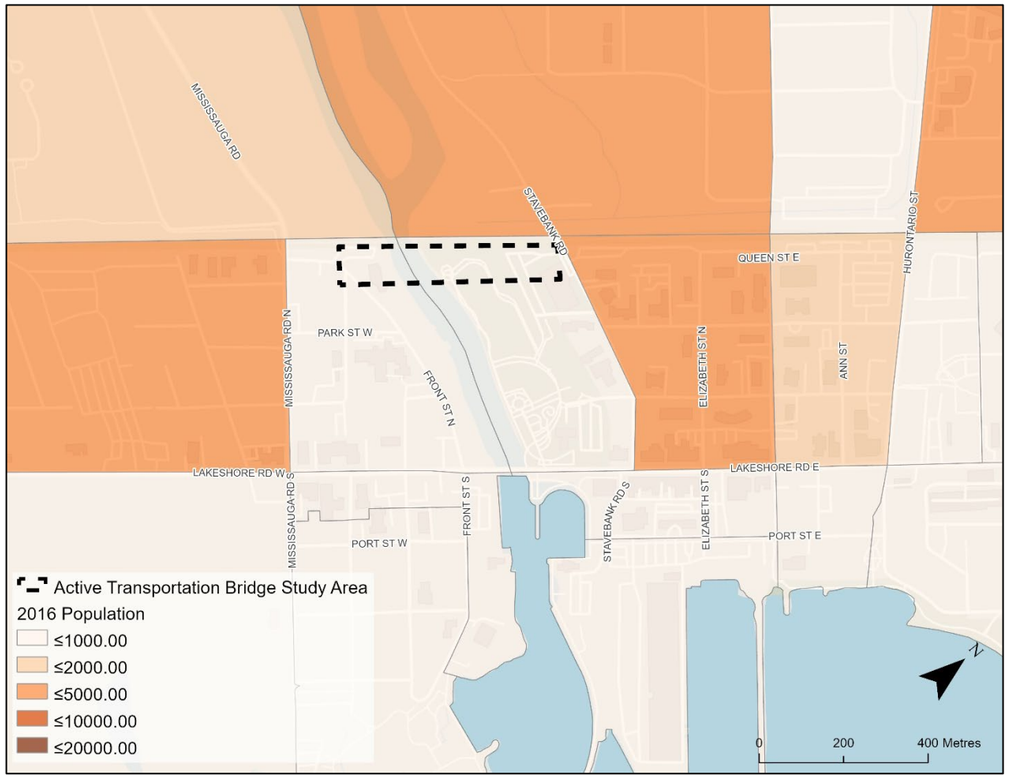
The Plan also recommended upgrades to the existing cycling network within the AT Bridge Study area, including:

- Mississauga Road N under the rail overpass (On-Road Facility Upgrade)

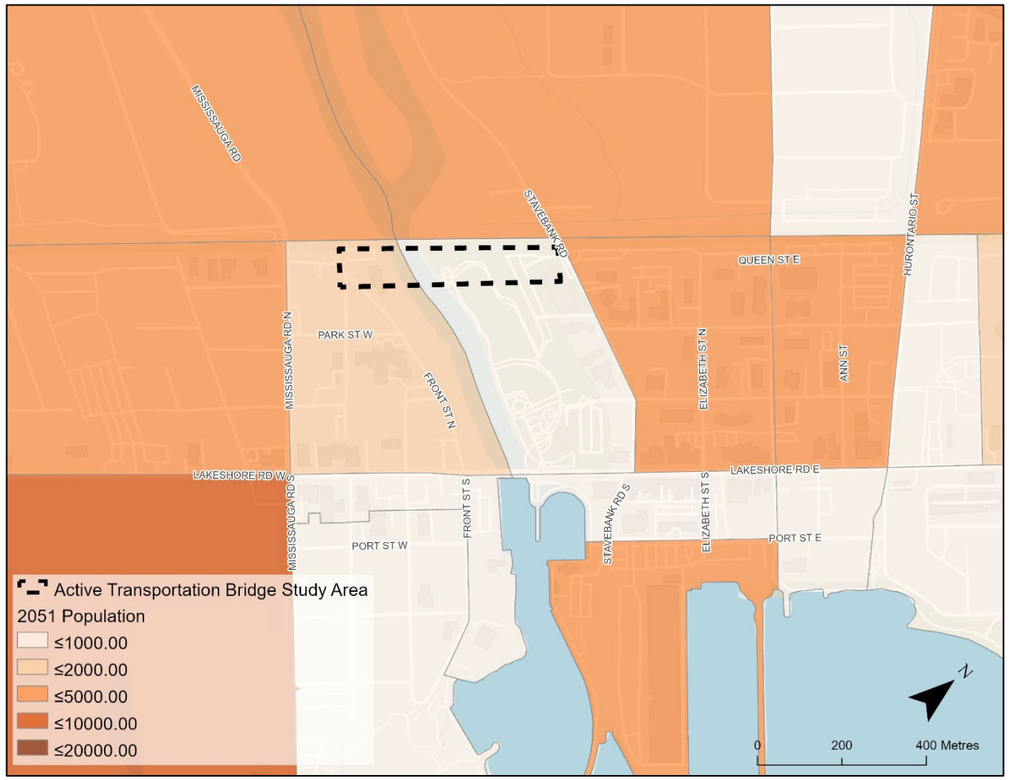
### 3.2.1 Population and Employment

The total population within the Study area of the AT Bridge is 54 (2016) and is expected to reach 73 by 2051. Employment within the Study area is currently at 54 (2016) and is expected to reach 70 by 2051. See Figure 3-3 to Figure 3-8 for an overview of the population conditions in the Study area.

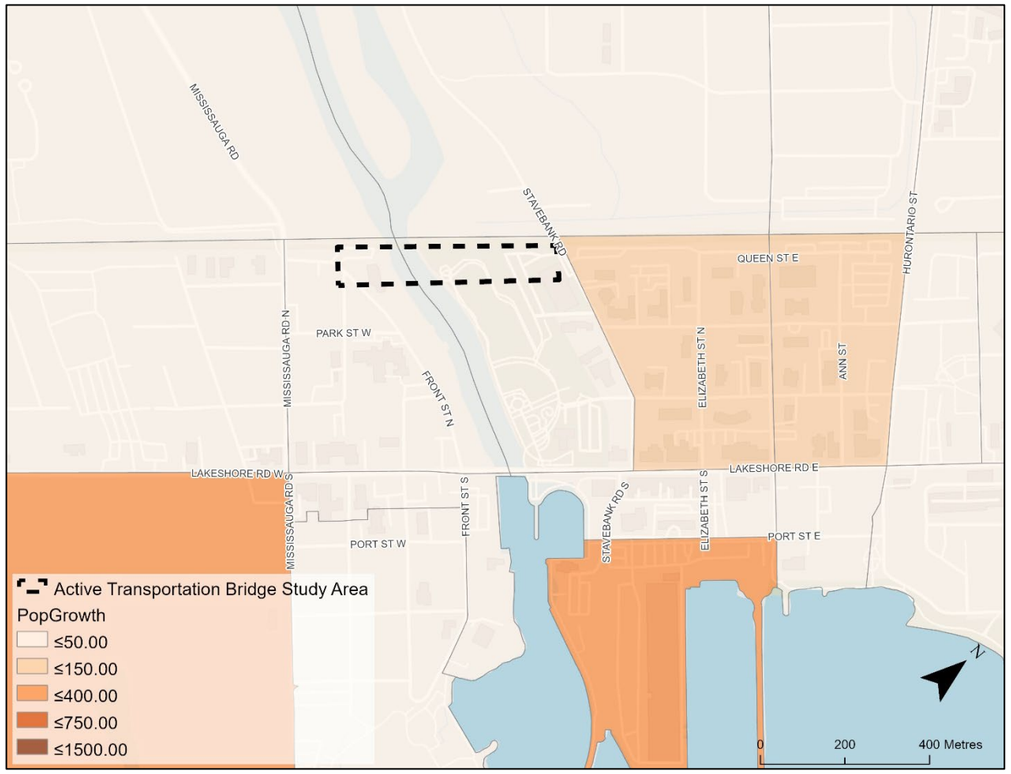
## Figure 3-3 Study Area Population (2016)



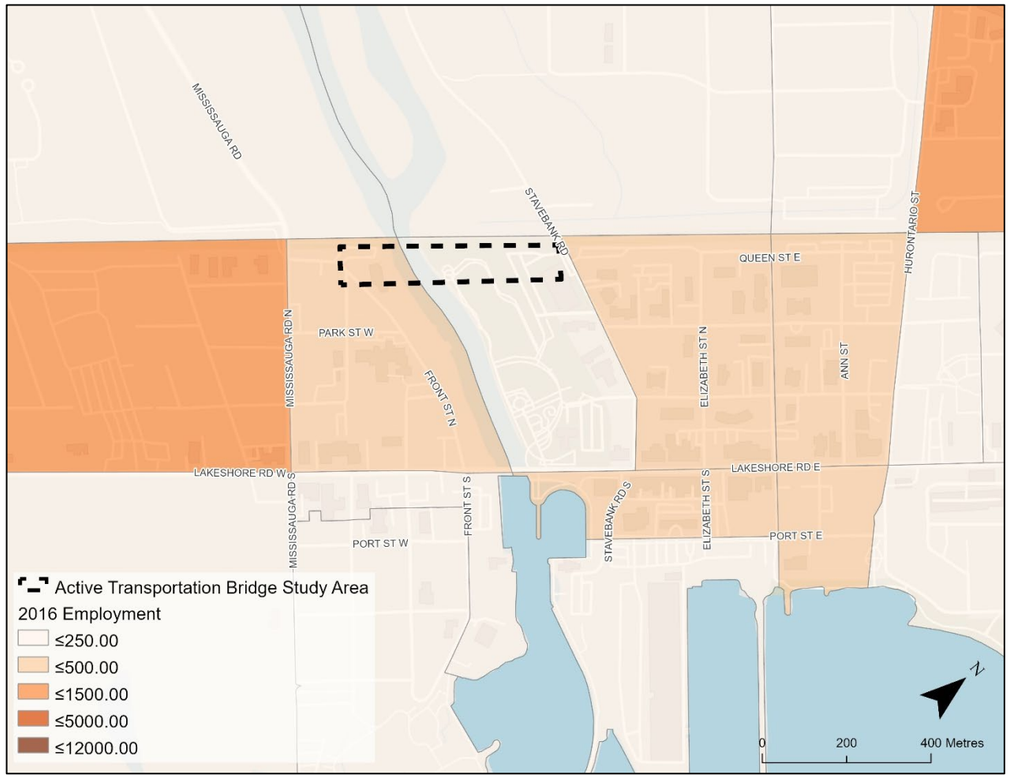

## Figure 3-4 Study Area Population 2051



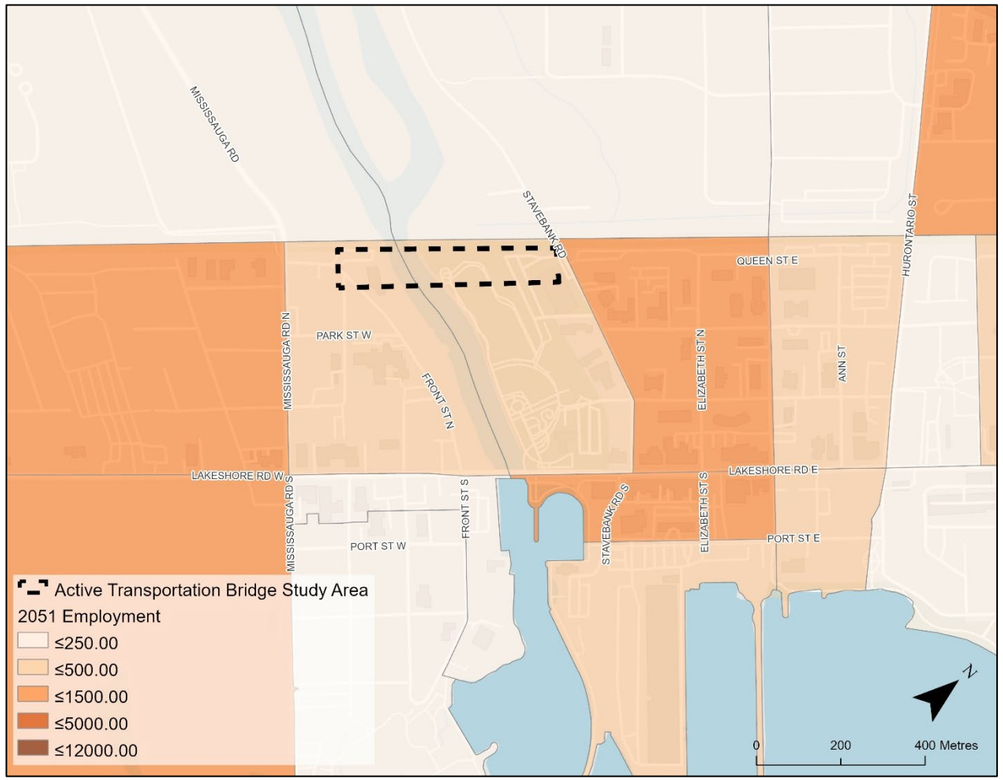
## Figure 3-5 Study Area Population Growth



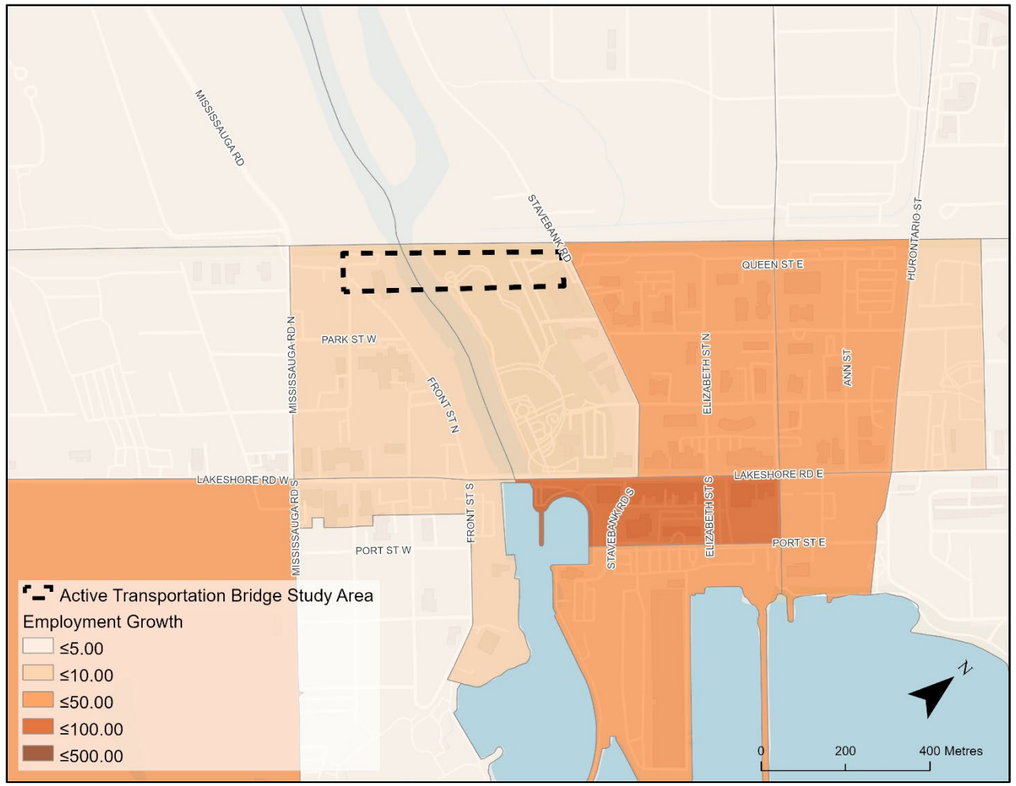

## Figure 3-6 Study Area Employment 2016



## Figure 3-7 Study Area Employment 2051




## Figure 3-8 Study Area Employment Growth

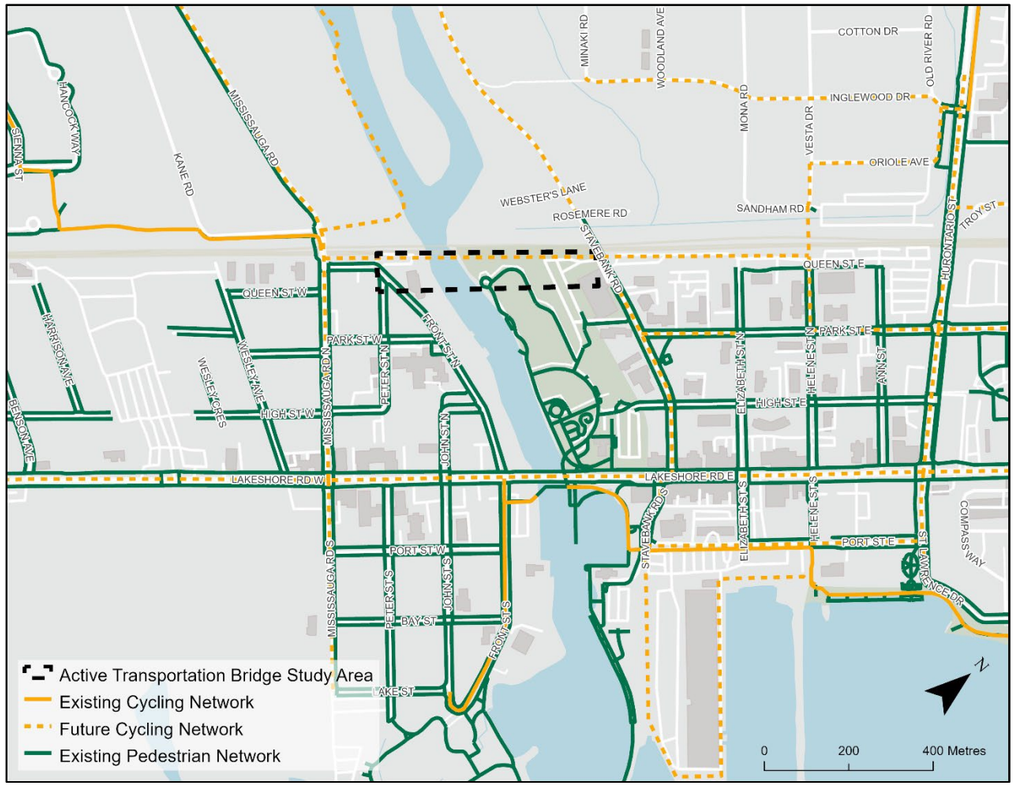


## 3.3 Transportation

### 3.3.1 Pedestrian Network

The sidewalk and trail network within the Study area of the AT Bridge is illustrated in Figure 3-9. On the west of the Credit River, the sidewalk network is continuous and connects to the future AT Bridge path on Front Street and Mississauga Road. On the East side of Credit River, a multi-use path runs along the bank of the river and connects to Stavebank Road.

**Figure 3-9 Existing Pedestrian Network**




### 3.3.2 Cycling Network

The existing and planned cycling network surrounding the future AT bridge is illustrated in Figure 3-10. The existing cycling network features gaps on both sides of the Credit River – a multi-use path on Kane Road terminates at Mississauga Road, and the west side of the Credit River lacks any dedicated cycling facilities.

**Figure 3-10 Existing and Planned Cycling Network**


As per the Mississauga Cycling Master Plan, several cycling facilities are proposed in the Study area to close the gaps in the network identified previously, including:

- Cycling Track / Separated Bike Lane on Mississauga Road between Kedleston Way and Lake Street
- Bike lane on Stavebank Road between the QEW and Lakeshore Road
- Multi-Use Path on Queen Street East between the West side of the AT bridge and Helena Street N
- Shared Route on Park Street East between Stavebank Road and Elizabeth Street North

### 3.3.3 Auto Network

The road network within the Study area consists mainly of local, minor collector, major collectors, and regional major collectors, as shown in Figure 3-11 and Table 3-1.

**Figure 3-11 Existing Road Network**

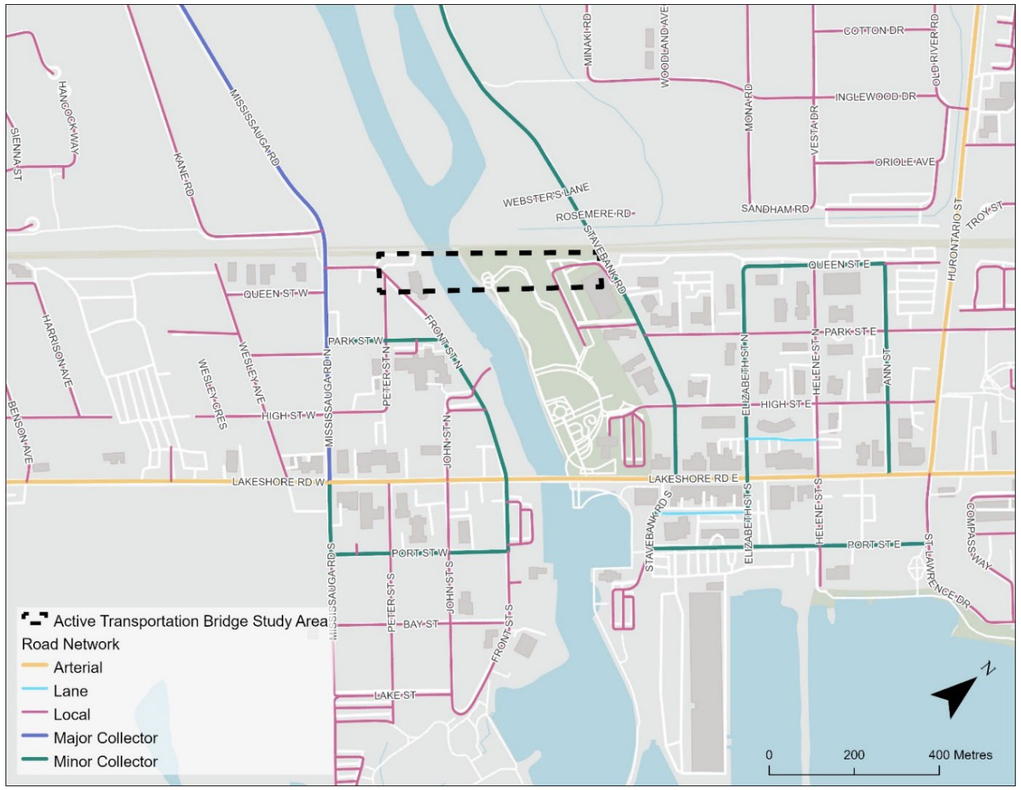



**Table 3-1 Roads in Study Area**

| Road Name | Classification |
|---|---|
| Front Street (Mississauga Road to Lakeshore Road) | Local/Minor Collector |
| Queen Street East (Stavebank Road to Hurontario Street) | Minor Collector |
| Mississauga Road (Queen Elizabeth Way to Lakeshore Road) | Major Collectors (Scenic Route) |
| Stavebank Road (Pinetree Crescent to CN Railway) | Regional Major Collectors (Scenic Route) |

### 3.3.4 Transit Network

Figure 3-12 and Table 3-2 below summarizes the existing and planned transit services within the vicinity of the Study area.

**Figure 3-12 Study Area Transit Network**

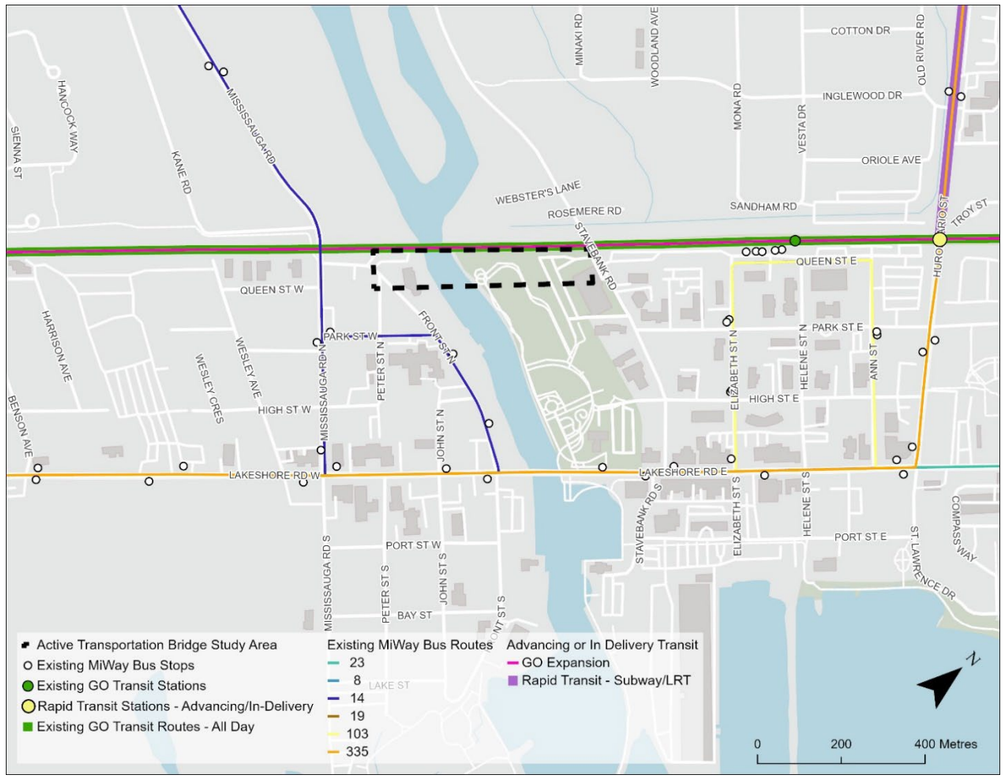


Table 3-2 Existing and Planned Transit Services within Study Area

| Route / Service | Description |
|---|---|
| Route 14 - MiWay | Runs along Mississauga Road and Park Street West |
| Route 103 - Miway | Runs along Lakeshore Road East, Elizabeth Street North, Queen Street East, Ann Street |
| Lakeshore Express- MiWay | Runs along Lakeshore Road and Royal Windsor Drive between East Avenue and Winston Churchill Boulevard |
| Hurontario LRT- Metrolinx | Runs along Hurontario St, with a terminal stop at the Port Credit GO station |
| Lakeshore West (Port Credit GO Station) – GO Transit | Runs along rail corridor on north-side of Study area |
| Lakeshore West (Port Credit GO Station) – GO Transit | GO Transit anticipates an increased frequency of service along the Lakeshore West train line |

### 3.3.5 Parking

Parking supply in the Study area is summarized as follows:

On the west side of the Credit River:

- There is a municipal parking lot with 22 lay-by parking spaces along Front Street N that is shared between the Royal Canadian Legion (the Legion) and the Mississauga Canoe Club
- Additionally, there is a private parking lot owned by the Legion that has 46 parking spaces
- There is no on-street parking allowed at any time on Mississauga Road and Front Street.

On the east side of the Credit River:

- There is a public parking lot located at 40 Stavebank Road with over 120 parking spaces that accommodates the users of the Port Credit Memorial Arena, Port Credit Figure Skating Club, Port Credit Memorial Playground, and the local skatepark
- Additionally, public on-street parking is permitted on both sides of Stavebank Road

### 3.3.6 Driveway Access

There are several driveway accesses within the Study area for residential, commercial, and institutional properties. On the east side of the Study area, there is access off Stavebank Road into the Port Credit Memorial Area parking lot. On the west side of the Study area, there is access off Front Street into the Royal Canadian Legion's parking lot and two driveways of private residential properties. Figure 3-13 provides and overview of all key driveway access points in the Study area.

Figure 3-13 Driveway Access


## 3.4 Natural Environment

### 3.4.1 Terrestrial Environment

**Vegetation Communities**

Three terrestrial communities and one aquatic community were documented based on field assessments conducted in 2021 (Table 3-3). Of the native vegetation communities found within the Study area, none are considered to be rare and are ranked as either S4 or S5. The natural environment of the Study area has been impacted by Metrolinx works since the field assessments conducted in 2021, these impacts are consequently not noted in the findings of this report. Updated impacts to be confirmed during the detailed design phase of the project.

**Table 3-3 Vegetation Communities**

| Ecological Land Classification Community Type | Location | Community Description |
|---|---|---|
| CUW1: Mineral Cultural Woodland (0.14 ha) | West side of Credit River | • A small woodlot is present along the Credit River north of the Royal Canadian Legion parking lot.<br>• Woodlot lies on a steep northeast-facing slope and was noted as containing large areas of bare mineral soil.<br>• The canopy was dominated by Manitoba Maple.<br>• Canopy-cover assessed to be approximately 60%.<br>• Other common canopy species included Black Walnut (*Juglans nigra*), Norway Maple (*Acer platanoides*), and Siberian Elm. A single large multi-stem Crack Willow (*Salix fragilis*) covers a large portion of the bank in this area.<br>• Species diversity in the understory was low, with dense areas of Garlic Mustard (*Alliaria petiolata*) and Dog-strangling Vine (*Cynanchum rossicum*). |
| FOD7: Dry- Fresh Deciduous Forest (0.61 ha) | East side of Credit River | • A linear woodlot is present east of the Credit River adjacent to Port Credit Memorial Park south of the railway which features a diverse canopy, though Manitoba Maple dominates throughout.<br>• Other common species include Basswood (*Tilia americana*), Norway Maple, Siberian Elm, and Mountain Ash (*Sorbus americana*).<br>• The eastern canopy features a higher proportion of maples and oaks (Sugar Maple [*Acer saccharum*]; Silver Maple [*Acer saccharinum*]; Red Oak [*Quercus rubra*]; Bur Oak [*Quercus macrocarpa*]), though Sugar Maple does not dominate the canopy here.<br>• Along the southern margin areas of dense Staghorn Sumac (*Rhus typhina*) form small Sumac Cultural Thicket (CUT1-1) inclusions.<br>• The understory within this woodlot was found to be almost entirely overgrown with Garlic Mustard.<br>• Other signs of disturbance include the presence of multiple walking trails and litter |
| CUM1-1: Mineral Cultural Meadow (0.13 ha) | Along rail bridge west of cultural woodland | • A graminoid-dominated cultural meadow is located along the rail right-of-way (RoW).<br>• The ecosite was flat and level and was dominated in areas by Canada/Tall Goldenrod (*Solidago canadensis/altissima*), Reed-canary Grass (Phalaris arundinacea), Teasel (*Dipsacus sylvestris*), and Canada Thistle (*Cirsium arvense*).<br>• Other common species included Smooth Brome, (*Bromus inermis*) Wild Carrot (*Daucus carota*), Tufted Vetch (*Vicia cracca*), Red/White Clover (*Trifolium pratense/repens*), Bird's-foot Trefoil (*Lotus corniculatus*).<br>• The RoW was enclosed by a chain-link fence. Along the fence numerous woody species and several mature trees were present including Manitoba Maple (*Acer negundo*), Siberian Elm (*Ulmus pumilia*), Eastern Cottonwood (*Populus deltoides*), and Eastern White Cedar (*Thuja occidentalis*), with dense growth of River Grape (*Vitis riparia*) and Virginia Creeper (*Parthenocissus quinquefolia*) noted as well |
| OA: Open Aquatic | Credit River | • This community consists of the open aquatic system of the Credit River. |

**Flora**

Of the 167 vascular plant species identified within the Study area, 52% of species are considered native or naturalized within the province; 45% are considered non-native, introduced, or a cultivar; and 3% were unclassified.

**Avian Species**

Of the 105 species identified within the background review, 13 species at risk (SAR) and 3 species of conservation concern (SCC) were noted to potentially occur within the Study area. The SAR and SCC species were assessed to identify the habitat potential within the Study area.

Breeding bird surveys were conducted on June 1 and June 22, 2021 and included two breeding bird stations. The breeding bird survey confirmed the presence of 21 species, which included two SAR (Barn Swallow [*Hirundo rustica*] and Chimney Swift [*Chaetura pelagica*]) within the Study area. No SCC were observed within the Study area.

### 3.4.2 Aquatic Environment

Upstream of Lakeshore Road East to a railway overpass, the Credit River flows as a defined watercourse within a narrow natural corridor through a highly urbanized environment. The water flows south toward Lake Ontario. Both banks contain a very narrow band of vegetation consisting of trees and shrubs. Between the two overpasses there is a canoe club with docks in the river on the west bank. The east bank has undergone channel hardening along the length of the Port Credit Memorial Park. The channel is sparsely shaded by overhead deciduous trees and overhanging shrubs in the understory along the banks.

Channel morphology within the Study area of Credit River measured an average width of approximately 55 m and a depth of 4.2 m in the centre, 3.5 m on the right, and 3.7 m on the left to create a bowl shape channel. The substrate is muck and the water is murky. There is no aquatic vegetation in the channel. Some of the bank has been naturalized just south of the railway however the banks are mainly armourstone lines with sparse overhanging vegetation. Riparian vegetation within the Study area consisted primarily of deciduous trees and shrubs. No instream vegetation was observed within the channel. Habitat within the Study area was limited. Overhanging trees and shrubs providing shade along with cracks in the armour stone create some habitat.

The Credit River is a warm water system which contains a variety of cyprinid species as well as sport fish. Fisheries data from CVC indicated 52 species in the Credit River, including the American Eel which is listed as endangered under the ESA and the Atlantic Salmon which is listed as extinct under SARA.

### 3.4.3 Natural Heritage Features, Wildlife, and Habitat

Significant natural heritage features and functions include those listed in the PPS (MMAH 2020), the Natural Heritage Reference Manual (NHRM) (MNR 2010), the Significant Wildlife Habitat Technical Guide (SWHTG) (MNR 2000) and the SWH Ecoregion 7E Schedules (MNRF 2015). Reference was also obtained from the natural heritage system from the City's Official Plan (City of Mississauga 2021). The findings of the site investigations were cross-referenced with the criteria provided in these documents in order to identify the presence of or potential presence of significant natural heritage features.

The following significant features were not present within the Study area:

- Environmentally Significant Areas
- Wetlands or unevaluated wetlands
- Special Management Areas

The following significant features were present within the Study area

- **Areas of Natural and Scientific Interest (ANSIs):** ANSIs are features identified by the Province of Ontario to be important for natural heritage, protection, scientific study, or environmental stewardship. Two life sciences ANSIs are located within the vicinity of proposed works. The first ANSI is the Lorne Park Prairie. This feature is a linear section of residual tallgrass prairie associated with the CN rail corridor southwest of the study area. The second ANSI is the Credit River Coastal Marsh, a system of coastal wetland areas along the Credit River immediately west of the study area that extends approximately 2 km west of the CN railway bridge.
- **Significant Valleylands and Corridors:** The Credit River and its associated valleylands are a part of the City's "Significant Natural Area" (City of Mississauga 2021) and, as a result, are considered significant.
- **Provincially Significant Wetland (PSW):** The Credit River marshes have been identified within Schedule 3 of the Official Plan as a PSW and ANSI system, which spans from north of the Queen Elizabeth Way to the CN railroad bridge. The marsh system ends upstream of the CN bridge; however, the works being completed on the downstream section as part of the Credit River AT bridge are within the PSW 120 m Area of Influence (AOI).

- **Significant Woodlands:** The wooded ecosites west of the rail bridge fall below the 0.5 ha threshold for significant woodlands, but the FOD7-C ecosite associated with the Port Credit Memorial Park does fit the definition of a significant woodlands designation per the City's Official Plan. It is greater than 0.5 ha and is within 30 m of a watercourse and a significant wetland.
- **Linkages and Corridors:** The Credit River is considered a linkage under the City's Official Plan "Significant Natural Area" designation. This linkage is significant for both terrestrial and aquatic organisms. The wooded riparian area along the edge of the river provides a linkage to other natural areas within the system.

**Significant Wildlife Habitat**

The wildlife habitat assessment was based on vegetation communities and incidental wildlife observations documented during the site investigations as well as data collected from the background review. The Ministry of Northern Development, Mines, Natural Resources, and Forestry (MNDMNRF)'s guidance on identifying and assessing wildlife habitat recognizes five main categories of wildlife habitat, each with several wildlife habitat types, each with criteria to evaluate significance. The results of the assessment indicated the potential for candidate SWH and included the following:

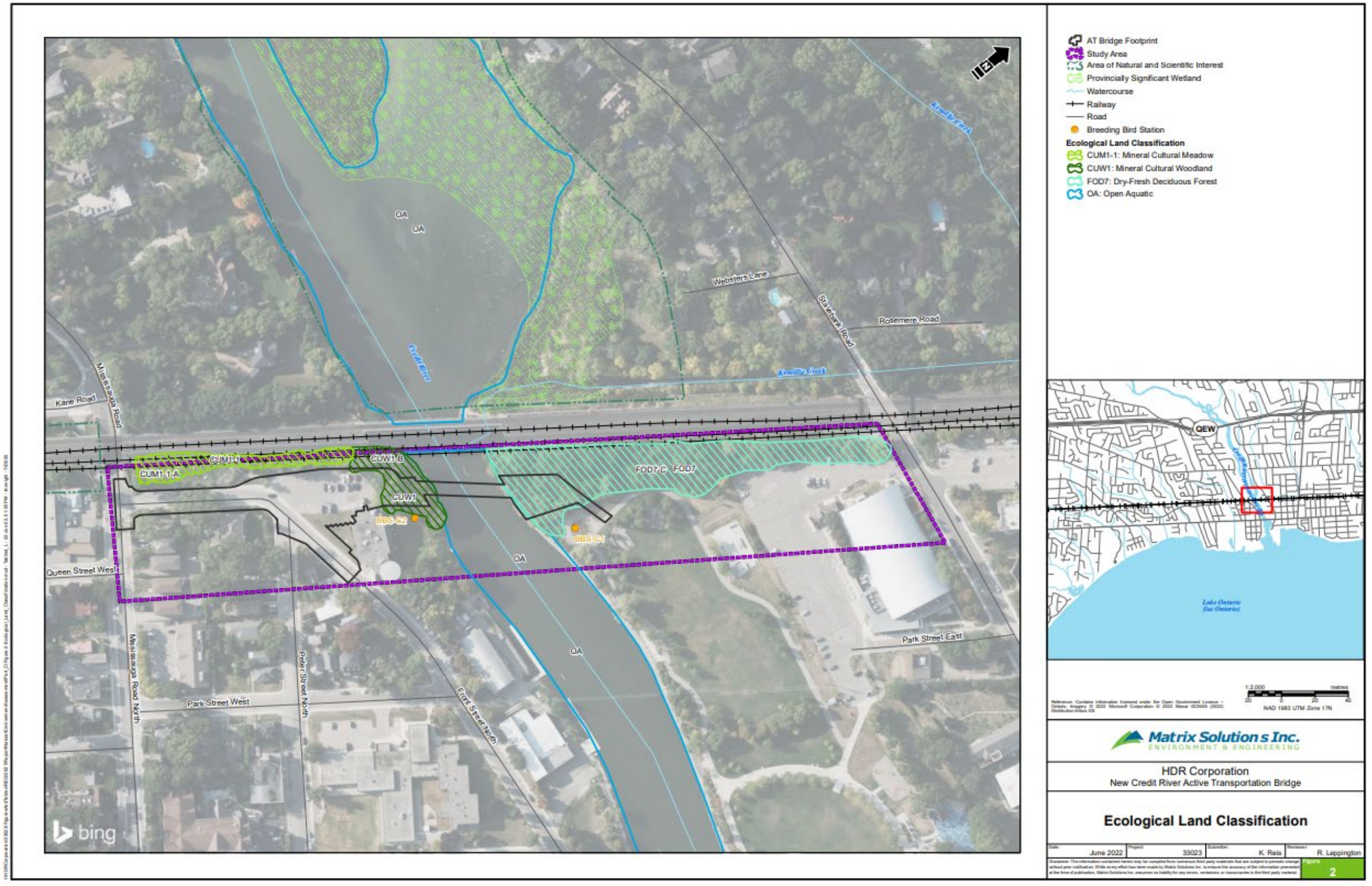
- **Bat Maternity Colonies:** there is a FOD community within the Study area that is located adjacent to water that allow for areas of feeding. In addition, both Oak (*Quercus*) and Maple (*Acer*) species were recorded in these areas which are preferred by SAR bats.
- **Turtle Wintering Area:** The Credit River outlets into Lake Ontario less than 1 km downstream of the Study area; therefore, it will not freeze over in the winter. The substrate was also found to be muck, which is conducive to turtle overwintering.
- **Bald Eagle and Osprey Nesting/Foraging/Perching:** There is forested area surrounding the Credit River within the Study area.
- **Rare Wildlife Species:** Candidate habitat for Eastern Wood-pewee, Northern Map Turtle, Greater Redhorse and Snapping Turtle.
- **Amphibian Movement Corridors:** The Credit River corridor acts as a north-south linkage associated with water that may act as a movement corridor for amphibian species.

**Species at Risk**

29 SAR were identified as potentially occurring within the Study area based on background review and site investigations. The results of the assessment indicated that 24 SAR species were unlikely to inhabit the area based on the lack of appropriate habitat, three SAR species have potential to occur within the Study area (Little Brown Myotis, Northern Myotis, and Tricolored Bat), while two species were confirmed within the Study area (Barn Swallow and Chimney Swift).

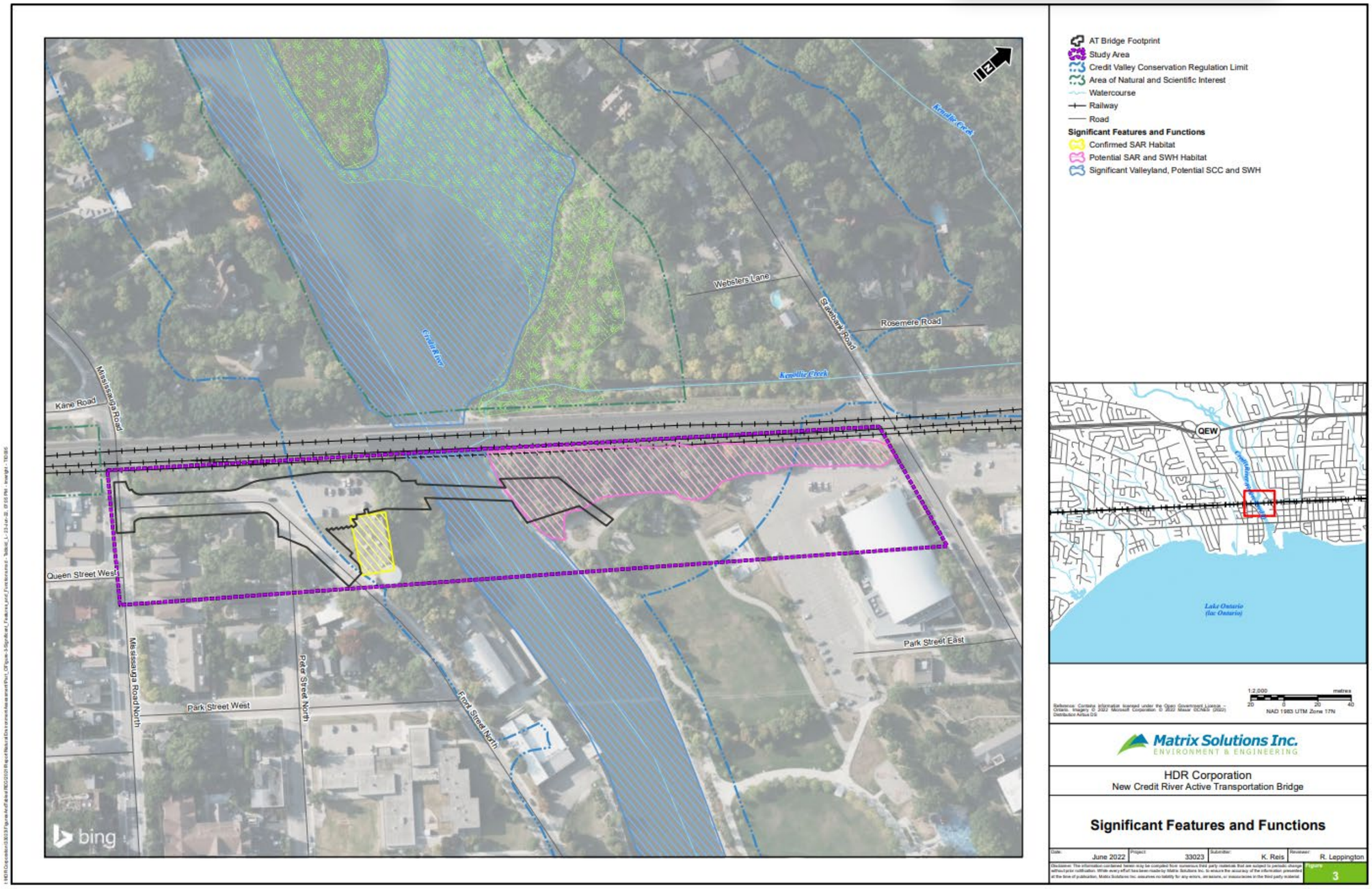
See Figure 3-14 and Figure 3-15**.** for all significant areas mentioned from Sections 3.4.3. More details on the terrestrial and aquatic environments and natural environmental resources in the Study area can be found in the *Natural Environment Assessment Report* in **Appendix C.1.**

## Figure 3-14 Ecological Land Classification




*CUM 1-1 have been impacted by Metrolinx works since the field assessments conducted in 2021, these impacts are consequently not noted in the findings of this report. Updated impacts to be confirmed during the detailed design phase of the project.

## Figure 3-15 Map of Significant Features and Function



## 3.5 Tree Inventory

The following sections outline the key processes and finding of the tree inventory conducted in the summer of 2021.

**Methodology**

An International Society of Arboriculture (ISA)-certified arborist conducted the tree inventory and assessment on June 2, 2021. All trees 10 cm or greater in diameter at breast height (DBH) within 10 m of the proposed AT bridge alignment were included in the inventory. The following information was collected for each tree:

- Genus or species identification based on physical characteristics of each tree
- Measurement of DBH which is the diameter of the trunk at 1.4 m above the ground
- Radial dripline estimation based on spread of canopy from trunk to limit of overhead branches: radial dripline is used as a starting point to determine the minimum limits of a tree protection zone (tpz) for a particular tree as part of tree protection planning.
- General rating (“good,” “fair,” “poor”) of trunk integrity, crown structure, and crown vigour based on observations of overall physical appearance of tree. No detailed structural assessment of roots, trunk, or branches were conducted.
- Condition observations including presence of multiple or codominant stems, percentage of crown dieback, lean direction, presence or absence of pathogens, insect pests, epicormics growth, cavities or wounds, and other physical anomalies
- Other general comments relating to unique conditions or surrounding growing conditions

A species at risk (SAR) information request was submitted to the Ontario Ministry of the Environment, Conservation and Parks (MECP) on May 27, 2021. The MECP indicated that there were no SAR tree species in the Study area but that Butternut, as recorded in the Natural Heritage Inventory Centre database, may be found. No SAR were found during the tree inventory of AT bridge Study area.

**Tree Inventory Results**

126 trees were collected within 10 m of the proposed crossing alignment. This includes 17 different genus and 23 different species. Trees range in size from 10 to 137 cm DBH, and the driplines range from 1 to 11 m. Additional details on the investigations and findings associated with tree inventory are provided in the *Tree Inventory Report* in **Appendix C.2**. A number of trees in the Study area have been impacted by Metrolinx works since the tree inventory conducted in 2021, these impacts are consequently not noted in the findings of this report. Further tree inventory will be required during the detailed design phase to confirm any new impacts.

## 3.6 Air Quality

Based on the project site’s unique location over the river and near Lake Ontario, twenty years of meteorological data (1990 to 2020) from the nearby Billy Bishop Toronto City Airport was utilized for the analysis. The wind rose shows the wind direction (blowing from) and wind speed along the various compass directions (Figure 3-16). The site-specific review and recommendations consider this meteorological data.

**Figure 3-16 Air Quality Compass Direction**

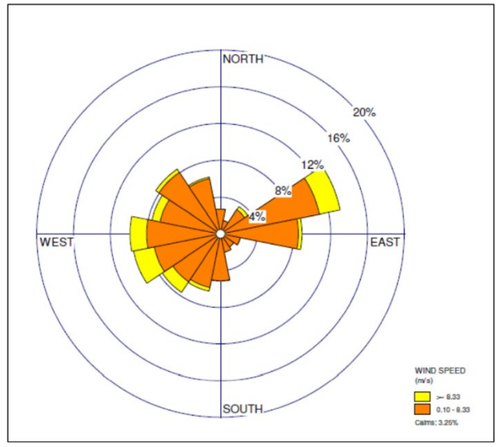



Figure 3-17 shows the identified sensitive receptor locations within 500 meters of the Study area. Within the buffer are mainly residential houses west of Port Credit Railway Bridge, with a mixture of commercial buildings and residential houses on the east side. Five churches and four education facilities also qualified as sensitive receptors.

Additional details on the air quality investigations and findings with are provided in the *Air Quality Report* in **Appendix C.3.**

Figure 3-17 Sensitive Receptor Locations


## 3.7 Noise & Vibration

An Environmental Noise Assessment was conducted to:

- Assess future “build” and “no-build” sound levels from project related noise sources (i.e., noise levels with and without the proposed project taking place).
- Assess potential impacts according to the applicable guidelines.
- Specify mitigation measures where required; and
- Assess the potential for construction noise and provide a code of practice to minimize potential impacts.

The potential environmental transportation noise impacts of the proposed undertaking have been assessed, including both operational and construction noise considerations.

Recommendations based on the assessment can be found in Section 6.5 of this report, and the full *Environmental Noise Assessment Report* can be found in **Appendix C.4.**

## 3.8 Geotechnical Environment

A geotechnical investigation was carried out by Frontop Engineering Ltd (Frontop). The purpose of the geotechnical investigation was to determine the subsurface conditions at borehole locations and from the findings in the boreholes make engineering recommendations for the bridges, abutment, piers, embankments, pavements and underground utilities.

A total of ten (10) boreholes were drilled for the current investigation on both sides of the Railway Crossing at Credit River, Mississauga (Figure 3-18). Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the Frontop laboratory for detailed examination by the project engineer and for laboratory testing.

Figure 3-18 Borehole Locations

### 3.8.1 Soil and Groundwater Conditions

Asphalt thickness as observed at boreholes ranges from 80 mm to 280mm; granular base thickness ranges from 250mm to 500mm.

Silty sand and gravelly sand were encountered at two boreholes (BH-01 and BH-02) on the east side of Railway Crossing in the deposit underneath the peat material, extending to depths varied from 13.1 to 14.2 m below existing grades and overlying shale bedrock at BH-02. Silt was encountered at BH-03 at west side of Railway Crossing deposit underneath the fill material, extending to depth of 7.2 m below existing grade. Silty clay till deposit was found in all boreholes except BH-02, extending to depths varying from 7.6 to 13.9 m below existing grades and overlying shale bedrock.

Two boreholes (BH-03 and BH-04) were drilled on the grass area at west side of Railway Crossing at Credit River and encountered a 150 mm thick topsoil layer at the surface. Fill material was encountered below the topsoil or pavement in the boreholes to depths varying from 4.1 to 6.4 m. The fill material consists of sandy silt to silty sand and was generally present in a very loose to compact state. Trace to some inclusions of topsoil / organics, asphalt/wood chips were noted in fill material. Clayey silt with peat, clayey peat, silty sand with peat were encountered at two boreholes (BH-01 and BH-02) at east side of Railway Crossing. This unit is below the fill material, extending to the depth varied from 11.7 to 11.9 m below ground surface.

Four (4) boreholes (BH-05 to BH-09) were drilled on the road and car parking surface. BH-07 and BH-10 were drilled on the grass area and encountered a 0 to 100 mm thick topsoil layer at the surface. Fill material was encountered below the pavement structure or topsoil in majority of the boreholes, (except BH-08 and BH-09) to depths varying from 0.6 to 4.3 m. The fill material was heterogeneous and consisted of clayey silt, sandy silt to silty sand and gravelly sand and was generally present in a compact state / soft to stiff consistency, with occasional very stiff layers. Trace to some inclusions of topsoil / organics, wood/glass chips were noted in fill material. Underneath the fill material, silty sand and sandy silt soil deposits were present.

The grey shale bedrock encountered in all boreholes belongs to Georgian Bay Formation. The assumed shale bedrock surface was found at depths varying from 7.6 to 14.2 m below the existing grade.

At the time of drilling, groundwater was observed in all boreholes except BH03, BH-06 and BH-09 and varied in elevation between 72.6 m and 81.1 m. Two (2) monitoring wells were installed within bedrock at all boreholes for the longer-term monitoring of groundwater level. The water level was measured on November 22, 2022 and was observed as 8.8 m (Elev. 74.1 m) at BH-03.

Additional details on the geotechnical investigations and findings with are provided in the *Geotechnical Investigations Report* in **Appendix C.10.**

## 3.9 Fluvial Geomorphology

### 3.9.1 Methodology

A fluvial geomorphology assessment report was completed by Matrix Solutions Inc. for the Study area. The geomorphic assessment included the following tasks:

- Background review
- Historical characterization of the Credit River
- Field reconnaissance and rapid geomorphic assessment
- Erosion hazard assessment

Geomorphic impacts and mitigation strategies for the preliminary design of the preferred AT bridge are provided in Section 6.7 of this report.

### 3.9.2 Hydrological Context

The hydrological context of the lower Credit River in the Study area is characterized by both Lake Ontario water levels and potential river flooding events generated from the watershed that have been assessed in the existing hydraulic modeling.

The base level of the Credit River is set by water levels in Lake Ontario. In the last century (1918-2019), mean monthly water levels of Lake Ontario have fluctuated over a range of approximately 2.1 m or 73.8 to 75.9 m elevation (DFO 2021). The annual cycle in Lake Ontario water levels has been fairly consistent from the mid-1990s to 2016. The maximum mean monthly flow in the record occurred in 2019 at approximately 75.9 m elevation (DFO 2021). In the long term, changes in lake water levels will have an impact on erosion rates along the lake shore and on backwatered riverbanks. In the future, isostatic rebound will continue to occur, which will cause a gradual rise in lake levels on the order of 20 cm per 100 years. Climate change presents the possibility of more extreme water supply conditions, storms and wind events that are more severe, and increased erosion impacts in winters when there is less ice along the shoreline (International Joint Commission 2020).

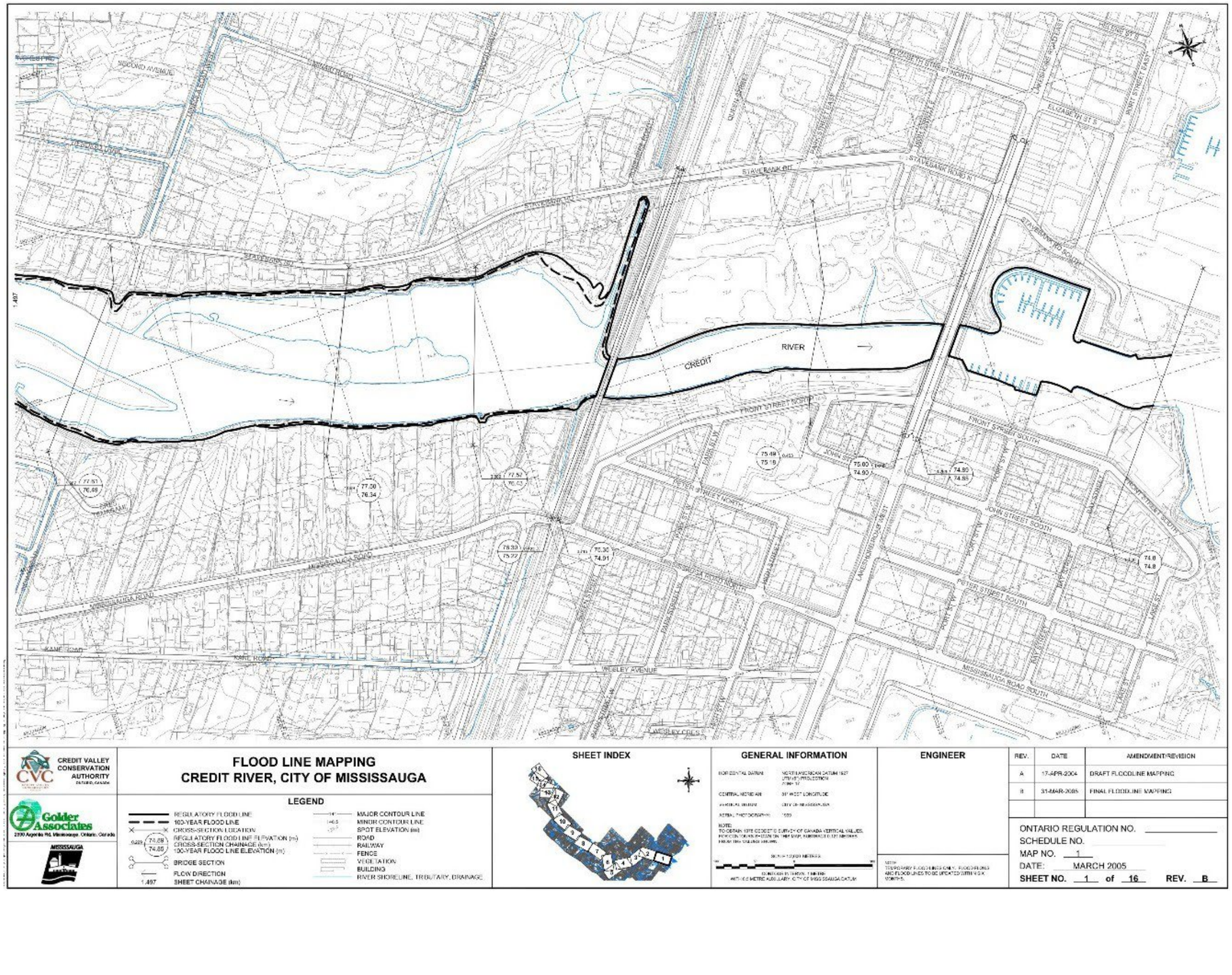
Using a HEC-RAS model of the Credit River provided by the CVC, existing peak flow rates in the vicinity of Lakeshore Road are summarized in Table 3-4. Regulatory floodline mapping provided by the CVC indicates that the floodline is contained within the main river channel south of the train bridge to Lake Ontario. Upstream of the train bridge, the floodline is contained within the river valley and differs slightly from the 100-year floodline (Figure 3-19).

**Table 3-4 Credit River Peak Flow Rates**

| Watercourse | 2-year $m^3/s$ | 5-year $m^3/s$ | 10-year $m^3/s$ | 25-year $m^3/s$ | 50-year $m^3/s$ | 100-year $m^3/s$ | Regional $m^3/s$ |
|---|---|---|---|---|---|---|---|
| **Credit River** | 120.00 | 222.90 | 290.50 | 368.60 | 468.20 | 557.10 | 732.60 |

The New Credit River AT Bridge Study area lies downstream of a hydraulic transition from the steep reaches of the main Credit River valley into a low-gradient estuary at Lake Ontario. Within the estuary reach, the historical port lands development, floodplain infilling, and extensive engineering of riverbanks have confined the Regional flood event into a narrower channel compared to the pre-development floodplain marshlands and barrier beaches. The highly controlled hydraulics of the reach significantly limit ongoing fluvial processes and thus, also limit geomorphic hazards/risks within the reach. Additional fluvial geomorphic investigations and findings are provided in *Fluvial Geomorphology Assessment Report* in **Appendix C.5.**

**Figure 3-19 Floodline Mapping of the Credit River Near Lakeshore Road (CVC, 2015)**



### 3.9.3 Geomorphic Field Assessment

Geomorphic field assessment was completed on August 20, 2021 and consisted of general site observations and a stream crossing assessment.

**General Observations**

The riverbanks are well-vegetated surrounding the CN rail bridge, with marsh habitat located upstream of the rail bridge along the east side. Both banks are continuously armoured with various types of bank protection except for the forested part of the south bank, which is not armoured. Types of bank protection include armourstone, boulders, gabion basket, and concrete.

Downstream of Lakeshore Road are many bank structures including marinas, an old pier with wood pilings, scrubby vegetation, and stone bank protection. In J.C. Saddington Park, which is constructed beyond the original shoreline limits, the south bank is protected with concrete blocks and armourstone. The north bank has also been artificially extended and is composed of sheet pile. A breakwater extends from the north shore into the lake.

At the location of the proposed new AT Bridge, the south bank is steep, approximately 7 m high, and has a simple profile. Downstream of the proposed crossing footprint to the canoe club, the bank has a similar total height but has a two-stage profile, with a steeper 2 to 3 m high segment at the bottom and a gentler slope above. Erosion and exposed bank materials were noted on the lower 2 to 3 m of the bank. The bank material was sandy and silty and is likely composed in part of artificial fill related to the rail bridge and surrounding developments. The bank is also well-vegetated with shrubs and trees and has an open understory. The bed at the bank toe contained over 10 cm of loose silt, and tree root mats were noted to have grown at the water surface. A concrete stormwater outfall is located on the south bank approximately 10 m downstream of the train bridge. This outfall is in moderate condition, with bank slumping above and deposited fines at its base. Near the proposed east abutment of the AT bridge, the north riverbank is approximately 2 to 3 m high. The toe of the north bank is protected with armourstone. Bank materials were not visible due to bank armouring and riparian vegetation; however, it is likely that the bank is composed of fill. The north bank is also well-vegetated with shrubs and trees before entering Memorial Park.

**Stream Crossing Assessment**

The Lakeshore Road bridge is skewed in relation to the river axis upstream of the bridge and is aligned with the river axis downstream. The river is wide with a low gradient near the bridge and passes through three cells. Due to water depth and turbidity, the riverbed was not visible through the bridge.

The riverbanks are protected upstream, through, and downstream of the bridge, and no signs of instability were observed apart from local rilling related to overland flow. A pedestrian walkway crosses below the bridge on the north bank.

The CN rail bridge abutments jut into the active channel and floodplain and are protected by concrete slabs. The profile of the rail bridge girders is low, with only a few meters of clearance from the water surface at the time of the site assessment. See Table 3-5 for a summary of existing crossing assessment.

**Table 3-5 Summary of Existing Cross Assessment**

| Structure | | | | Local Bankfull Dimensions | | Channel | Gradient | Flow Restriction |
|---|---|---|---|---|---|---|---|---|
| Crossing | Type | Opening Width (m) | Skew Angle (degrees) | Width (m) | Depth (m) | Opening Width | | |
| **Lakeshore Road Bridge** | Three-span bridge | 56 m | 24° upstream 2° downstream | 55 to 60 m | 4.2 m (1) | Similar | 0.027% (2) | None |
| **CN Rail Bridge** | Single-span iron bridge | 60 m | 15° upstream 22° downstream | 55 to 160 m | 4.2 m (1) | Opening narrower than upstream channel | 0.027% (2) | None |

**Erosion Hazard Assessment**

Due to the geomorphic setting of the study reach, lateral migration and meandering is not the dominant process and is quite unlikely to occur. In practical management terms, the river is being managed as a port, and engineering controls on bank erosion are being maintained through the great majority of the study reach. Excessive sedimentation on the riverbed is being managed with periodic dredging for navigability. Near the lake, the banks and shoreline are artificial.

Local erosion risk can still exist in this context for areas hydraulically impacted by existing crossings, particularly if banks are not armoured. Based on the field assessment, the south bank immediately downstream of the train bridge lacks bank protection. For this location, a 2 m toe erosion allowance is recommended as a reasonable setback in the context of the low-energy reach and surrounding artificial bank structures.

From the train bridge to roughly 25 m downstream, the unarmoured bank was approximately 7 m high in relation to the water level and has an angle of approximately 1 horizontal (H):1.5 vertical (V). From roughly 25 to 100 m downstream of the rail bridge, the bank has a similar total height but has a two-stage profile, with a steeper (~2H:1V), 2 to 3 m high segment at the bottom and a gentler (>3:1) slope above. Evidence of erosion was observed on the lower 2 to 3 m bank face. The local erosion hazard limit ranged from 8 to 23 m from the toe of bank.

## 3.10 Drainage and Stormwater Management

There is an existing three span CN railway bridge over Credit River upstream of the proposed bridge. Front Street primarily is an urbanized cross-section. The roadway is drained by a network of catchbasins and storm sewers, and discharge to the Credit River.

## 3.11 Contamination

A Phase 1 ESA was conducted to identify current and historical potentially contaminating activities (PCAs) and areas of potential environmental concern (APECs) within the Study area. The Phase I ESA Study area encompasses a 250 m buffer, which includes the properties wholly and partially located within 250 m from the boundaries of the site. The Limited Phase I ESA includes a review of historical records available for the properties within the Study area and documents observations made from a drive-by, windshield site visit of the properties within the Study area from public roadways and lands.

Fifteen (15) properties and/or areas within the Phase 1 Study area are identified as having a “high” potential for soil and groundwater contamination, including gas stations or service centres, dry cleaning facilities, vehicle repair garages, and industrial or manufacturing sites. Nine (9) properties and/or areas within the Study area as having a “medium” potential for soil and groundwater contamination.

The remaining properties in the Study area, which are undeveloped or were developed but only used for agricultural (excluding orchards, nurseries, tree farms, and golf courses), residential, or parkland uses, were rated as having a “low” potential for contamination.

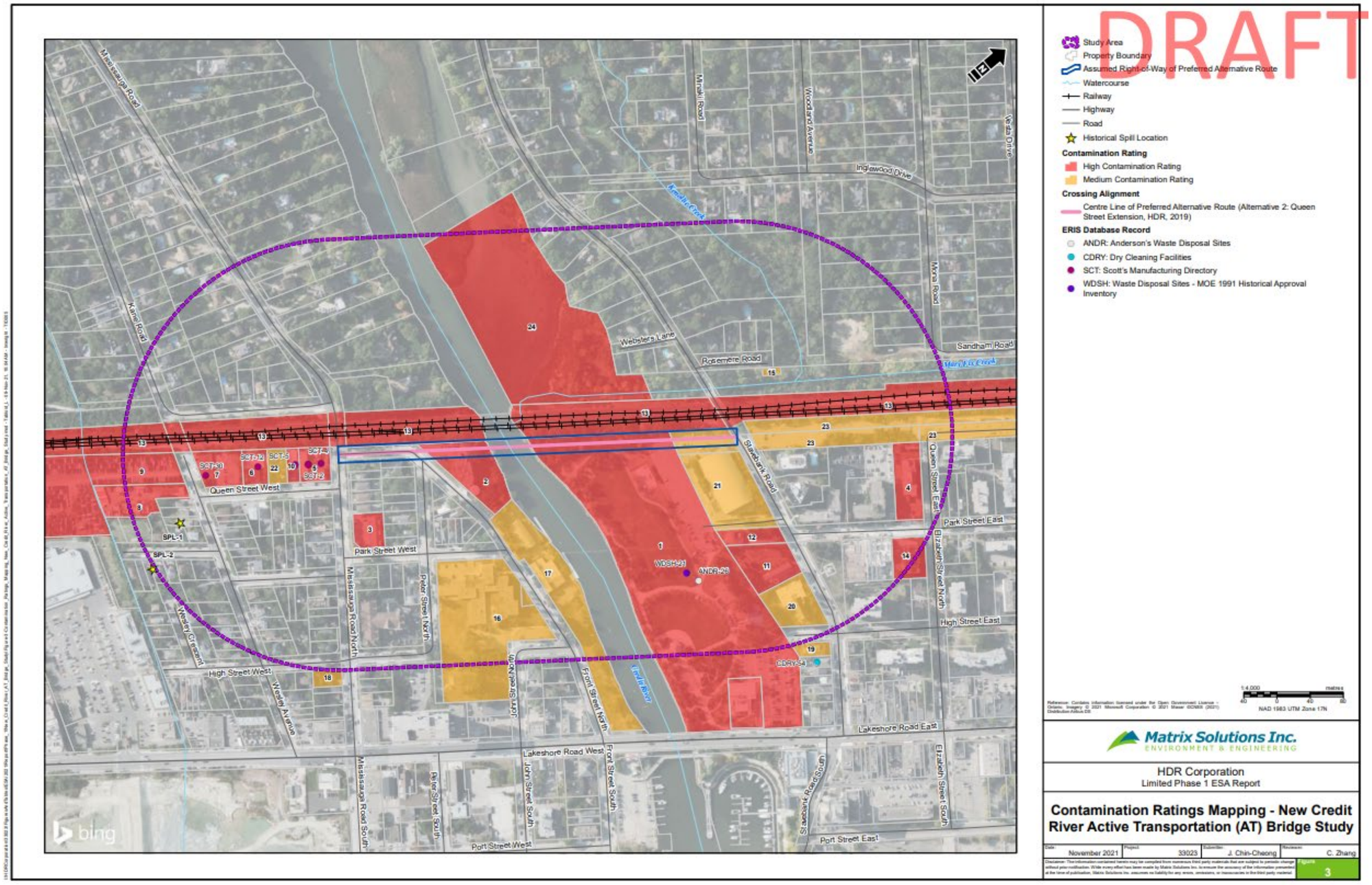
In addition, two significant spill records (representing two spill locations) are also considered as having a “high” potential for soil and/or groundwater contamination. In addition to the APECs, potential impacts from de-icing salt applications during winter season and unrecorded spill incidents on the site and other municipal roadways are also considered as potential environmental concerns to impact the nearby soil and groundwater quality. See Table 3-6 and Figure 3-20 for all potential properties and/or areas of contamination. Additional Phase 1 ESA findings can be found in the *Phase 1 ESA Report* in **Appendix C.6.**

**Table 3-6 List of Properties with Potential Contamination**

| ID | Address | Company Name |
|---|---|---|
| **1** | 20 and 22 Lakeshore Road East | • Port Credit Memorial Park<br>• Port Credit Library (current)<br>• Memorial Park Dump (former) |
| **2** | 35 Front Street North | • Port Credit Sewage Disposal Plant (former)<br>• Royal Canadian Legion and Air Cadets (current) |
| **3** | 49-53 Mississauga Road North | • 49 - Briarwood Cleaners (current)<br>• 53 - Port Credit Village of Waterworks Plant (former - 1958) |
| **4** | 28 Elizabeth Street North | • Above All Cleaning Services (former - 2000) |
| **5** | 2-6 Queen Street West | • 2-4 - H-Do All (current)<br>• Auto Glass of Mississauga and Mississauga Auto Trim and Glass (former - 1989 to 2000)<br>• 6-Old Credit Brewing Co. Ltd. (current) and Aldo Lista |
| **6** | 22 Queen Street West | • Auto Safety Centre (current)<br>• Good Guys Auto (former - 1989) and Mississauga Auto Trim (former - 1979)<br>• Active Engine Rebuilding Inc. (former)<br>• Studio Woodworking Inc. (former) |
| **7** | 28-34 Queen Street West | • H-Do All<br>• Super Kleen Car Care and Gillespie Car Clinic (former – 1970/71)<br>• Elmwood Tire Service Ltd Factor Br (former – 1958)<br>• 28 - LV Wraps - vehicle branding to commercial graphics (current)<br>• 34 – RooterWorx Mississauga - plumbing services (current)<br>• 34 - BMB Process and Packaging Services (current)<br>• 34 - Airboat - boat distributor and retailer (current) |
| **8** | 70 Wesley Avenue | • Lakefront Motors (current)<br>• Westaire Air Conditioning and Heating Ltd. (former) |
| **9** | 140 Queen Street West | • Mopar Garage of Peel Chrysler |

| ID | Address | Company Name |
|---|---|---|
| **10** | 10 Queen Street West | • Lakeport Metalcraft (former)<br>• Residential house (current) |
| **11** | 26 Stavebank Road | • Trinity Anglican Church |
| **12** | 30 Stavebank Road | • Enersource Hydro Mississauga<br>• Alectra Utilities Corp.<br>• Fire Station (1928-1952) |
| **13** | Railway tracks in Study area | • Canadian National (CN) Rail |
| **14** | 20 Elizabeth Street North and 33 Park Street East | • Condo building (current occupant)<br>• Sunoco Ltd (former - 1989)<br>• Ritamade Consultants (2000) |
| **15** | 182 Rosemere Road | • The Regional Municipality of Peel<br>• Sewage Pumping Station |
| **16** | 30 John Street North | • Riverside Public School (current) |
| **17** | 25-33 Front Street North | • 25 - Don Rowing Club of Mississauga (current)<br>• 31 - Mississauga Canoe Club (current)<br>• 33 - Unlisted |
| **18** | 18 Mississauga Road North | • Terry D. Richardson - Barrister and Solicitor Office (current) |
| **19** | 20 Stavebank Road | • Professional Office Building (current) |
| **20** | 24 Stavebank Road | • St. Andrew's Presbyterian Church (current) |
| **21** | 40 Stavebank Road | • Port Credit Arena |
| **22** | 20 Queen St W | • Trailer Storage Yard (current) |
| **23** | 30 Queen St E | • Port Credit GO Train Station |
| **24** | North of CN rail along the east side of Credit River | • Currently vacant, possible former landfill site (1946 aerial photograph) |

## Figure 3-20 Map of Potential Property with Potential Contamination



## 3.12 Archeological Assessment

A Stage 1 Archeological Assessment was prepared to identify any potential archaeological impacts within the Study area, in accordance with the *Ontario Heritage Act* and the *2011 Standards and Guidelines for Consultant Archaeologists* (S & G). The Stage 1 background study determined that while 15 previously registered archaeological sites are located within one kilometer of the Study area, none are within 50 meters (Table 3-7). It was concluded that portions of the Study area had been previously assessed without further recommendations. A review of past aerial and satellite imagery of the Study area demonstrated the Study area had been subjected to deep and extensive soil disturbance.

**Table 3-7 Registered Sites within 1 km of the Study Area**

| Borden Number | Site Name | Temporal/ Cultural Affiliation | Site Type |
|---|---|---|---|
| **AjGv-1** | Hare | Archaic; Woodland, Middle | Campsite |
| **AjGv-5** | Glenbunny | Pre-Contact Indigenous | Campsite |
| **AjGv-9** | Avonbridge | A`rchaic | Campsite |
| **AjGv-10** | Stavebank | Unknown | Unknown |
| **AjGv-11** | Port Street | Unknown | Unknown |
| **AjGv-13** | Fort Toronto | Pre-Contact Indigenous | Village |
| **AjGv-32** | Scott O'Brien | Archaic, Middle; Woodland, Middle; Woodland, Early | Campsite` |
| **AjGv-46** | Not applicable | Pre-Contact Indigenous | Findspot |
| **AjGv-57** | Rewa | Woodland, Middle | Burial |

The Stage 1 property inspection was conducted on November 12, 2021, in accordance with the Ontario Heritage Act and the S & G. The property inspection confirmed that the majority of the Study area did not have archaeological potential on account of previous deep soil disturbance events associated with the stabilization of the Credit River shoreline, construction of Port Credit Memorial Area, Port Credit Memorial Park, and the Port Credit Royal Canadian Legion Branch 82 (Figure 3-21).

Due to the Study area's overlap with the Credit River, it's archaeological potential was evaluated following the MCM's Criteria For Evaluating Marine Archaeological Potential checklist and it was determined that a Marine Archaeological Assessment should be completed once construction impacts to the Credit River have been identified during detailed design.

Additionally, a Stage 2 test pit survey is required for the Study area in order to confirm the extent of existing disturbances.

Recommendations based on the assessment can be found in Section 6.9 of this report. A full detailed report, *Stage 1 Archaeological Assessment*, can be found in **Appendix C.7**

## 3.13 Cultural Heritage Assessment

An existing conditions and preliminary impacts assessment was prepared to identify and inventory any known and potential building heritage resources (BHRs) and cultural heritage landscapes (CHLs), identify existing conditions of the Study area, provide a preliminary impact assessment, and propose appropriate mitigation measures. The results of background historical research and a review of secondary source material, including historical mapping, indicate a Study area with a suburban land use history dating back to the early nineteenth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are six known BHRs and three known CHLs within the Study area (Table 3-8 and Figure 3-22). No additional BHRs or CHLs were identified during field review.

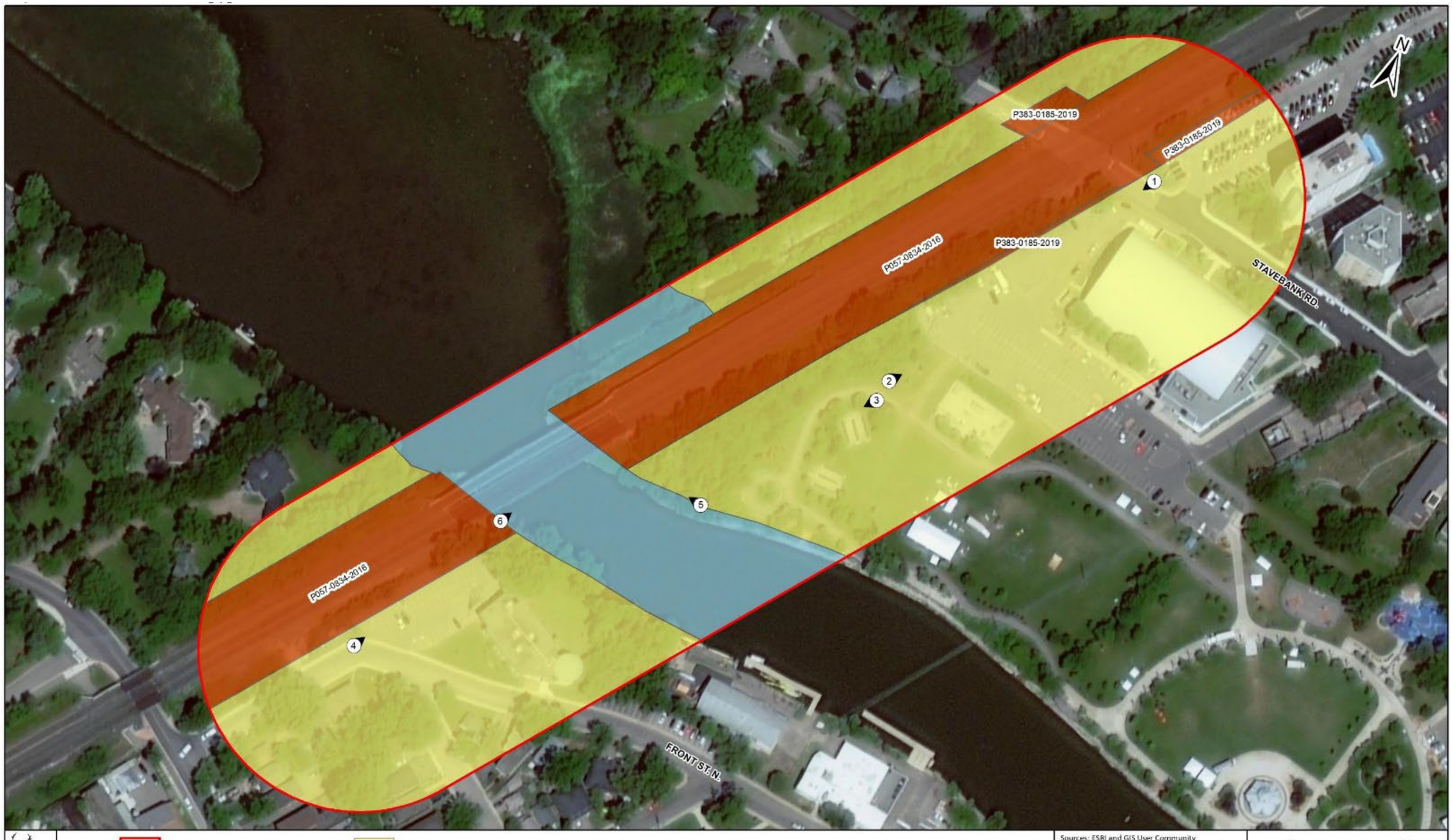
**Table 3-8 Inventory of Known and Potential BHRs and CHLs Within the Study Area**

| Feature ID | Type of Property | Address or Location | Heritage Status and Recognition |
|---|---|---|---|
| BHR 1 | Bridge | Port Credit Railway Bridge | Known BHR – Provincial Heritage Property of Provincial Significance |
| BHR 2 | Institutional | 35 Front Street North | Known BHR – Listed in the *Heritage Register for Mississauga* |
| BHR 3 | Residence | 1135 Mississauga Road | Known BHR – Listed in the *Heritage Register for Mississauga* |
| BHR 4 | Recreational | 33 Front Street North | Known BHR – Listed in the *Heritage Register for Mississauga* |
| BHR 3 | Residence | 1135 Mississauga | Known BHR – Listed in the *Heritage* |

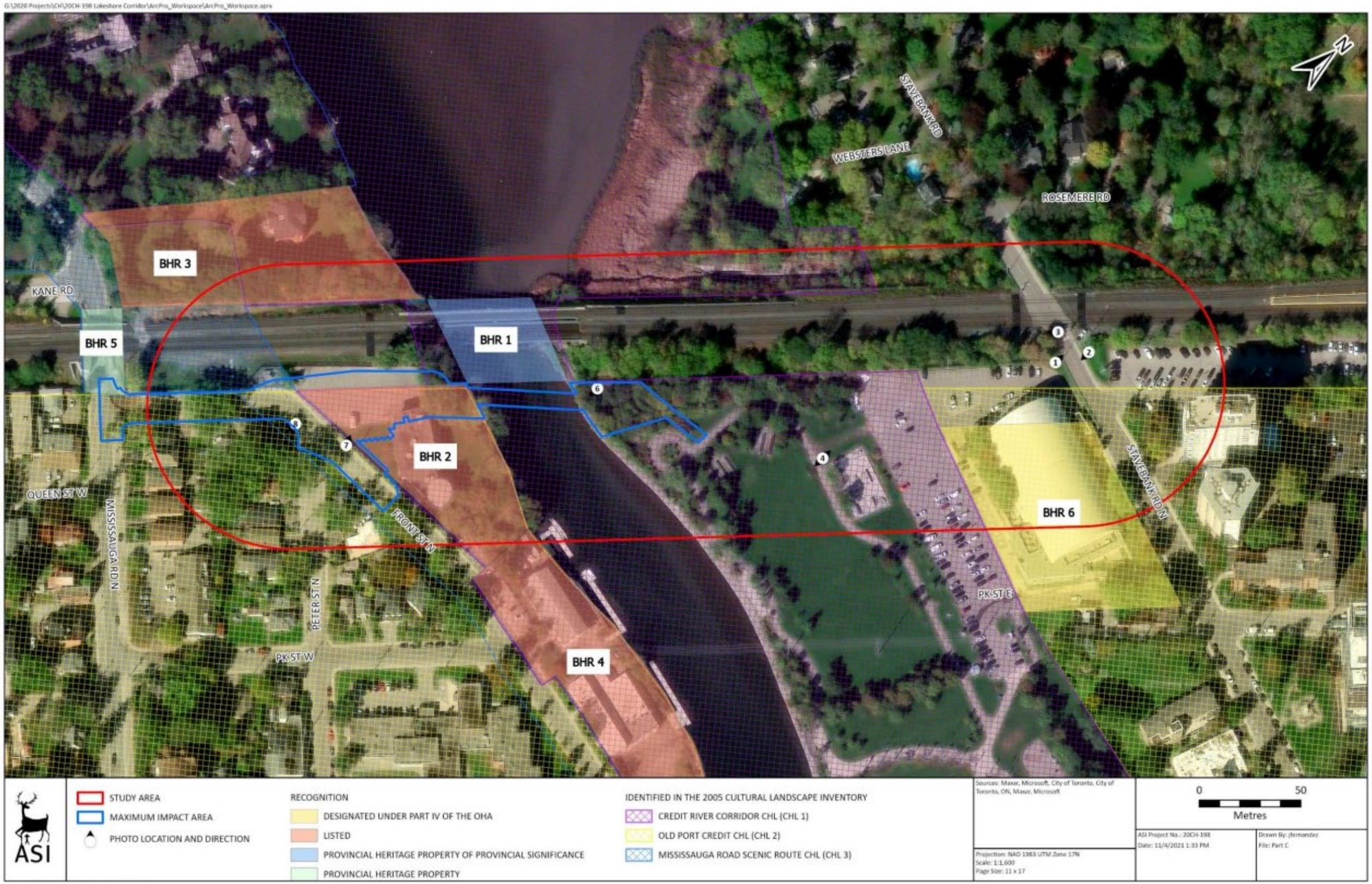
| Feature ID | Type of Property | Address or Location | Heritage Status and Recognition |
|---|---|---|---|
| | | Road | *Register for Mississauga* |
| BHR 4 | Recreational | 33 Front Street North | Known BHR – Listed in the *Heritage Register for Mississauga* |
| BHR 5 | Bridge | Mississauga Road Railway Bridge | Known BHR – Provincial Heritage Property |
| BHR 6 | Arena | 40 Stavebank Road | Known BHR - Designated under Part IV of the OHA (By-law # 0040- 2011) |
| CHL 1 | Historical Settlement | Old Port Credit CHL | Known CHL – Identified in the 2005 Cultural Landscape Inventory |
| CHL 2 | Natural Landscape | Credit River Corridor CHL | Known CHL – Identified in the 2005 Cultural Landscape Inventory |
| CHL 3 | Transportation Corridor | Mississauga Road Scenic Route CHL | Known CHL – Identified in the 2005 Cultural Landscape Inventory |

Recommendations based on the assessment can be found in Section 6.10 of this report, and the full *Cultural Heritage Report* can be found in **Appendix C.8.**

## Figure 3-21 Stage 1 Assessment Results



## Figure 3-22 Location of identified BHRs and CHLs



## 3.14 Property

The properties encompassed in the Study area and would potentially be impacted by the implementation of the AT bridge are listed in Table 3-9 and shown in Figure 3-23.

**Table 3-9 Properties within Study Area**

| ID | Property Address | Ownership |
|---|---|---|
| 1 | Port Credit Memorial Park | City of Mississauga |
| **2** | 35 Front Street N | Port Credit Royal Canadian Legion |
| **3** | GO Train Rail corridor | Metrolinx |
| **4** | 71 Mississauga Road and 52 Front Street N | Private residential<br>*Properties only subject to impacts during construction, no permanent impacts anticipated* |

## 3.15 Utilities

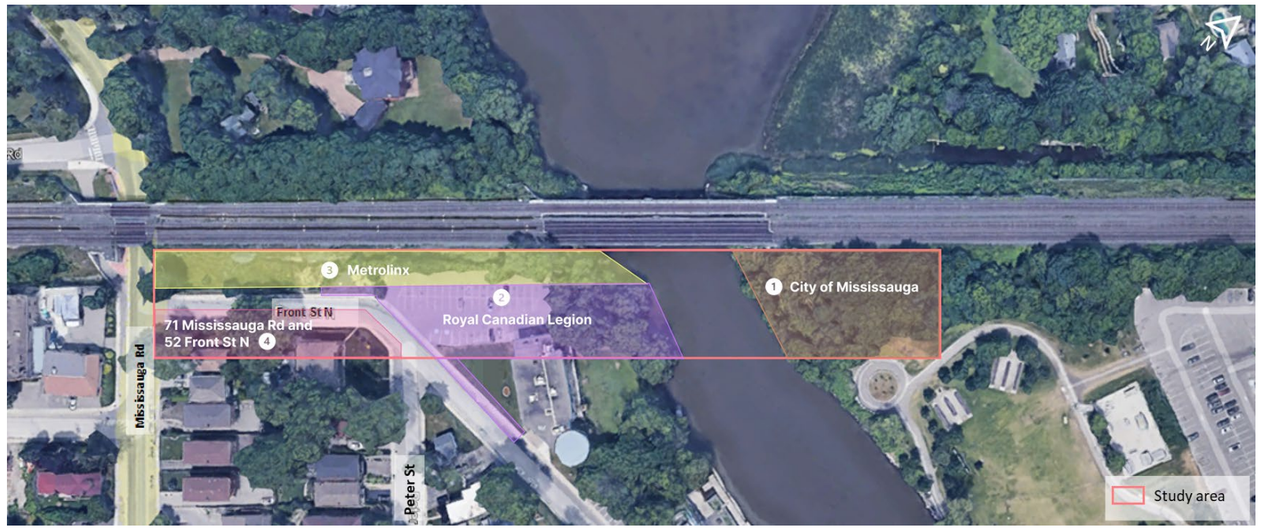
A utility request was submitted by HDR in December, 2021 to the utility companies within the Study area to identify any existing and planned utility facilities that may be impacted by this Study. The results of the utility request are outlined in Table 3-10.

**Table 3-10 Summary of Utilities Request Results**

| Utility Company | Results |
|---|---|
| **Group telecom** | Existing infrastructure identified, and available drawings provided to project staff |
| **Rogers** | |
| **Enbridge** | |
| **Alectra** | |
| **Bell** | |
| **Peel Region** | |
| **Telus** | |
| **Beanfield Metroconnect** | Confirmed that they do not have any infrastructure in the Study area |
| **Hydro one** | |
| **CN Rail** | CN Rail did not share drawings and suggested that locates to be conducted during subsequent phases of design |

The findings from the preliminary utility request informs the project team of the utility facilities in the Study area. Locates would be required during the detailed design phase to confirm the exact location of utilities.

**Figure 3-23 Properties within the Study Area**



# 4 Alternative Solutions and Evaluation Process

Through Phase 1 of the 2019 TMP, it was determined that the existing Lakeshore Road crossing of the Credit River will become congested by 2041 and to accommodate future projected travel demand in the Study area, a new crossing of the Credit River may improve traffic operations and provide a new connection between the Queen Elizabeth Way (QEW) and Lakeshore Road to fill a 3 km gap in the east-west road network. Therefore, Credit River Crossing alternatives were identified, assessed, and evaluated for the Study Corridor.

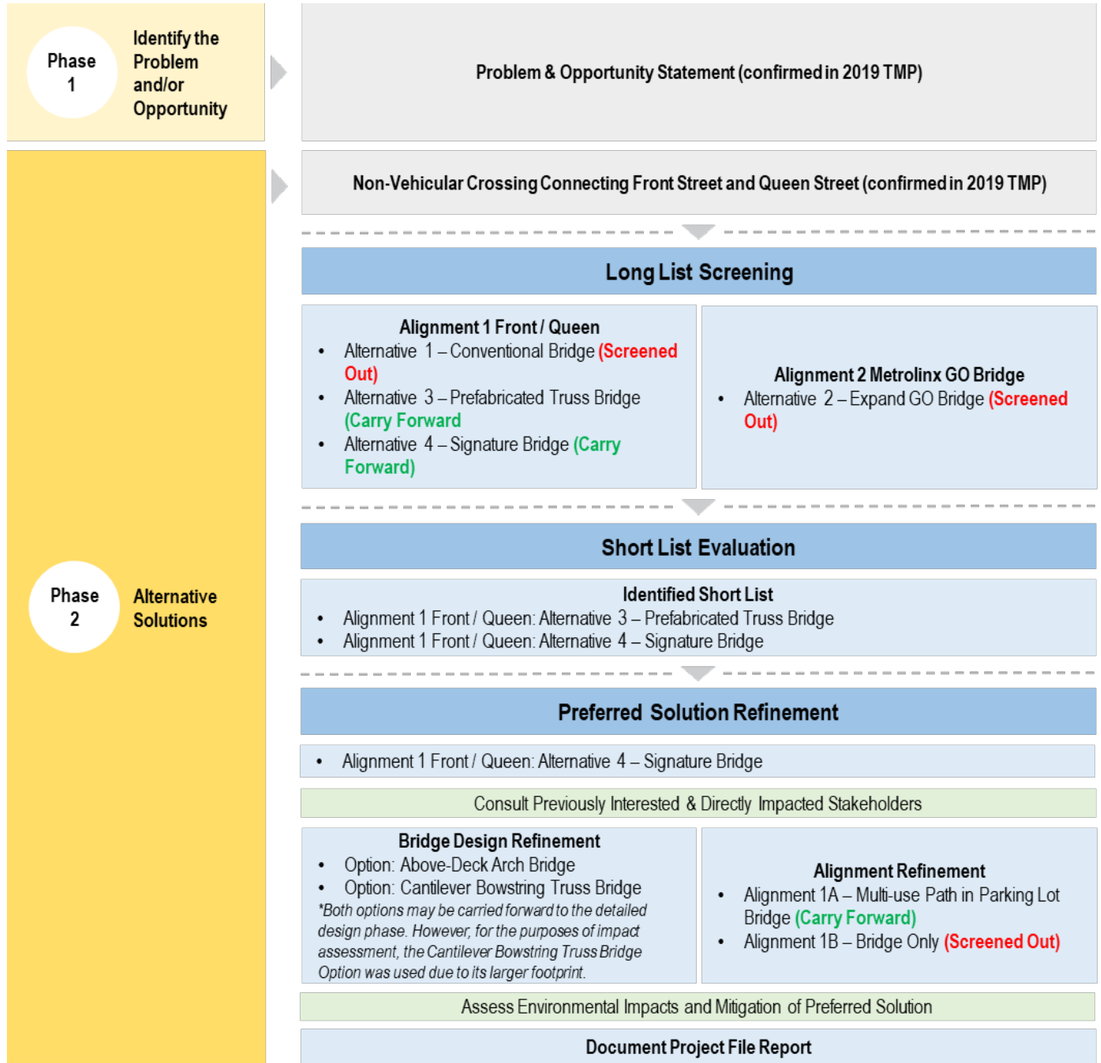
## 4.1 Development of Alternative Solutions

As described in Section 1.1 of this report, Phases 1 and 2 of the 2019 TMP identified a non-vehicular (or active transportation only) crossing located at Site 2, connecting Front Street and Queen Street east as the preferred solution.

An evaluation of the crossing locations was carried out and opportunities to improve network connectivity and impacts on property, the natural environment, cultural heritage, archaeology, and the social environment were considered. This option was the most suited to meet the City transportation objectives and align with future planning development goals east and west of the Credit River.

Therefore, the identified preferred solution from the 2019 TMP to be carried forward in this Schedule B Class EA is a non-vehicular crossing that would connect Front Street and Queen Street. Figure 4-1 illustrates the process undertaken to further develop the preferred solution for the AT Bridge.

**Figure 4-1 Evaluation Process in context of Schedule B Class EA**




### 4.1.1 Long List Screening

A long list of bridge alignments and types were considered. Table 4-1 presents the four bridge types that were identified and evaluated at a high-level, in addition to the 'Do Nothing' alternative.

**Table 4-1 Summary of Long List Screening**

| Alignment | Alignment Description | Applicable Bridge Type | Description | Screening | Rationale |
|---|---|---|---|---|---|
| **Do Nothing** | n/a | n/a | The Do Nothing alternative represents a scenario where a bridge crossing is not implemented. | **Carry Forward** | Carried forward as a basis for comparison per the EA process. |
| **Alignment 1 – Front/Queen (Figure 4-2)** | Alignment 1 connects the existing multi-use path on Mississauga Rd to the trail network on the east side of Credit River. This alignment features a 1.5 m sidewalk and 3.0 m two-way cycling facility on the north side of Front St; this would require Front Street to be realigned to the south. Alignment 1 would encroach upon the parking lot of the Port Credit Royal Canadian Legion, resulting in a reduction of 23 ~~9~~ parking spaces (from a total of 46 spaces). | Alternative 1: Conventional Bridge | A conventional bridge - such as precast prestressed (slab/ box/ I-girder) concrete bridge or steel I- girder bridge. Given the length of the bridge, this option cannot span the whole length of the river and would require in-water pier(s). | **Screened Out** | In-water piers have a significant environmental impact; due to the environmental sensitivity of the area and the expressed objection to in-water piers by the Credit Valley Conservation, Alternative 1 is not a viable option. This option has minimal opportunity for an aesthetic design compared to the other options. |
| | | Alternative 3: Prefabricated Truss Bridge | A Truss bridge can span longer and possibly remove the requirement for in-water piers. A Pony Truss such as a Baily Truss or Bowstring Truss cannot span over the length of the river given the required length and desired width. A Through-Truss can span the required length and avoid the requirement for in-water piers. Pre-fabrication of the truss allows for quick installation but may require additional space for construction staging. Truss bridges are less aesthetically appealing compared to signature bridges. | **Carry Forward** | Given the length and width of the bridge a Through Truss bridge is a viable option and does not require in-water piers. |
| | | Alternative 4: Signature Bridge | A signature bridge can span the length of the Credit River without in-water piers. Given the proximity to the railway bridge and construction limits a cable stayed bridge was not carried forward. However, a network tied arch bridge that can be prefabricated and launched over the river was carried forward. Relative to other bridge alternatives, signature bridges are more costly due to additional design considerations and complex construction methodology but provide a visually appealing option. | **Carry Forward** | A network tied arch bridge can span the length of the River and is a visually appealing option. |
| **Alignment 2 – Metrolinx GO Bridge (Figure 4-3)** | Alignment 2 avoids parking impacts to adjacent properties and explores the potential for a GO Bridge expansion. A new bridge adjacent to the existing GO bridge requires a new culvert and retaining walls on the east side. | Alternative 2: Expand GO Bridge | Expanding the GO Bridge would entail widening the existing bridge to the south to accommodate the active transportation components within the existing deck truss. | **Screened Out** | Upon more detailed analysis it was found that the existing bridge could not be widened structurally to meet the desired width for the active transportation components. Furthermore, Metrolinx did not support any encroachment into their ROW, and expressed that the GO rail corridor is to be protected and used exclusively as a rail corridor. |

**Figure 4-2 Alignment 1- Front/Queen**

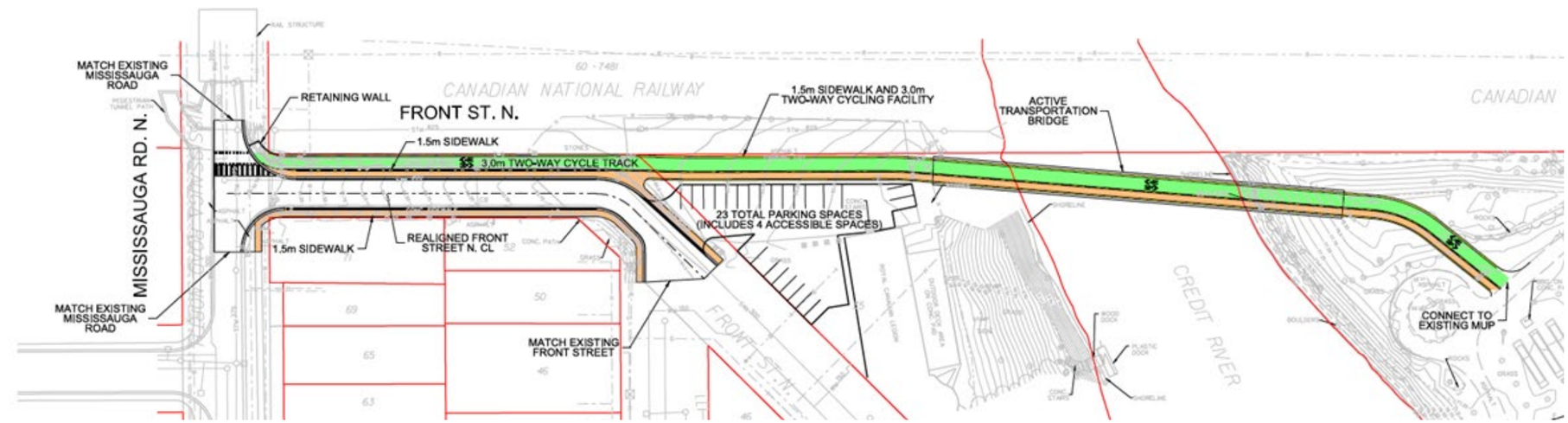
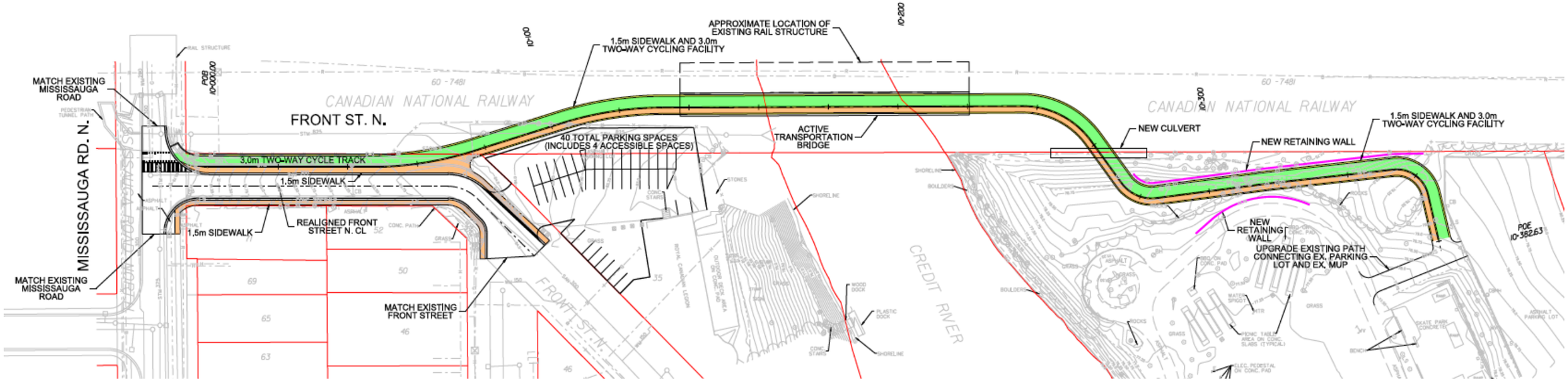



**Figure 4-3 Alignment 2 - Metrolinx GO Bridge**



## 4.2 Short List Evaluation

### 4.2.1 Approach

The short list of alternatives was evaluated using the evaluation framework (Table 4-2) and ranked using a colour scale (Figure 4-4) to demonstrate how the alternatives perform relative to another.

**Figure 4-4 Evaluation Colour Scale**

| Worst | Worse | Comparable | Better | Best |
|---|---|---|---|---|

### 4.2.2 Evaluation Framework

The evaluation framework was applied to guide the evaluation of the short list of alternatives, and include five high-level groupings:

- **Mobility** – refers to design features that impact how pedestrians and cyclists move, including ease of travel and overall qualitative experience for all ages and abilities.
- **Environment** – refers to design features that impact all forms of the natural terrestrial and aquatic environment, including air, trees, greenspace, habitat, and hydrological conditions.
- **Public Health & Safety** – refers to design features that influence individual health and safety, including factors that encourage physical activity as well as user safety
- **Quality of Place & Prosperity** – refers to design features that contribute to making location desirable and economically vibrant.
- **Affordability & Constructability** – refers to design factors that impact the total cost and ease of implementation of the project, including up-front capital costs, costs required to mitigate environmental impacts, long-term maintenance costs, and magnitude of indirect impacts from the project such as traffic and business disruption.

**Table 4-2 Evaluation Framework**

| Group | Bridge (Part C) Outcomes | |
|---|---|---|
| Mobility | Walking Experience | Pedestrian LOS |
| | | Pedestrian Network Connectivity |
| | Cycling Experience | Cycling LOS |
| | | Cycling Network Connectivity |
| | Equity | Physical Accessibility |
| Environment | Habitat / Wildlife | Designated Natural Areas Incl. Provincially Significant Wetlands (PSW), Environmental Sensitive Areas (ESA), Areas of Natural and Scientific Interest (ANSI) |
| | | Wildlife, Vegetation, Aquatic Species and Habitat and Species at Risk |
| | Hydrology/ Hydraulics | Impact to hydrology condition (incl. floodplain) of the Credit River |
| | | Drainage and Stormwater |
| | Air | Air Quality |
| | Soil | Soil quality and potential for contamination |
| Public Health & Safety | Public Health | Supports active communities |
| | Safety | Emergency Response |
| | | Pedestrian Safety |
| | | Bicycle Safety |
| Quality of Place & Prosperity | Aesthetics | Visual Impact |
| | Public Realm | Noise and Vibration |
| | | Public Space / Public Realm |
| | Cultural Environment | Built Heritage Features |
| | | Archeological Features |
| | Resilience & Sustainability | Flexibility to accommodate network disruption |
| | | Resiliency or Vulnerability of the Project to Changing Climatic Conditions |
| Affordability & Constructability | Capital Cost | Utility Relocation |
| | | Environmental Mitigation |
| | | Construction |
| | | Property |
| | Operational Cost | Life Cycle Cost Requirements |
| | Constructability | Staging and Construction Complexity |
| | | Geotechnical Considerations |

Following the screening of the long list alternatives, two alternatives: Alignment 1: Alternative 3 (Prefabricated Truss Bridge) and Alignment 1: Alternative 4 (Signature Tied Arch Bridge) were carried forward to the short list for a detailed evaluation in addition to the 'Do Nothing' alternative. The alternatives are described in detail in the following sections.

### 4.2.3 Description of Short List Alternatives

#### Do Nothing

The Do Nothing alternative represents the scenario where a bridge crossing is not implemented; this alternative is carried forward as part of the Environmental Assessment process and used as a basis for comparison.

#### Alignment 1 - Alternative 3: Prefabricated Truss Bridge

A Truss Bridge is a common bridge type used for an array of crossings from pedestrian and vehicular bridges, where the load bearing structure is composed of a series of trusses in triangular units. Truss bridges are an economical choice, and are typically prefabricated and pre-designed off-site, and assembled on-site in a relatively short amount of time. See Figure 4-5 for an example of a pedestrian Truss Bridge. See Figure 4-7 and Figure 4-8 for general arrangement drawings of Alignment 1: Alternative 3 (Prefabricated Truss Bridge).

**Figure 4-5 Example of Pedestrian Truss Bridge**

#### Alignment 1 - Alternative 4: Signature Tied Arch Bridge

A Signature Tied Arch is an arch bridge with inclined hangers where hangers intersect other hangers at least twice. Signature bridges are custom designed to meet context-specific requirements, have more maintenance requirements, and require longer construction durations. Given the bespoke nature of a tied-arch bridge, this alternative will bear a higher cost. The benefit of this alternative is that it has a strong aesthetic quality that provides an opportunity to communicate a unique community identity. See Figure 4-6 for an example of a pedestrian Tied Arch Bridge. See Figure 4-9 and Figure 4-10 for general arrangement drawings of Alignment 1: Alternative 4 (Signature Tied Arch Bridge).

**Figure 4-6 Example of Tied-Arch Bridge**

**Figure 4-7 Plan View of Alignment 1 - Alternative 3: Prefabricated Truss Bridge**

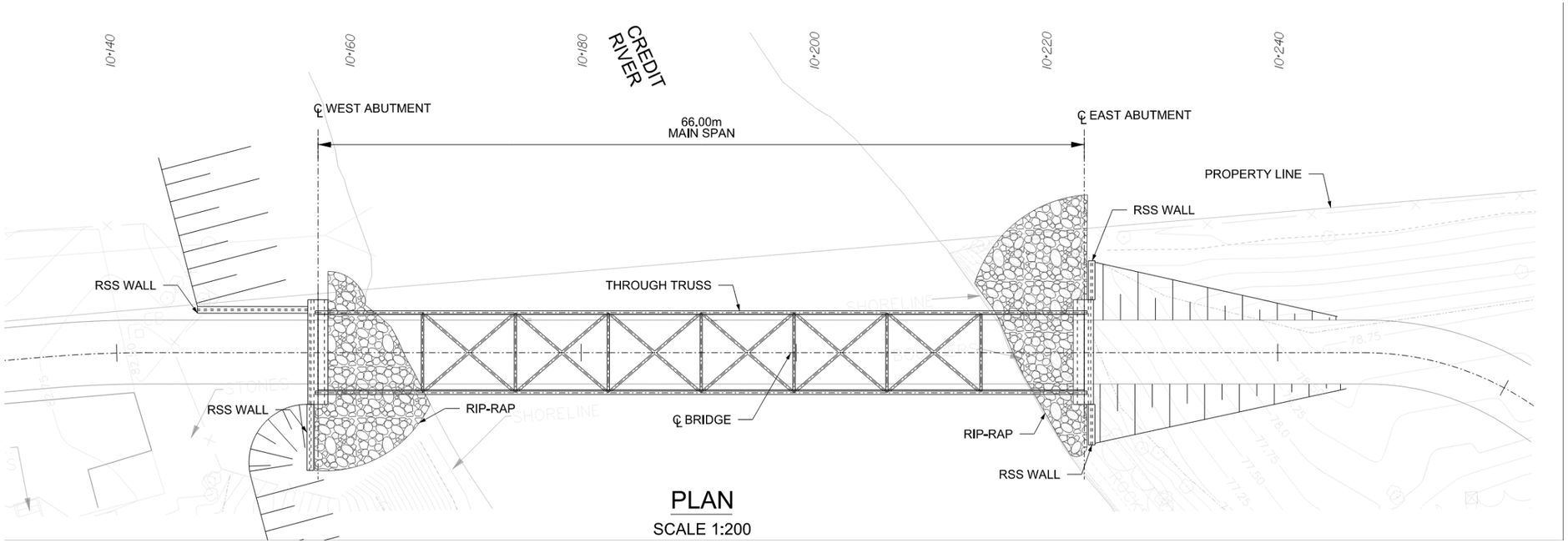



**Figure 4-8 Profile View of Alignment 1 - Alternative 3: Prefabricated Truss Bridge**

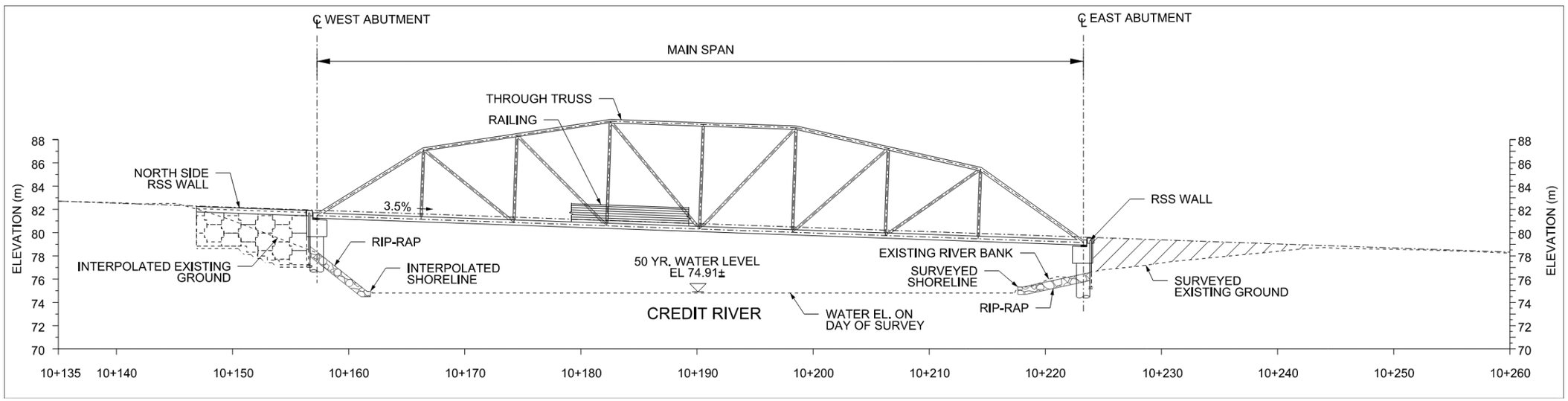


**Figure 4-9 Plan View of Alignment 1 - Alternative 4: Signature Bridge**

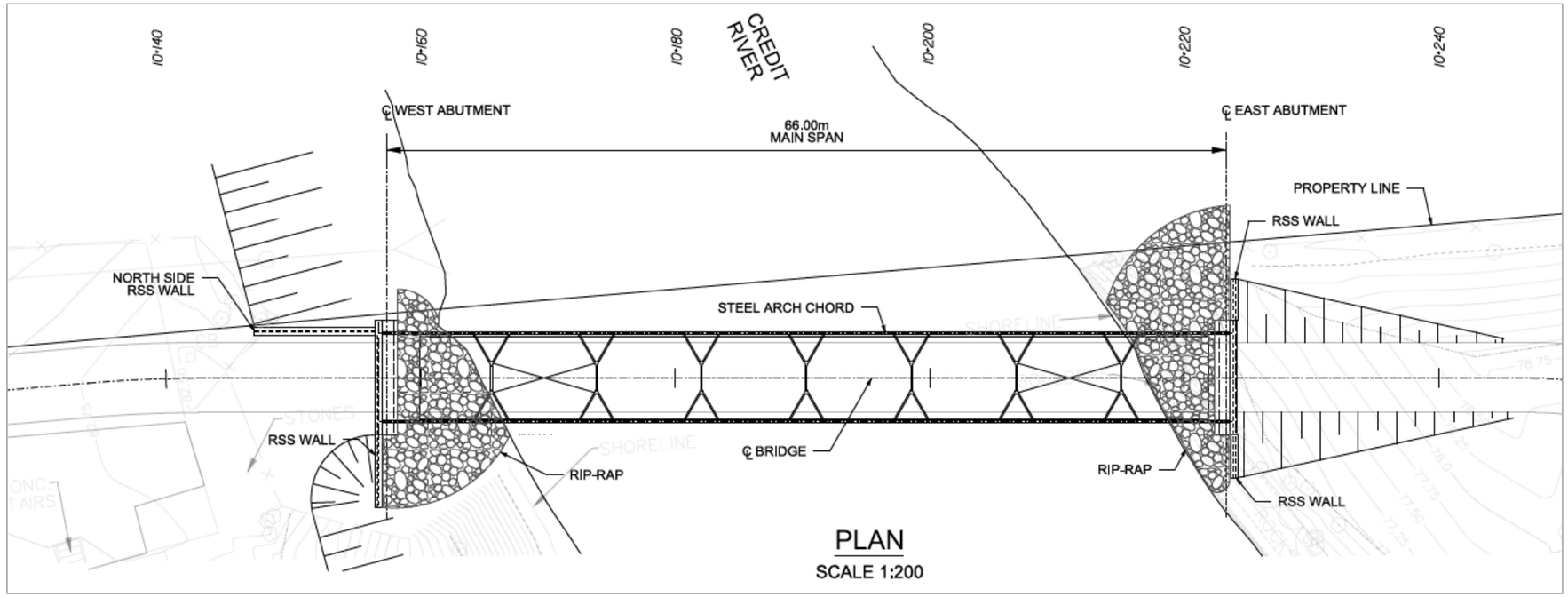
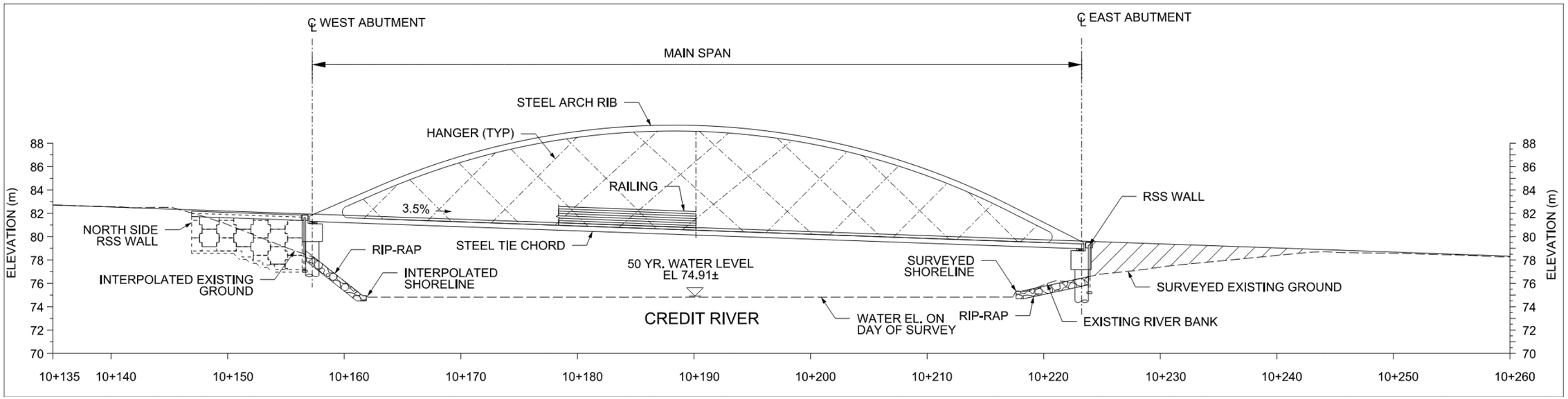



**Figure 4-10 Profile View of Alignment 1 - Alternative 4: Signature Bridge**



### 4.2.4 Preliminary Cost Estimates

Preliminary cost estimates were prepared for the capital works for each alternative. The following assumptions are included:

- Estimates include civil works approaching the bridge, environmental restoration, and mobilization
- Costs do not include property, utility relocation, nor HST
- Estimate is in 2021 Canadian dollar
- COVID-19 Pandemic impact on costs has not been considered in the estimate
- 30% Contingency is considered

Preliminary costs have been summarized in Table 4-3 below.

**Table 4-3 Preliminary Cost Estimates**

| Item | Description | Alternative 3: Prefabricated Truss Bridge | | | | Alternative 4: Signature Tied Arch Bridge | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Quantities | | Unit Cost | Sub Total | Quantities | | Unit Cost | Sub Total |
| | | Total | Unit | | | Total | Unit | | |
| **Part A: Roadway** | | | | | | | | | |
| **A1** | Earth Work (Fill) | 1,200 | $m^3$ | $50 | $60,000 | 1,200 | $m^3$ | $50 | $60,000 |
| **A2** | Concrete/ Asphalt Removal & Disposal | 300 | $m^3$ | $135 | $40,500 | 300 | $m^3$ | $135 | $40,500 |
| **A3** | Sidewalk (Pedestrian and bicycle path) | 1,300 | $m^2$ | $200 | $260,000 | 1,300 | $m^2$ | $200 | $260,000 |
| **A4** | Asphalt overlay (Existing Front St. and Parking Lot) | 200 | tonne | $170 | $34,000 | 200 | tonne | $170 | $34,000 |
| **A5** | Asphalt (Parking lot addition) | 340 | $m^2$ | $80 | $27,200 | 340 | $m^2$ | $80 | $27,200 |
| **A6** | RSS Walls | 1 | l.s. | $140,000 | $140,000 | 1 | l.s. | $140,000 | $140,000 |
| **A7** | Rip-Rap | 180 | $m^2$ | $100 | $18,000 | 180 | $m^2$ | $100 | $18,000 |
| | **TOTAL Part A** | | | | $579,700 | | | | $579,700 |
| **Part B: Bridge** | | | | | | | | | |
| **B1** | Superstructure | 120 | tonne | $6,000 | $720,000 | 1 | l.s. | $1,300,000 | $1,300,000 |
| **B2** | Hangers | - | - | - | - | 1 | l.s. | $100,000 | $100,000 |
| **B3** | Bridge deck | 370 | $m^2$ | $900 | $333,000 | 370 | $m^2$ | $900 | $333,000 |
| **B4** | Waterproofing | 370 | $m^2$ | $100 | $37,000 | 370 | $m^2$ | $100 | $37,000 |
| **B5** | Asphalt | 70 | tonne | $170 | $11,900 | 70 | tonne | $170 | $11,900 |
| **B6** | Pedestrian Steel Railing | 140 | m | $1,200 | $168,000 | 140 | m | $1,200 | $168,000 |
| **B7** | Concrete abutments | 70 | $m^3$ | $2,500 | $175,000 | 70 | $m^3$ | $2,500 | $175,000 |
| **B8** | Drilled Shafts | 4 | l.s. | $80,000 | $320,000 | 4 | l.s. | $75,000 | $300,000 |
| | **TOTAL Part B** | | | | $1,764,900 | | | | $2,424,900 |
| **Part C: Miscellaneous** | | | | | | | | | |
| **C1** | Mobilization | 5 | % | | $117,300 | 5 | % | | $150,300 |
| **C2** | Engineering and design | 15 | % | | $351,700 | 15 | % | | $450,700 |
| **C3** | Environmental Restoration | 1 | l.s. | $300,000 | $300,000 | 1 | l.s. | $300,000 | $300,000 |
| **C4** | Bridge Lighting, Sign, Pavement Marking | 1 | l.s. | $200,000 | $200,000 | 1 | l.s. | $200,000 | $200,000 |
| **C5** | Drainage | 1 | l.s. | $100,000 | $100,000 | 1 | l.s. | $100,000 | $100,000 |
| | **TOTAL Part C** | | | | $1,069,000 | | | | $1,201,000 |
| | **SUBTOTAL** | | | | $3,413,600 | | | | $4,205,600 |
| | **Contingency** | | | 30% | $1,024,080 | | | 30% | $1,261,680 |
| | **TOTAL** | | | | **$4,437,680** | | | | **$5,467,280** |

### 4.2.5 Evaluation Results

Table 4-4 below provides a detailed evaluation summary of the short list of alternatives.

**Table 4-4 Detailed Evaluation Summary**

| Evaluation Framework | | | Alternatives | | |
|---|---|---|---|---|---|
| **Group** | **Outcomes** | **Outcomes** | **Do Nothing** | **Alignment 1 - Alternative 3: Prefabricated Truss Bridge** | **Alignment 1 - Alternative 4: Signature Bridge (Tied Arch)** |
| Mobility | Walking Experience | Pedestrian LOS | No change to the existing pedestrian LOS | 1.9 m total sidewalk width (includes 0.4 m side clearance from bridge railing) | |
| | | Pedestrian Network Connectivity | No change in pedestrian accessibility and connectivity | Links to Front Street and existing multi-use path (MUP) east of the river | |
| | Cycling Experience | Cycling LOS | No change to the existing cycling LOS | 3.0 m two-way cycling facility | |
| | | Cycling Network Connectivity | No change in cycling accessibility and connectivity; does not support long-term cycling objectives in the City | Links to existing cycling facility on Mississauga Road and existing MUP east of the river | |
| | Equity | Physical Accessibility | Equity in mobility by gender, ability, income, family status, and age class remain the same | Equity in mobility improved through the provision of an active transportation crossing. Pedestrian clearway complies with City accessibility design standards. Grading of bridge approach is 5% or less. | |
| Environment | Habitat / Wildlife | Designated Natural Areas | No impacts to designated natural areas | Bank work in support of the new bridge will be located downstream of the PSW/ANSI and is not anticipated to result in any negative impacts to this upstream feature. | |
| | | Natural Land | No impact to natural land | Permanent vegetation removals of natural habitats associated with the bridge works are expected to be minor (438m$^2$). No long-term impacts are anticipated following the mitigation measures. | |
| | | Wildlife/Habitat | No impact to wildlife/habitat | Both alternatives may potentially result in habitat loss and/or alteration. To access the banks, there will be 2,909m$^2$ of temporary removal of vegetation. This will result in short term impacts and removal of habitat while construction is taking place. Following recommended mitigation measures and construction timing windows, no long-term negative effects are anticipated for the aquatic and terrestrial system. | |
| | | Trees | No impact to trees | Based on the proposed construction access and laydown areas, 126 trees were inventoried. An estimate of 70 trees will require removal and 23 trees will be potentially injured, while the remaining 33 trees will not be impacted. Trees removed will be replaced according to specifications within the arborist report and will be used to revegetate previously impacted areas within the Study area.<br>**A number of trees in the Study area have been impacted by Metrolinx works since the tree inventory conducted in 2021, these impacts are consequently not noted in the findings of this report. Further tree inventory will be required during the detailed design phase to confirm any new impacts. The impact noted here will likely be less as a result of work already undertaken.* | |

| Evaluation Framework | | | Alternatives | | |
|---|---|---|---|---|---|
| **Group** | **Outcomes** | **Outcomes** | **Do Nothing** | **Alignment 1 - Alternative 3: Prefabricated Truss Bridge** | **Alignment 1 - Alternative 4: Signature Bridge (Tied Arch)** |
| | Hydrology/ Hydraulics | Fluvial Geomorphology | No impact to fluvial conditions | Lateral migration and meandering are unlikely to occur. Local erosion risk can still exist for areas hydraulically impacted by existing crossings, particularly if banks are not armoured. Based on the field assessment, the south bank immediately downstream of the train bridge lacks bank protection. | |
| | | Impact to hydrology conditions (incl. floodplain) of the Credit River | No impact to hydrology conditions | For both bridge alternatives, both options do not result in overtopping at the crossing under a 50-year storm even and 100-year regional storm event.<br>No change in the water surface elevations was observed at the remaining cross sections within the Study area. Accordingly, the proposed design is not considered to generate a negative impact on flood levels under the full range of storm events. | |
| | Air | Air Quality | Potential for poor air quality due to increased congestion as a result of not providing additional active transportation options to cross the Credit River | Both bridges pose no operational air quality impact from the use of the proposed bridge because only bicycles and pedestrians will be using the new structure. During construction, the greatest potential for impacts would occur on dry and/or windy days, particularly when the winds are blowing from the west through northwesterly to north directions, which can be mitigated as per the recommendations of the Construction Air Quality Assessment Report. | |
| | Soil | Soil Quality | No impact to soil quality | Geotechnical mitigation is expected for both bridges. Soil quality to be confirmed in future phases of design. | |
| Public Health & Safety | Public Health | Support Active Communities | Does not support active communities as a result of not providing additional active transportation options to cross the Credit River | Both bridge alternatives support active communities by providing an active transportation option to cross the Credit River | |
| | | Pedestrian Safety | No improvements to safety for pedestrians to cross the Credit River | Cycling and pedestrian facilities are linked to the existing pedestrian and cycling network, are physically separated, and meet minimum or desired widths | |
| | | Emergency Response | No change in ability for emergency vehicles to cross Credit River | No change in ability for emergency vehicles to cross the Credit River | |
| Quality of Place & Prosperity | Aesthetics | Visual Impact | No change to existing views in the area | Visual impacts of new structure likely to impede views of the Port Credit Railway Bridge | |
| | | | | Truss bridge has less flexibility for aesthetic input from the community. A Truss bridge is generally less visually appealing depending on how it is integrated into the surrounding context. | Signature bridge provides more flexibility and opportunity for public input during detailed design. A Tied Arch Bridge design allows for greater aesthetic design that can reflect community context and promote greater visual integration into the surrounding environment. |
| | Public Realm | Noise and Vibration | Does not introduce changes to existing noise and vibration conditions | Both bridges pose no operational noise impact from the use of the proposed bridge because only bicycles and pedestrians will be using the new structure. Construction noise impacts are temporary in nature but may be noticeable at times in nearby residential areas. | |

| Evaluation Framework | | | Alternatives | | |
|---|---|---|---|---|---|
| **Group** | **Outcomes** | **Outcomes** | **Do Nothing** | **Alignment 1 - Alternative 3: Prefabricated Truss Bridge** | **Alignment 1 - Alternative 4: Signature Bridge (Tied Arch)** |
| | | Public Space / Public Realm | No public space/public realm improvements | Both bridges contribute to improving the public space and public realm by providing cycling and pedestrian facilities that are linked to the pedestrian and cycling network; providing additional options to cross the Credit River. A pedestrian clearway that complies with City design standards. Grading of bridge approach is 5% or less. | |
| | Cultural Environment | Built Heritage Resources and Cultural Heritage Landscapes | No impact to built heritage resources and cultural heritage landscapes | Both bridge designs present indirect impacts to the Port Credit Railway Bridge, 35 Front Street North, the Mississauga Road Railway Bridge, the Old Port Credit CHL, the Credit River Corridor CHL, and the Mississauga Road Scenic Route CHL because of their location adjacent to the proposed alignment. Indirect impacts due to the construction of the AT bridge adjacent to BHR 1 (Port Credit Railway Bridge) are anticipated to include impacts to the views of the Port Credit Railway Bridge. | |
| | | Archeological Resources | No impact to archeological resources | Both bridge types hold the same potential for archaeological impacts. 15 previously registered archaeological sites are within 1 km of the Study area, but none are within 50 meters. Majority of the Study area does not have archaeological potential on account of previous deep soil disturbance events. Archaeological potential must be evaluated if impacts to the Credit River riverbed is proposed. | |
| | Resiliency & Sustainability | Supports climate change objectives | Does not support climate change objectives | Both bridge alternatives have a similar structural, material, operational and life cycle outcomes. Both bridge alternatives support climate change objectives by providing new pedestrian and cycling facilities to the overall transportation network. | |
| Affordability & Constructability | Capital Cost | Preliminary Cost Estimate | No construction/No cost | $4.4M | $5.5M |
| | | Utility Relocation | Utility relocation not required | Both alternatives will require road works to reconstruct Front Street approaching the bridge crossing. Potential utility impact to the TELUS cables in 360GT's leased ducts and vaults, depth to be confirmed in future phases of design with locates and test pits. | |
| | | Environmental Mitigation | Environmental mitigation not required | Both alternatives will require a similar level of effort and cost to mitigate potential environmental impacts from the structures. | |
| | | Construction Complexity | No construction | Construction staging area would generally be on the east of the river. A crane is needed to lift the structure in place. Construction would be likely limited to night-time hours when all trains on the Metrolinx rail corridor are non-operational. Discussions with Metrolinx would be needed during design to determine logistics and restrictions. | General construction requirements for the Tied Arch Alternative would be similar to the Truss Bridge; construction would be likely limited to night-time hours when all trains on the Metrolinx rail corridor are non-operational. Discussions with Metrolinx would be needed during design to determine logistics and restrictions.<br><br>A signature bridge is significantly lighter than a prefabricated truss bridge; therefore, the size of the crane needed to lift the bridge into place would be smaller. |
| | | | | Both alternatives will have a similar material (steel construction); details on specific finishes will be confirmed in detailed design. | |
| | | | | Both Alternatives will meet standard bridge design requirements as specified in the Design Criteria. | |
| | | Property | Property is not required | In the final configuration, 600 $m^2$ from the parking lot owner by the Canadian Legion will be required for both alternatives. | |

| Evaluation Framework | | | Alternatives | | |
|---|---|---|---|---|---|
| **Group** | **Outcomes** | **Outcomes** | **Do Nothing** | **Alignment 1 - Alternative 3: Prefabricated Truss Bridge** | **Alignment 1 - Alternative 4: Signature Bridge (Tied Arch)** |
| | Operational Cost | Life Cycle Cost Requirements | No costs related to infrastructure and operation maintenance | A prefabricated truss bridge will require a moderate level of maintenance and operations i.e., snow clearance, painting, and coating. | A signature bridge will require more maintenance effort than a prefabricated truss bridge; in addition to snow clearance, painting, and periodic inspection of arches (if any) is required. |
| | Construction Complexity | Environmental Mitigation | No construction | The environmental mitigation required would be the same for both options. Significant staging area is required for bridge assembly, piling and abutment works on both sides of the river. Both alternatives will require a restoration strategy for vegetation and trees. | |
| | | | | The Royal Canadian Legion parking lot would be affected during construction of either bridge options for the duration of the construction. Minor traffic mitigation is required on Front St while the road is reconstructed and on Mississauga Road at the intersection with Front St. | |
| | | Geotechnical Considerations | Geotechnical consideration not required | Geotechnical mitigation for both alternatives is similar.<br><br>A prefabricated truss bridge is significantly heavier than a signature bridge; which will require a stiffer foundation system that would have a higher cost implication and may impact scheduling. | Geotechnical mitigation for both alternatives is similar.<br><br>A signature bridge is generally lighter in weight than a prefabricated truss bridge, this alternative may have lower costs associated with foundation construction. |

## 4.3 Summary

Table 4-5 below provides an overall summary of the evaluation of the short list alternatives, and identifies Alternative 4: Signature Bridge as the preferred alternative solution

**Table 4-5 Evaluation Summary**

| Group | Outcomes | Do Nothing | Alternative 3: Prefabricated Truss Bridge | Alternative 4: Signature Bridge (Tied Arch) |
|---|---|---|---|---|
| Mobility | Walking Experience | No improvements made to pedestrian LOS or connectivity | Improvements made to pedestrian LOS: new bridge crossing provides 1.9 m pedestrian sidewalk<br><br>Pedestrian connectivity improved: new bridge crossing provides link to transit hub at Port Credit GO Station | |
| | Cycling Experience | No improvements made to cycling LOS or connectivity | Improvements made to cycling LOS: new bridge crossing provides 3.0 m wide bi-directional cycling facility<br><br>Cycling connectivity improved: new bridge crossing provides link to transit hub at Port Credit GO Station | |
| | Equity | No improvements made to equity in mobility | Equity in mobility improved through the provision of an active transportation crossing | |
| Environment | Habitat / Wildlife | No impact to habitat/wildlife | No impact to designated natural areas<br><br>Permanent vegetation removal is required – restoration and mitigation plan to be included in detailed design | |

| Group | Outcomes | Do Nothing | Alternative 3: Prefabricated Truss Bridge | Alternative 4: Signature Bridge (Tied Arch) |
|---|---|---|---|---|
| | | | Potential habitat loss is anticipated – restoration and mitigation plan to be included in detailed design<br><br>Estimate of 70 trees will be removed – restoration and mitigation plan to be included in detailed design<br><br>**A number of trees in the Study area have been impacted by Metrolinx works since the tree inventory conducted in 2021, these impacts are consequently not noted in the findings of this report. Further tree inventory will be required during the detailed design phase to confirm any new impacts. The impact noted here will likely be less as a result of work already undertaken.* | |
| | Hydrology/ Hydraulics | No impact to hydrology/hydraulic conditions | Lateral migration of the river is not expected to occur<br><br>No change in water surface elevation<br><br>No negative impact on flood levels under the full range of storm events is expected | |
| | Air | Potential for long-term poor air quality due to increased congestion due to absence of attractive active transportation facilities | No impact to air quality from use of the bridge | |
| | Soil | No impact to soil quality | Geotechnical mitigation is expected for both bridges | |
| Public Health & Safety | Public Health | No changes to existing pedestrian safety<br>Does not support active communities<br>No change in ability for emergency vehicles to cross the Credit River | Pedestrian safety is improved as new crossing provides a mode-separate option to cross the Credit River<br><br>Supports active communities through the provision of an attractive alternative transportation facility<br><br>No change in ability for emergency vehicles to cross the Credit River | |
| Quality of Place & Prosperity | Public Realm | No impact to existing views | Likely to impede existing views. Less flexibility in design. | Likely to impede existing views. A signature bridge allows for more flexibility in design. |
| | | No impact on noise and vibration | No operational noise and vibration impact | No operational noise and vibration impact |
| | | Does not support public space/public realm improvements | Supports public space/public realm improvement by providing an alternative option for active transportation | |
| | Cultural Environment | No impact to cultural heritage resources | No direct impact to cultural heritage resources | |
| | | Does not support climate change objectives | Both bridge alternatives support climate change objectives by providing new pedestrian and cycling facilities to the overall transportation network. | |
| Affordability & Constructability | Preliminary Cost Estimate | No construction | $4.4M | $5.5M |
| | Capital Cost | Utility relocation not required<br><br>Environmental mitigation not required | Costs associated with utility relocation required<br><br>Costs associated with environmental mitigation efforts required | |

| Group | Outcomes | Do Nothing | Alternative 3: Prefabricated Truss Bridge | Alternative 4: Signature Bridge (Tied Arch) |
|---|---|---|---|---|
| | | No property costs | Property is required from the Royal Canadian Legion parking lot | |
| | Operational Cost | Costs related to infrastructure and operation maintenance not required | Moderate level of maintenance and operations required for snow clearance, painting, and coating. | Higher level of maintenance and operations required; in addition to snow clearance, painting and periodic inspection of arches (if any) is required. |
| | Construction Complexity | No construction is required | Parking lot access is required to be maintained for the Royal Canadian Legion<br><br>Construction duration is estimated to be one construction season plus a few months the following season to reinstate landscaping<br><br>Temporary traffic mitigation/detours may be required on Front Street and the Mississauga Road/Front St intersection<br><br>Moderate to major construction complexity may be explored: potential requirement for in-water pier/ falsework during construction, and barge-work to minimize disturbance to waterbed | |
| | | Geotechnical consideration not required | Prefabricated truss bridge may require additional foundation works | A signature bridge may have lower costs associated with foundation works compared to the Truss Bridge |
| **Overall Summary** | | The Do-Nothing alternative does not address the problem/opportunity statement and does not support active transportation goals and objectives in the area. | This alternative supports the area's overall active transportation goals and objectives and performs comparatively to Alternative 4 in terms of level of impact. Given the economic savings in using a prefabricated structure, the prefabricated truss bridge provides less flexibility and opportunity for aesthetic design. | This alternative supports the area's overall active transportation goals and objectives and performs comparatively to Alternative 3 in terms of level of impact. With a moderate increase in cost ($1.1M more than Alternative 1), a signature bridge allows for greater aesthetic design input that can reflect community context and promote greater visual integration in the surrounding environment. |
| **Overall Recommendation** | | **NOT PREFERRED** | **LESS PREFERRED** | **MOST PREFERRED** |

## 4.4 Bridge Design Refinement

Alignment 1 - Alternative 4 (Signature Bridge) was presented to the public at the second PIC as the preliminary preferred bridge design, with the understanding that a tied-arch bridge was used as a representative signature bridge for evaluation purposes, and that the design of the preferred bridge is subject to change based on context-specific requirements in future phases of the project.

Feedback received from the second PIC identified that the public wanted more opportunities to provide input on the design elements of the AT Bridge. The public expressed their desire for the design of the AT bridge to compliment the character of the Port Credit area while also acting as a place for bridge users to pause and admire the scenery. Subsequently, an additional virtual design workshop and survey was held during which the renderings of two signature bridge options, an above-deck arch bridge and a bowstring truss bridge, were presented to the public for additional feedback. Both options take into considerations various aesthetic and functional elements that would potentially be of interest to bridge users and could improve the overall user experience. All elements explored during the workshop, such as lighting, public seating, and signage, can be implemented into either of the two bridge options and will be explored further during detailed design.

The following sections provide a detailed description of the two signature bridge options presented at the virtual design workshop.

### 4.4.1 Above-Deck Arch Bridge

The above-deck arch bridge features lookout and seating areas on the south side of the bridge and could be designed to accommodate either a multi-use path or separate pedestrian and cyclist lanes. See Figure 4-11 and Figure 4-12 for the sample layout of the above-deck arch bridge.

### 4.4.2 Cantilever Bowstring Truss Bridge

In addition to the lookout and seating areas on the south side of the bridge similar to the above-deck arch bridge, the bowstring truss bridge also features public seating along the pedestrian walkway throughout the length of the bridge. Under this design, pedestrians and cyclists would be fully separated by a barrier. See Figure 4-13 and Figure 4-14 for the sample layout of the bowstring truss bridge.

**Figure 4-11 Above-Deck Arch Bridge Plan and Profile**

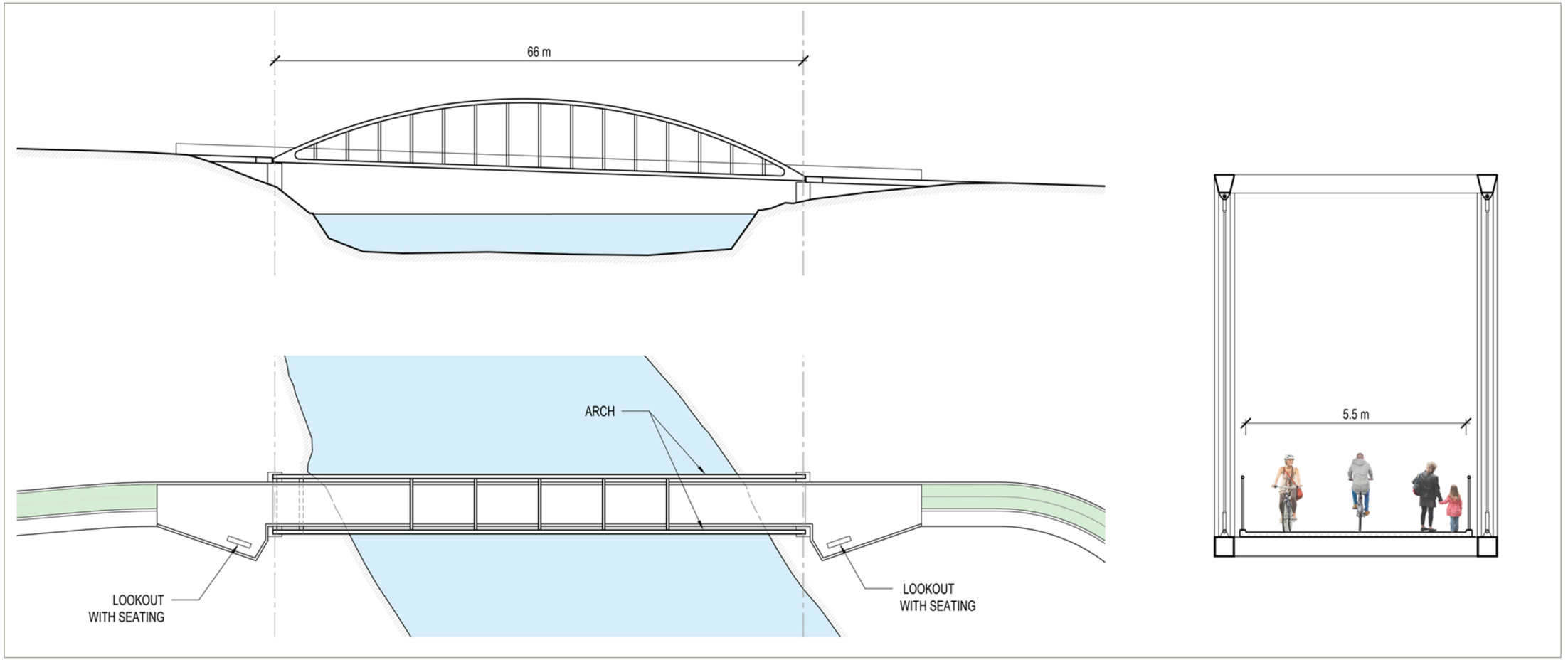


**Figure 4-12 Conceptual Renderings of Above-Deck Arch Bridge**

**Figure 4-13 Cantilever Bowstring Truss Bridge Plan and Profile**

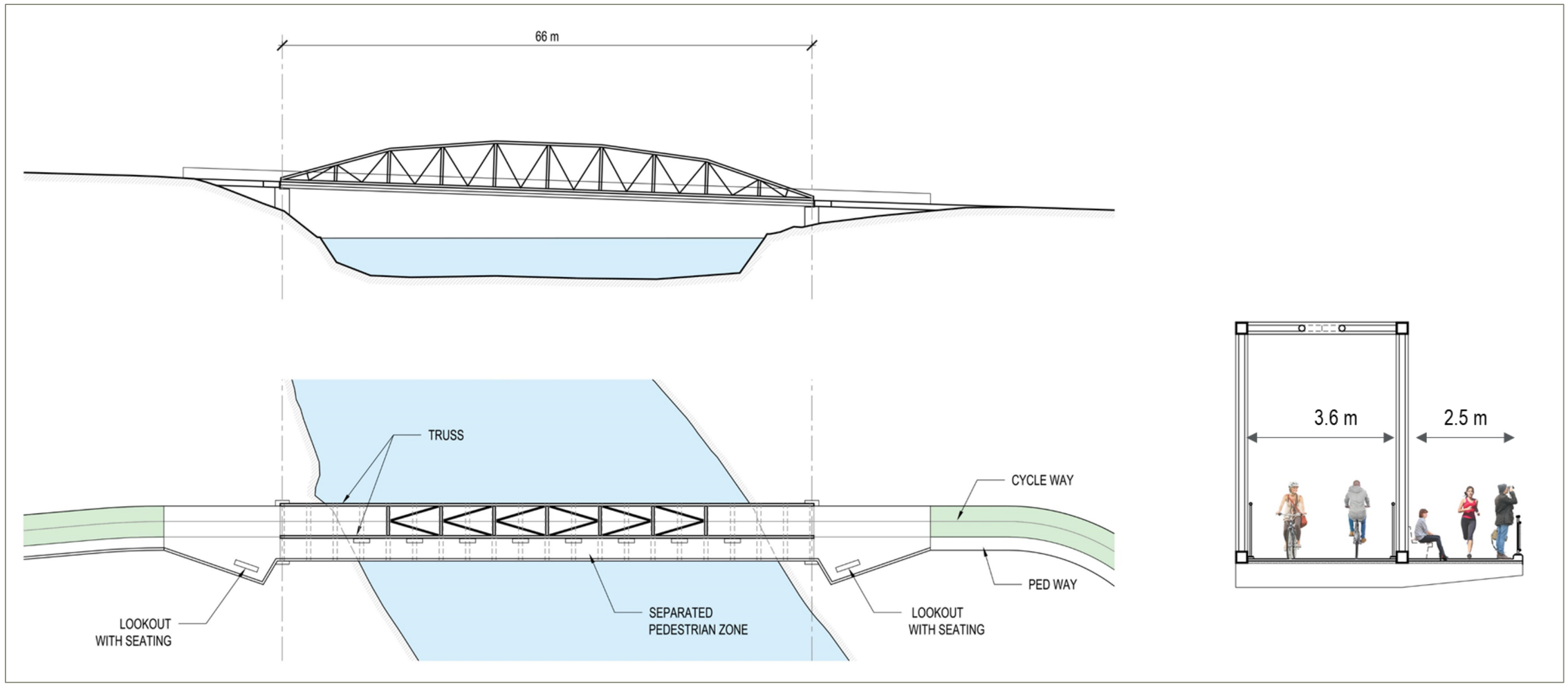


**Figure 4-14 Conceptual Renderings of Bowstring Truss Bridge**

## 4.5 Alignment Refinement

Alignment 1 was presented to a key stakeholder, the Royal Canadian Legion, on March 4, 2022. The legion did not support this alignment due to the significant impacts it would have on their parking lot. Two additional sub-alternative alignments were developed to mitigate impacts to the Legion.

### 4.5.1 Alignment 1A - Multi-use Path (MUP) in Parking Lot

Alternative 1A would have a separated cycling and pedestrian path that transitions to a 3.0 m shared multi-use path (MUP) that would span across the Legion's parking lot (Figure 4-15). Key considerations of this alignment include:

- Minimizing impacts to the Legion's parking lot; 34 parking spaces in the parking lot can be accommodated (a reduction of 6 from existing conditions)
- Shared multi-use path limits the pedestrian and cyclist level of service
- A total of 488 $m^2$ of property from the Legion would be required

Since parking impacts to the Legion continue to remain, Alignment 1A offers the option to provide additional parking spaces in other locations, as shown in Figure 4-16 and in Table 4-6.

**Table 4-6 Additional Parking Compensation for Alignment 1A**

| Parking Zone | Description |
|---|---|
| **PZ1** | Legion Parking lot – 34 spaces |
| **PZ2** | 10 perpendicular spaces along Front Street. This parking option would require an additional 34 $m^2$ of property from the Legion's front yard. |
| **PZ3** | 5 parallel lay-by spaces behind sidewalk on Front Street |
| **PZ4** | 22 parking spaces, expansion of Memorial Arena lot |

### 4.5.2 Alignment 1B – Bridge Only

Alternative 1B would have no path connecting the bridge to Front Street; pedestrians and cyclists would have to travel through the Legion's parking lot to access the bridge. Key considerations of this alignment include:

- No impact to the Legion's parking lot
- No connection between future bridge and adjacent active transportation network on Front/Mississauga
- Negatively impacts pedestrian and cyclist safety and comfort (no safe connection through parking lot)

See Figure 4-17 for Alignment 1B.

### 4.5.3 Preferred Alignment

In keeping with the goals and objectives of the AT Bridge, Alignment 1A was selected as the preferred alignment.

Alignment 1A was presented to the Legion on August 4, 2022 and received initial support from the Legion representative in attendance. The Legion reflected that they preliminarily prefer Parking Zone 3 over Parking Zone 2, as it has fewer impacts on their front yard. The Legion also informed the project team that they currently lease a small portion of Metrolinx' property for parking just south of the Metrolinx fence line that could potentially be retained as parking under a revised Alignment 1A. Given this information, the project team revised the parking arrangement to accommodate 45 parking spaces in total, at the Legion's request. See Figure 4-18 for a revised Alignment 1A. Since 45 spaces are being provided on the east side of the Credit River as compared to 46 in the existing condition, the project team has not included the additional 22 parking spaces in PZ4 in the preferred option; however, this area could be expanded at a later time if required and has been accounted for in the impact assessment for this EA.

**Figure 4-15 Alignment 1A – Multi-Use Path (MUP) in Parking Lot**

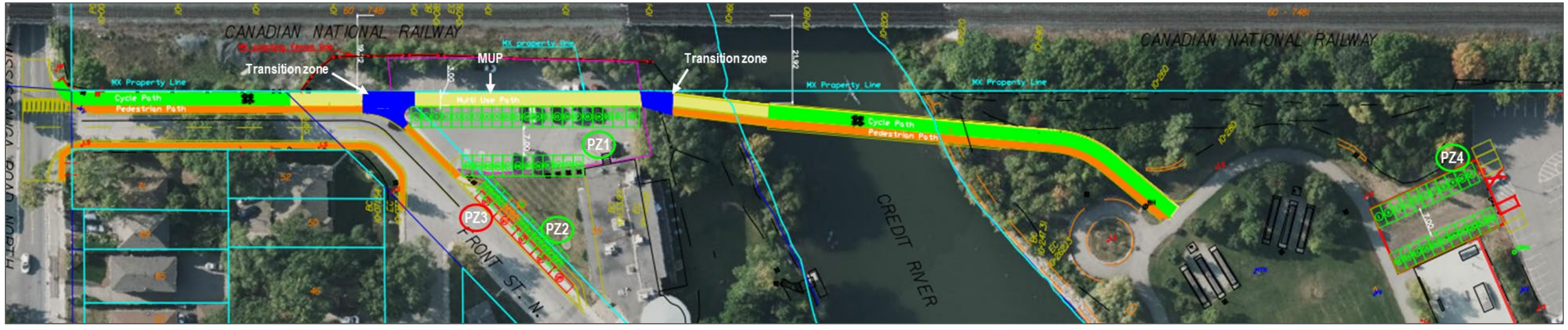



**Figure 4-16 Alignment 1A – Parking Compensation Options**

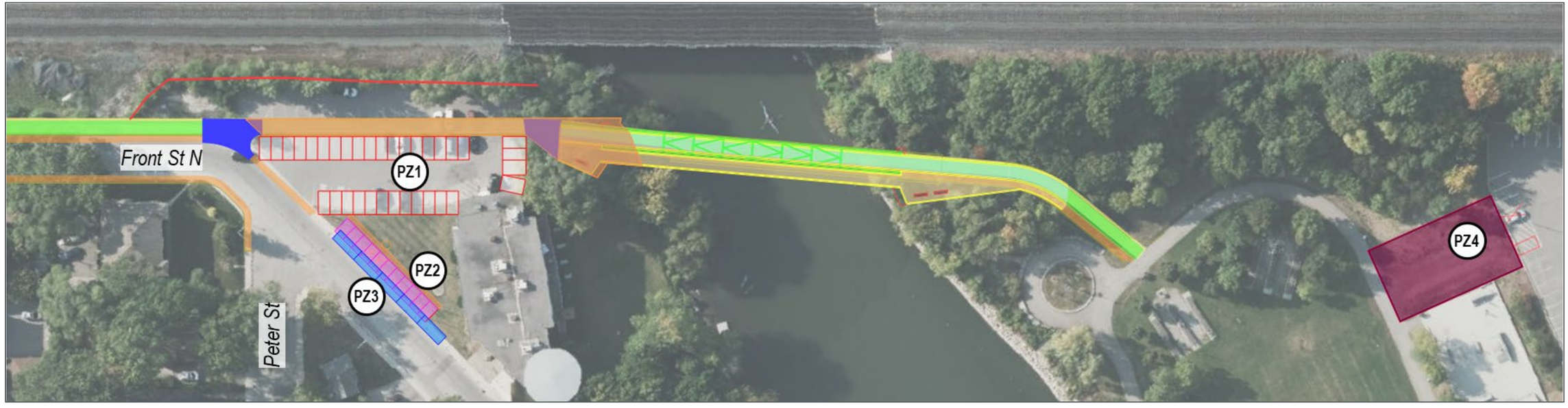


Figure 4-17 Alignment 1B – Bridge Only

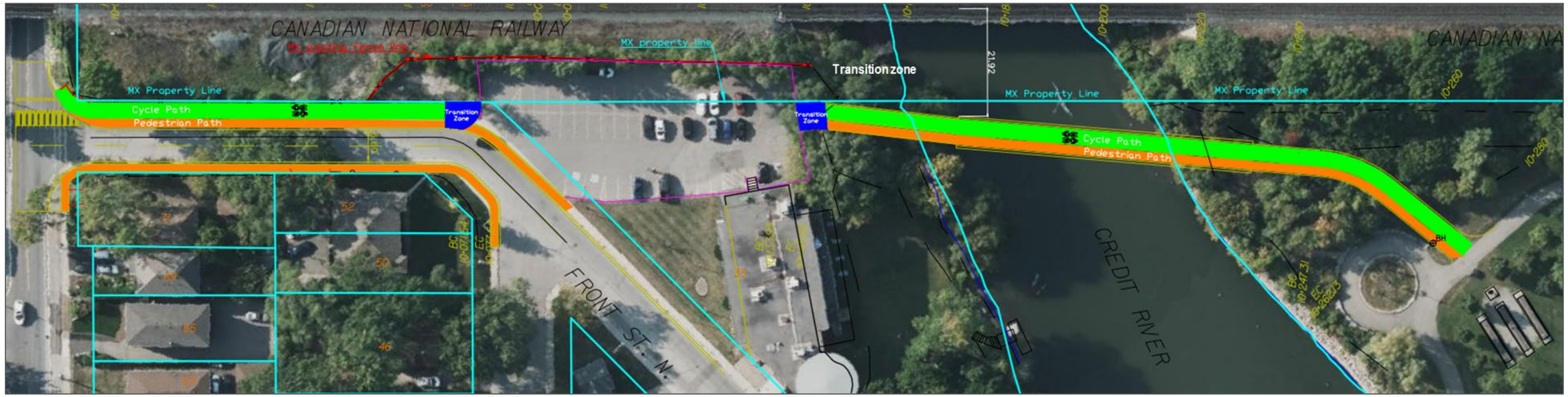
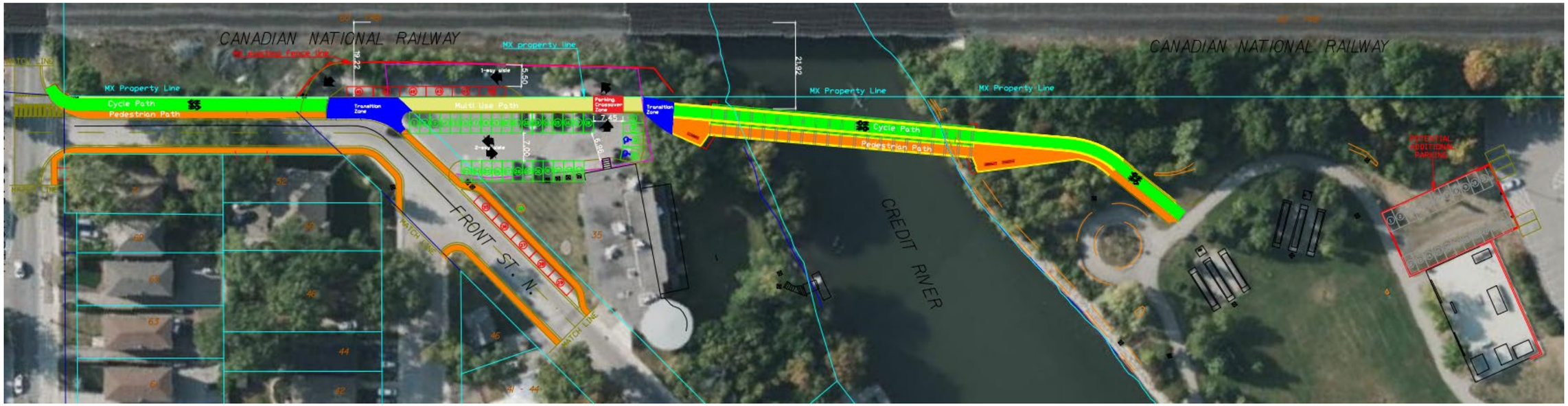



Figure 4-18 Revised Alignment 1A



# 5 Preferred Alternative Solution

## 5.1 Description of the Preferred Alternative Solution

Based on the evaluation of alternative solutions, the preferred alternative for the new AT bridge is a signature bridge that would span across the Credit River, connecting the existing multi-use path near the Port Credit Memorial Arena to Front Street adjacent to the Lakeshore West GO Rail tracks. The crossing would facilitate a future direct connection to the Port Credit GO Station, which would involve constructing a new path through the existing station parking lot. This future connection is dependent on Metrolinx and City plans for the at-grade railway crossing of Stavebank Avenue.

Two signature bridge design options were explored during the refinement of the alternative design solutions:

- Tied-Arch bridge
- Through-Truss bridge

During the drafting of this PFR, a preferred signature bridge option had not yet been confirmed. The footprints of the two bridge designs are identified to be similar, with the through-truss bridge having a slightly larger footprint. Therefore, the Through-Truss bridge was used for the purposes of impact assessment to ensure that all potential impacts are captured. A preliminary general arrangement plan and profile drawing was developed for the through-truss bridge and used to progress the impact assessment (Figure 5-2). Revised Alignment 1A shown in Figure 4-18 is the preferred alignment for the bridge.

### 5.1.1 Structural Design

While details on the structural design of the preferred signature bridge should be confirm through detailed design, the following design parameters are to be followed for both design options:

- Minimum 5.5 m wide deck to accommodate either a multi-use or separated cycling and pedestrian paths
    - Minimum cycling width of 1.5 m per direction
    - Minimum pedestrian width of 1.5 m
    - Minimum 0.3 m buffer between cycling and pedestrian paths (if applicable)
    - Minimum 0.3 m – 0.4 m side clearance from bridge railing
- Bridge length of 66.0 m
- Bridge deck with of 8.0m (to be determined based on total width of all elements in detail design)
- Vertical clearance from water of 5.5 m (+/- 1.25 m)
- Standard safety and accessibility standards
- Sustainable design practices will be considered where possible.

For the through-truss bridge option, the cantilevered pedestrian pathway outside the structure should have a minimum clear width of 2.5 m and a preferred width of 3.0 m to allow for seating.

The structural design parameters stated above are based on best practices and preliminary structural and design feedback obtained from the City of Mississauga. Structural design should be refined and confirmed during detailed design, and depend on the following factors, including:

- City requirements, precedents, and preferences with respect to similar active transportation bridges
- Preferred structural type and overall plan layout
- Agreed approach to separation or sharing of user modes on the bridge, and the transition to the approach pathways
- Structural calculations
- Accessibility considerations

### 5.1.2 Bridge Design Workshop and Online Survey

As the preferred alternative solution is a signature bridge, a public design workshop was held to provide an opportunity for community input on bridge aesthetics, function and experience to be considered in the detailed design phase of the project. Feedback gathered from the Bridge Design Workshop and Online Survey has been documented and logged in the *Feedback Report from Credit River Active Transportation Bridge Design Workshop and Online Survey* in **Appendix B.3**

## 5.2 Design Criteria

The geometric design for this bridge project shall be designed in accordance with the approved design criteria, standards, manuals, and guidelines:

- Canadian Highway Bridge Design
- MTO Structural Manual
- City of Mississauga (CoM) T&W Standard Drawings (August 12, 2020)
- City of Mississauga Facility Accessibility Design Standards (2015)
- TAC Geometric Design Guidelines (June 2017)
- OTM Book 18 (2020)

The design criteria for the AT Bridge Crossing are provided in Table 5-1.

**Table 5-1 Design Criteria**

| Criteria | Proposed Standard | Source |
|---|---|---|
| Design Code | • Canadian Highway Bridge Design Code-CHBDC (CSA S6-19)<br>• MTO Structural Manual, 2016 | |
| Vertical Clearance | • 5.3 m per the Geometric Design Standards for Ontario Highways Policy clause C.4.4.3.1 | MTO Structural Manual clause 16.9.2 |
| Live Load | • Pedestrian Live Load per CHBDC Clause 3.8.9.<br>• Maintenance Vehicle Load per CHBDC clause 3.8.11 for bridge width greater than 3 m. | MTO Structural Manual, clause 16.9.3 & clause 16.9.4 |
| Barrier | • Barrier Load to be considered per CHBDC clause 3.8.8.2.<br>• Minimum barrier height is 1.37 m per CHBDC Table 12.8.<br>• Barrier to be designed per CHBDC clause 12.4.4 and 12.4.5.<br>• Handrails to be placed 1050 mm above top of deck. | CHBDC |
| Wind Load | • Per CHBDC clause 3.10.<br>• Wind load on live load specified in clause 3.10.2.4 will be ignored | CHBDC MTO Structural Manual clause 16.9.5 |
| Snow Load | • To be considered per Ontario Building Code | MTO Structural Manual clause 16.9.6. |
| Thermal Load | • To be considered per CHBDC clause 3.9.4, if applicable. | CHBDC |
| Load Combinations | • The following load combinations will be considered in addition to the load combinations specified in CHBDC clause 3.5.1:<br>• SLS1+1.0S<br>• ULS2+0.5S<br>• ULS3+0.5S<br>• Full ULS factored dead loads plus 1.5S<br>• Where S is the snow accumulation load according to the Ontario Building Code | MTO Structural Manual, clause 16.9.7 |
| Deflection | • Maximum SLS deflection due to the pedestrian live load does not exceed 1/600 of the span.<br>• The maximum SLS deflection of cantilever arms due to pedestrian live load shall not exceed 1/350 of the cantilever length.<br>• The horizontal deflection, due to lateral wind load with service load factor of 1.0, shall not exceed 1/600 of the length of the span. | MTO Structural Manual, clause 16.9.8 |
| Vibration | • To be considered per Clause C3.4.4 of the Commentary to the CHBDC | MTO Structural Manual, clause 16.9.9 |
| Construction Stages | • Construction stages shall be considered in the design. | MTO Structural Manual, clause 16.9.14 |
| Aesthetics | • Bridges require to have a medium or high level of aesthetic consideration.<br>• Bridges with chain link fencing should not be considered. | MTO Structural Manual, clause 16.9.15 |
| Pathway Grades | • Desired grades meeting the 5% maximum. | O. Reg. 413/12: Integrated Accessibility Standards |
| Bicycle Lane Width | • 1.5 m (minimum) – 2.0 m (desired)<br>• *1.2 m (minimum) may be considered in a low-volume, low speed constrained corridor | OTM Book 18 Section 4.4<br>MTO Geometric Design Standards for Ontario Highways – Revision Information Sheet, February 2002, Table D7-1 |

| Criteria | Proposed Standard | Source |
|---|---|---|
| Multi-Use Path Width | • 3.0 m (minimum) – 4.5 m (desired) | City of Mississauga Standard No. 2240.080, Multi-Use Trail |
| Pedestrian Clearway Width | • 1.5 m (minimum)<br>• 1.8 m (desired to allow for two wheelchairs to pass)<br>• 2.0 m (recommended upper limit) | City of Mississauga Standard No. 2240.010, Standard Concrete Sidewalk<br>O. Reg. 413/12: Integrated Accessibility Standards<br>TAC Geometric Design Guide for Canada Roads, Chapter 6 – Pedestrian Integrated design |
| Side Clearance from Bridge Railing | • 0.5 m | Section D.7.2.3 of the MTO Geometric Design Standards for Ontario Highways |
| Mode separation, if applicable | • 0.3 m (minimum) – 0.5 m (desired)<br>• A linear boundary between the two facilities should be provided with tactile characteristics for visually impaired pedestrians. | TAC Geometric Design Guide for Canada Roads, Chapter 5 – Bicycle Integrated design<br>OTM Book 18 Section 4.2.2 |

## 5.3 Typical Cross Section

A preferred typical cross section was developed to be carried forward and refined during detailed design. Two types of pedestrian and cyclist facilities are considered: separated and shared.

**Separated Facilities** - A bridge crossing with separated cycling and pedestrian facilities would apply best design practices for a two-way cycle track. In this option, cyclists would have a dedicated path, and pedestrians, including people pushing strollers or using walkers would use the designated pedestrian path. Barriers such as flex poles and buffered markings may be used to separate modes.

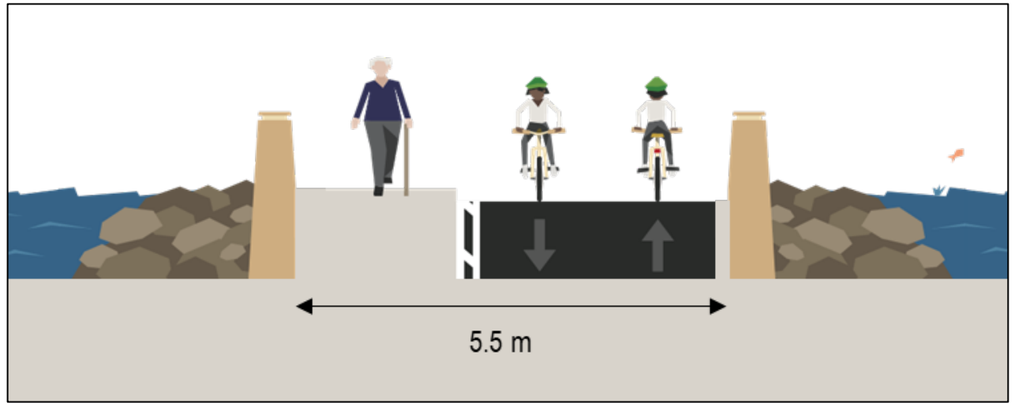
**Shared Facilities** - A shared facility bridge crossing would apply best design practices applied to a multi-use trail or multi-use path (MUP) design. A multi-use bridge crossing would be shared by pedestrians and cyclists, including people pushing strollers or using walkers, rollerblades, skateboards, wheelchairs, or other non-motorized modes of transportation. Multi-use crossings typically do not have physical barriers (i.e., bollards or flexi-poles) separating pedestrians from cyclists. Instead, posted signage or pavement markings may be used to guide and communicate the correct location and direction of travel.

Based on applicable design standards, it is recommended that the active transportation bridge be designed with separated facilities for the following key reasons:

- Flexibility to accommodate desired shared facility design and a modified minimum separated facility
- Integration with existing trails and planned active transportation facilities within the adjacent network that are also separated facilities (connecting multi-use paths will be upgraded to separated facilities)
- Limit impact to sensitive features (minimize deck width)
- Minimize cost and complexity of the bridge (minimize deck width)

Figure 5-1 shows the recommended typical cross section and width carried forward to conceptual design.

**Figure 5-1 Recommended Minimum Typical Cross Section**



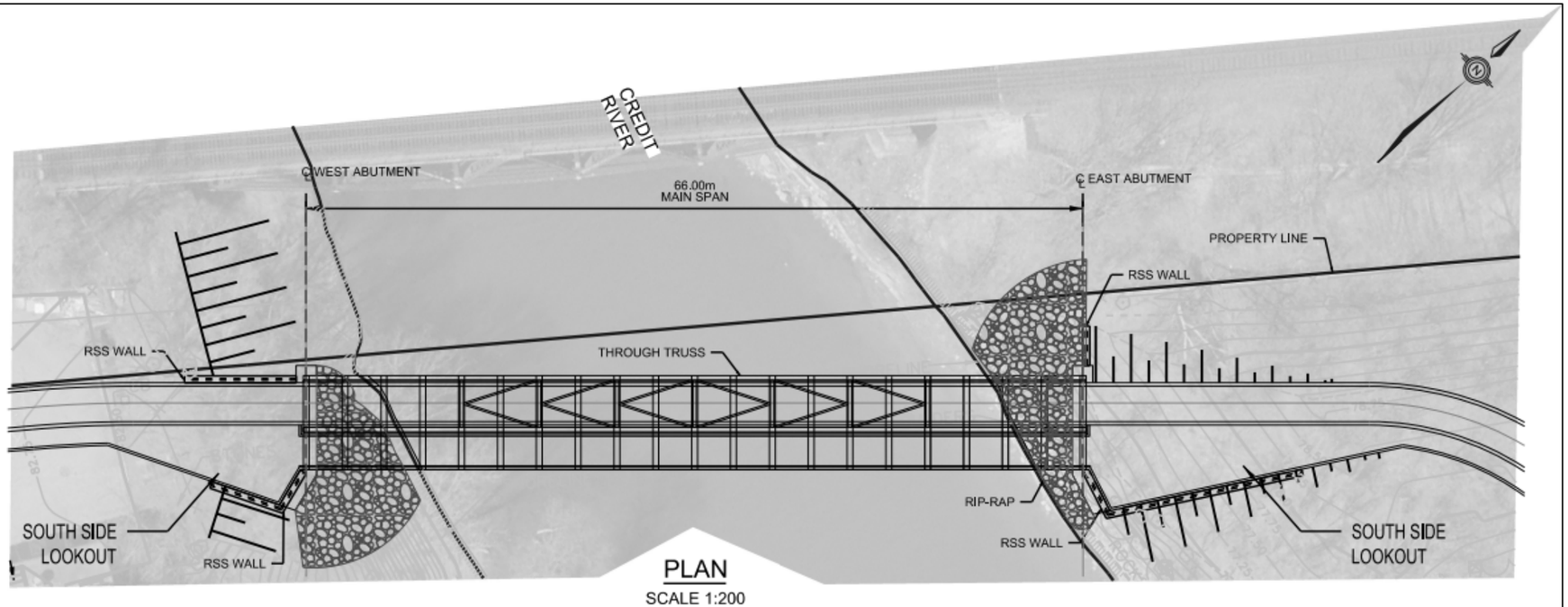

Note the following considerations:

- A 0.3 m painted buffer between the cycling and pedestrian facility is shown in the figure; flexi-bollards are an option that may be implemented. Other treatments for separation will be explored during detail design.
- Side clearance from bridge railing is between 0.3 m – 0.4 m. It is recommended that the 0.4 m be applied to the pedestrian side for enhanced user comfort. The 0.5 m side clearance is based on vehicle grade-separated crossings with sidewalks and a 60 km/h – 80 km/h design speed; therefore, this dimension may be relaxed to fit the separated facilities within the 5.5 m effective width.

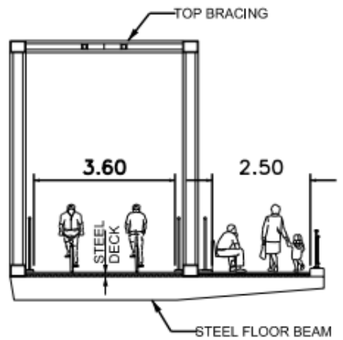
The purpose of the recommended cross section is to serve as a basis for conceptual design and may be refined through detailed design phases of planning. Following the bridge design workshop, the following typical section was developed for use in impact assessment (Figure 5-2):

- Two lookouts on the south side of the bridge
- 66.00 m main span
- 2.50 m sidewalk with seating
- 3.60 m two-way cycling facility

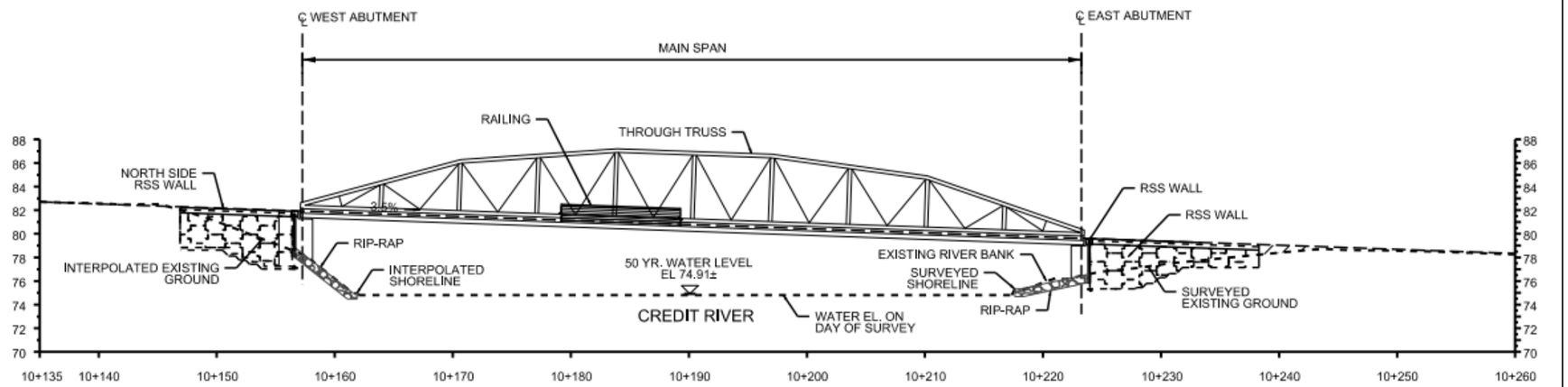
**Figure 5-2 Plan and Profile of the Through-Truss Bridge**




PLAN
SCALE 1:200




TYPICAL
SUPERSTRUCTURE




PROFILE ALONG PROPOSED BRIDGE CENTERLINE
SCALE 1:200

# 6 Impacts, Mitigation Measures, and Monitoring

The impact assessment for this Study has taken a conservative approach to ensure that all potential impacts and mitigation measures are captured. As such, impact assessment is based on an assessment footprint that includes both alternative solutions: **Alignment 1A - Multi-use Path (MUP) in Parking Lot**, and **Alignment 1B – Bridge Only.**

## 6.1 Transportation and Access

Using the traffic volumes data from 2019, an intersection analysis conducted on the intersection of Mississauga Road and Front Street presented that the intersection does not warrant traffic signals under existing traffic conditions but may warrant traffic signals by 2041. Considering the two-way cycle track on the north approach at this intersection, there is a potential sightline issue for the southbound vehicular traffic on Mississauga Road due to geometry curve and railway overpass. Advance warning signage/signals (e.g., Signalized Intersection Warning Beacon, or Active Advance Warning Beacon) for the southbound direction on Mississauga Road are recommended to improve cycle safety. No permanent impacts on driveway and parking lot access are anticipated, bridge construction and the realignment of a small section of Front Street may temporarily impact access to properties in the area. Specific construction impacts to transportation and access are to be determined during detailed design.

Pedestrian and cyclist connectivity in the Port Credit area is expected to be improved as a result of the AT Bridge, with increased access to the Port Credit GO station and other existing transit routes.

## 6.2 Natural Environmental Impacts and Mitigation Measures

### 6.2.1 Natural Heritage Features, Wildlife, and Habitat

A natural environment assessment (NEA) was completed by Matrix Solutions Inc. for the preferred AT Bridge Alternative. The NEA report focuses on the natural heritage features and functions associated within the AT Bridge Study area. The NEA report provides details on existing conditions through a background review and site investigation results; evaluates the significant heritage features and functions; identifies potential impacts the proposed design may have on significant features or functions; and recommends measures to avoid or mitigate the potential impacts.

The construction of the active transport bridge will require dewatering at the proposed bridge footing above the high-water mark on either side of the Credit River as well as permanent land alteration and revegetation of the Study area. Table 6-1 outlines the potential impacts to the natural heritage features as well as mitigation measures that should be followed to avoid serious harm during construction. Once the mitigation measures are implemented, the residual effects are assessed to determine their duration, extent, severity, and permanence.

The greatest potential impacts are associated with the removal of vegetation within the significant valleylands of the Credit River as well as near-water works and potential effects of localized groundwater table drawdown due to dewatering activities. This work could include the removal of SAR trees or SAR bat habitat, destruction or harm to fish and fish habitat, and impacts to nearby PSW areas. The span of the AT bridge will include both permanent and temporary removal of vegetation along the west side (CUW1) and east side (FOD7) of the Credit River. This will include the temporary removal of 141 $m^2$ and a permanent removal 544 $m^2$ of land with the CUW1 community. Within the FOD7 community there will be a temporary removal of 1,928 $m^2$ and a permanent removal of 868 $m^2$. The bridge footing will be placed along the shoreline, out of the water channel. No in-water works are anticipated for the design of this bridge; however, near-water works will need to consider potential aquatic impacts. The natural environment of the Study area may have been further impacted by Metrolinx works since the field assessments conducted in 2021, these impacts are consequently not noted in the findings of this report. Updated impacts to be confirmed during the detailed design phase of the project.

### 6.2.2 Mitigation Measures

Detailed mitigation recommendation for construction and operational effects to the natural heritage features within the Study area are provided in detail in the *Natural Environment Assessment* in **Appendix C.1**. These include timing windows/working in the dry, best construction practices, prevention of wildlife mortality and disturbance, prevention of terrestrial disturbance, erosion and sedimentation control, as well as residual impacts after mitigation.

The greatest potential impacts to the natural heritage features and functions are the removal of trees within the FOD7 habitat, working within proximity to confirmed Barn Swallow habitat, as well as the proximity of construction to the Credit River and PSW/ANSI feature. Tree removals will result in short-term disturbance to the area; however, it has been recommended within the mitigation measures that a tree preservation plan and replanting plan be created for those areas disturbed. This should include a replacement of trees according to the arborist report with appropriate native species for the areas, as well as native seed mix. The permanent removal of habitat within the FOD7 and CUW1 are expected to be relatively small (868 $m^2$ and 544 $m^2$ respectively). Tree compensations for this area should occur within previously impacted area within the Study area. Although trees species will be removed, this is not anticipated to reduce the availability of foraging habitat, or aerial insect availability for the Barn Swallows. The bank work in support of the new bridge will be located downstream of the

PSW/ANSI and is not anticipated to result in any negative impacts to this upstream feature. A CVC permit will be required for works occurring within the 120 m AOI.

Currently the project is not requiring any in-water works to occur; therefore, if mitigation measures are followed, there should be no impact to the Credit River while construction works are occurring. Appropriate approvals should be obtained during the detailed design phase of this project to ensure the natural features and functions within the Study area are adequately protected.

**Table 6-1 Impacts, Mitigations, and Net Effects of the Short-list Alternatives**

| Project Activity | Natural Heritage Features | Potential Impacts | Mitigation Measures | Net Effects |
|---|---|---|---|---|
| **Construction access, staging, and laydown areas** | General wildlife and habitat | Habitat Loss and/or Alteration:<br>• soil compaction and rutting outside of construction zone<br>• damage to edge trees (i.e., outside of construction zone)<br>• fugitive dust<br>• spills (e.g., fuel)<br>• erosion and sedimentation | Timing Windows<br>• 1A-2A, 4A<br>Best Construction Practices<br>• 1B-7B<br>Prevention of Terrestrial Disturbance<br>• 1D-6D<br>Erosion and Sedimentation Control<br>• 1E-6E, 8E-9E | • Construction access and laydown areas will utilize existing roadings, pathways, and parking lots.<br>• In order to access the banks, there will be a temporary removal of vegetation within the FOD7 (1,938 $m^2$) and CUW1 (141 $m^2$). This will result in short term impacts and removal of habitat while construction is taking place.<br>• Trees removed with the construction laydown areas will be replaced according to specifications within the arborist report and will be used to revegetate impacted areas due to construction.<br>• It is acknowledged that the compensation of mature tree removal with immature plantings does not fully account for the negative impact of removing mature woodland. The compensation and restoration of these areas will utilize native species and augment existing and adjacent habitat to the greatest possible extent. |
| | | Disturbance/Avoidance of Habitat:<br>• increase noise during construction<br>• increased human presence | Timing Windows<br>• 1A-2A, 4A<br>Prevention of Wildlife Mortality and Disturbance<br>• 1C-5C | |
| | | Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during natural travel patterns to and from habitats):<br>• increased collision with machinery | Timing Windows<br>• 1A-2A, 4A<br>Prevention of Wildlife Mortality and Disturbance<br>• 1C-5C | |
| **Vegetation clearing, earthworks/grubbing, and disposal** | Potential significant wildlife habitat (SWH):<br>• Bat Maternity<br>• Bald Eagle and Osprey<br>• nesting/foraging/perching<br><br>Potential species at risk (SAR):<br>• Little Brown Myotis<br>• Northern Myotis<br>• Tricolored Bat<br><br>Confirmed SAR:<br>• Barn Swallow (Category 3 habitat) | Habitat Loss and/or Alteration:<br>• permanent/temporary loss of the FOD7 habitat which is<br>• considered candidate SWH<br>• soil compaction and changes in moisture regime<br>• changes to the structure and composition of vegetation communities (e.g., introduction of invasive species)<br>• fugitive dust<br>• spills (e.g., fuel) | Timing Windows<br>• 1A-2A, 4A<br>Best Construction Practices<br>• 2B, 4B, 6B, 7B<br>Prevention of Terrestrial Disturbance<br>• 1D-6D<br>Erosion and Sedimentation Control<br>• 1E-6E, 8E-9E | • Permanent vegetation removals of natural habitats associated with the bridge works are expected to be minor. This will include 868 $m^2$ within FOD7 and 544 $m^2$ within CUW1.<br>• Trees removed as part of construction will be replaced according to specifications within the arborist report and will be used to revegetate previously impacted areas within the Study area.<br>• Many natural areas (including the FOD7 significant woodland) are heavily degraded through the presence of aggressive invasive species such as Garlic Mustard. Though removal is proposed, |
| | | Species at Risk:<br>• Barn Swallow Nests were noted along the Royal Canadian Legion building. Removal or degradation of natural habitat (including mature trees, wetland areas, and waterways) that support aerial insect | Timing Windows<br>• 1A-2A, 4A | |

| Project Activity | Natural Heritage Features | Potential Impacts | Mitigation Measures | Net Effects |
|---|---|---|---|---|
| | | populations has the potential to negatively impact this species by decreasing the availability of insect prey.<br>• There is potential for SAR bat species within the FOD7stand. Vegetation and tree removal to accommodate the bridge has the potential to reduce the availability of suitable cavity trees. | Prevention of Terrestrial Disturbance<br>• 1D 6D<br>Prevention of Wildlife Mortality and Disturbance<br>• 1C-6C | restoration and impact mitigation will create opportunities I for invasive species management and re-introduction of native vegetation to these areas.<br>• It is acknowledged that the compensation of mature tree removal with immature plantings does not fully account for the negative impact of removing mature woodland. The compensation and restoration of these areas will utilize native species and augment existing and adjacent habitat to the greatest possible extent. |
| | | Disturbance/Avoidance of Habitat:<br>• increased noise during construction<br>• increased human presence | Timing Windows<br>• 1A-2A, 4A<br>Prevention of Wildlife Mortality and Disturbance<br>• 1C-5C | |
| | | Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during<br>natural travel patterns to and from habitats):<br>• increased collision with machinery<br>• removal of nests and eggs<br>• smothering hibernacula or nesting site | Timing Windows<br>• 1A, 2A, 4A<br>Prevention of Wildlife Mortality and Disturbance<br>• 1C-5C | |
| **Near-water construction works** | Fish and fish habitat:<br>• Provincially Significant Wetland (PSW)/Area of Natural and Scientific Interest (ANSI)<br>• significant valleylands<br><br>Potential SAR:<br>• American Eel<br><br>Potential SWH:<br>• Turtle Over Wintering Areas<br><br>Potential SCC:<br>• Northern Map Turtle<br>• Common Snapping Turtle<br>• Deepwater Sculpin<br>• Greater Redhorse | Habitat Loss and/or Alteration:<br>• near-water works, works along the banks, have the potential to impact aquatic and semi-aquatic species and their habitat through the following:<br>• fugitive dust<br>• spills (e.g., fuel)<br>• erosion and sedimentation | Timing Windows<br>• 1A-4A<br>Best Construction Practices<br>• 1B-7B<br>Prevention of Terrestrial Disturbance<br>• 1D-6D<br>Erosion and Sedimentation Control<br>• 1E-10E | • The construction of the bridge will be located within the significant valleyland but is not anticipated to include any in-water works. Any works anticipated to occur below the high-water marks will require a Fisheries and Oceans Canada request for review and, if necessary, authorization.<br>• The bank work in support of the new bridge will be located downstream of the PSW/ANSI and proposed near-water works are not anticipated to result in negative impacts to this upstream feature. A Credit Valley Conservation permit will be required for works occurring within the 120 m AOI.<br>• If mitigation measures are followed, no long-term impacts are anticipated for the aquatic system. |
| | | Disturbance/Avoidance of Habitat:<br>• increased noise during construction<br>• increased human presence | Timing Windows<br>• 1A-4A<br>Prevention of Wildlife Mortality and Disturbance<br>• 1C-5C | |
| | | Injury or Incidental Take (particularly during migration to and/or emergence from hibernacula, nesting sites, or during<br>natural travel patterns to and from habitats):<br>• increased collision with machinery<br>• removal of nests and eggs<br>• smothering hibernacula or nesting site | Timing Windows<br>• 1A-4A<br>Prevention of Wildlife Mortality and Disturbance<br>• 1C-5C | |

| Project Activity | Natural Heritage Features | Potential Impacts | Mitigation Measures | Net Effects |
|---|---|---|---|---|
| Dewatering activities | Fish and fish habitat:<br>• Provincially Significant Wetland (PSW)/Area of Natural and Scientific Interest (ANSI)<br><br>Potential SWH:<br>• Turtle Over Wintering Areas<br><br>Potential SCC:<br>• Northern Map Turtle<br>• Common Snapping Turtle<br>• Deepwater Sculpin<br>• Greater Redhorse | Habitat Loss and/or Alteration:<br>• Dewatering activities adjacent to the Credit River have the potential to impact aquatic and semi-aquatic species and their habitat through the following:<br>  ○ Drawdown of water table | Timing Windows<br>• 2A, 5A-6A<br>Best Construction Practices<br>• 9B | • Bridge construction will require temporary dewatering activities to install footings on either side of the Credit River. Quantification of how dewatering and subsequent draw-down of the local water table will impact surface features such as the Credit River and nearby PSW will need to be completed through groundwater investigations at detailed design.<br>• Generally, dewatering influence on the water table are anticipated to be temporary.<br>• Potential ramifications of dewatering include impacts to wildlife during sensitive breeding or hibernating periods and impacts to obligate wetland plant species due to shock or prolonged dewatering activities.<br>• Mitigation measures focus on avoidance of draw-down during the most sensitive times of the year, including wildlife timing windows and the driest period of the summer months. |
| | | Disturbance/Avoidance of Habitat:<br>• Desiccation of semi-aquatic habitats during sensitive breeding periods<br>• Alteration or other negative impacts to vegetation assemblages due to changes in prevailing subsurface hydrology | Timing Windows<br>• 2A, 5A-6A<br>Best Construction Practices<br>• 9B | |
| | | Injury or Incidental Take:<br>• Interruption of sensitive breeding periods which may result in mortality to eggs or young<br>• Alteration of wildlife behaviour which may increase chance of mortality<br>• Shock to obligate hydrophilic plant species which may result in death | Timing Windows<br>• 2A, 5A-6A<br>Best Construction Practices<br>• 9B | |

## 6.3 Tree Impact

Based on the proposed construction access and laydown areas a general understanding of tree impacts can be gained. Based on the proposed alignment, construction access, and laydown areas, it was estimated that of the 126 trees that were inventoried, 59 trees would require removal, and 18 trees would be potentially injured, while the remaining 49 trees would not be impacted. The disturbance footprint for all alternatives indicates that the actual quantified impacts to trees will be variable. Additionally, a number of trees in the Study area have already been impacted by Metrolinx works since the tree inventory conducted in 2021, these impacts are consequently not noted in the findings of this report. These impacts will therefore need to be reassessed during the detailed design phase to more accurately anticipate impacts to trees, as well as to evaluate the potential for lessened impact.

**Tree Preservation and Mitigation Measures**

Protective barriers can be used throughout the Study area to provide sufficient protection of trees during the construction phases of the project. The minimum amount of pruning should be conducted to avoid negative effects to the structure and integrity of the tree. Pruning may include both the branches and roots depending on the extent of the dripline.

Compensation will allow for the restoration of an area that has undergone tree removals or that experiences tree injuries. Following the Ecosystem Offsetting Guideline (2020) provided by the CVC, an estimated compensation of 701 trees is required for the Study area.

A tree preservation plan has been created showing the recommended placement of tree protection fencing for the Study area. The tree preservation plan in Appendix D of the Tree Inventory Report is preliminary and will need to be finalized during detailed design. At detailed design, the details and plans should be updated to incorporate the additional area that was not surveyed in 2021 and updated to reflect any changes to the disturbance footprint for the new AT Bridge.

Additional mitigation measures and recommendations can be found in **Appendix C.2**.

## 6.4 Air Quality

A construction air quality assessment was conducted by SLR Consulting (Canada) Ltd. for the preferred Bridge Alternative. The assessment identifies sensitive receptor locations within 500 m of the construction activities, proposed project works relative to identified sensitive receptors, recommendations for Best Management Practices (BMPs) and the types of BMPs that should be employed.

From an air quality perspective, it is recommended that precautionary and mitigation approaches be considered when operating in close proximity to the identified sensitive receptor locations. The greatest potential for impacts would occur on dry and/or windy days, particularly when the winds are blowing from the west through northwesterly to north directions. During such meteorological events, consideration should be given to limiting or postponing operations that create fugitive dust emissions. As per guidance from the MECP, it is recommended that non-chloride dust suppressants be applied for all excavation, drilling and unpaved vehicle track movements to minimize fugitive dust. Regular cleaning of the construction site and vehicles and maintenance of equipment should be undertaken.

Considerations should also be given to locating construction staging and storage areas away from identified receptors for both sides of the Credit River. Additional mitigation measures and recommendations can be found in **Appendix C.3.**

## 6.5 Noise and Vibration

An environmental transportation noise impact assessment was conducted by SLR Consulting (Canada) Ltd. for preferred Bridge Alternative. The Environmental Noise Assessment (found in **Appendix C.4.**) provides the following recommendations. The potential environmental transportation noise impacts of the proposed undertaking have been assessed. Both operational and construction noise impacts have been considered. The conclusions and recommendations are as follows:

- There will be no perceivable operational noise impacts from any of the possible trail/bridge location options from the use of the proposed bridge because only bicycles and pedestrians will be using the new structure. Options located further to the north will lessen any possible extremely minor noise impacts from the use of the new facility.
- Construction noise impacts are temporary in nature but may be noticeable at times in nearby residential Noise Sensitive Areas.

Methods to minimize construction noise impacts should be included in the Construction Code of Practice:

- To minimize the potential for construction noise impacts, it is recommended that provisions be written into the contract documentation for the contractor, as outlined below:
    - Where possible construction should be carried out during the normally allowed hours specified in the local by-laws (specified in Appendix C of the Environmental Noise Assessment Report). If construction activities are

required outside of these hours, the Contractor should minimize the amount of noise being generated to not be clearly audible in any noise sensitive areas.

- There should be explicit indication that the Contractor is expected to comply with all applicable requirements of the contract.

All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. This is also a requirement of the local noise control by-laws.

## 6.6 Geotechnical Impacts

Based on the findings of the geotechnical investigation and borehole information, geotechnical discussion and recommendations for the bridge design are provided in the following subsections.

### 6.6.1 Recommended Soil Parameters

The recommended soil parameters are established on findings of the site investigation showing that subsurface soils in the study area generally consist of silty clay (till) deposits. Shale bedrock was found in the bridge area at about 14 m at east side and 8 - 9 m at west side of the Railway Crossing below the existing grade.

The proposed soil parameters for the design of foundations and ground support systems are summarized in Table 4.1 of the *Geotechnical Investigations Report* in **Appendix C.10.**

### 6.6.2 Foundations

The recommended foundation type and bearing capacities based on the borehole information are for preliminary design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. The foundation type is to be confirmed in future phases of the design. According to information available at this stage, the structure can be supported by a range of foundation options such as footings, drilled caissons and driven piles.

Spread and strip footings founded on the undisturbed silty clay till or shale bedrock, below the sandy soils. Positive dewatering will be required prior to excavation in the upper water bearing sandy soils. Water must also be lowered to at least 1 m below the lowest excavation level. The recommended geotechnical bearing resistances and founding levels for footings are provided in Table 4.2 of the *Geotechnical Investigations Report* (**Appendix C.10**) and should be updated as the design of the AT bridge advances.

Deep foundations such as drilled caissons or driven piles founded on the sound shale bedrock can also be used to support the proposed bridge structure. Based on the borehole information, the driven piles can consist of steel H-piles such as HP310x110, to be driven minimum 2 m into the bedrock. For preliminary design purpose, the ultimate axial bearing capacity of the piles driven into the bedrock can be taken for HP 310x110 piles as:

- Factored geotechnical resistance at ULS = 1000 kN/pile
- Bearing capacity at SLS: = 1000 kN/pile

The recommended factored geotechnical resistance at ULS should be confirmed by dynamic testing procedures, ASTM D4945, using the Pile Driving Analyzer (PDA). It should be noted that the pile stresses should not exceed 85% of the pile steel yield stress or follow the requirement in Canadian Highway Bridge Design Code (CHBDC).

Based on the borehole information, the proposed drilled piers / caissons founded in sound shale bedrock can be designed for axial bearing capacity value of 5.0 MPa at SLS and for a factored geotechnical resistance of 7.5 MPa at ULS. The drilled piers / caissons must be founded at least 1.0 m into the sound bedrock (i.e., 2.5 m below the surface of shale bedrock), or socketed minimum 2 times caisson diameter below the bedrock surface, whichever is greater / deeper. All caisson bases must be inspected by the geotechnical experts to ensure that the caisson bases consist of undisturbed sound shale, free from loose/disturbed materials.

Mitigation for erosion and scour protection should be provided for the foundations, piers and abutments of the bridge. Proper erosion and scour protection should also be provided along the sides of the watercourse near the bridge structure. Section 4.6.5 of CHBDC requires that seismically induced lateral soil pressures on the back of abutment shall be included in design, where appropriate.

### 6.6.3 Approach Embankments

The soil conditions below the approach embankments generally consisted of loose to compact surficial sandy silt and very soft peat material overlying stiff silty clay till deposits over shale bedrock. The boreholes indicate that the soil conditions below the approach embankments are considered normal and relatively competent in terms of slope stability and settlements.

All organic and otherwise unsuitable soils should be removed within an envelope given by an imaginary slope no steeper than 1H:1V from the toe of the proposed embankment. After stripping, the exposed subgrade should be inspected and approved by the geotechnical expert. It should then be compacted, where feasible, from the surface using

a suitable compactor. With this procedure, conventional 2H:1V side slopes of embankments should not cause foundation instability of the embankments. The settlement of the foundation soils due to the embankment loading is expected to be within 25 mm.

Proper benching of the existing embankment slope should be implemented if and where abutting into the existing embankments. This can be constructed in accordance with OPSD 208.01 – Benching of Earth Slope.

The materials used for the construction of the embankment fills should consist of approved, acceptable earth fill, i.e., select subgrade materials (SSM) or Granular 'B' – OPSS 1010. The embankment fill should be placed on the approved and properly rolled subgrade in lifts not exceeding 200 mm when loosely placed and each lift should be uniformly compacted to at least 95% of the material's Standard Proctor Maximum Dry Density (SPMDD). The degree of compaction should be increased to 98% of SPMDD for the upper 1.0 m of subgrade.

The settlement of the new embankment fills under their own weight can be expected to occur. However, if SSM or granular soils are used, about half of this settlement should be completed within two months and the remaining half substantially completed within one year.

### 6.6.4 Earth Pressures and Retaining Structures

Backfilling behind bridge abutments and any retaining (wing) walls should consist of granular materials in accordance with the applicable Standards. Free draining backfill materials, weepholes, etc. should be provided in order to prevent hydrostatic pressure build-up.

Computation of earth pressures acting against bridge abutments, retaining walls and any wing walls should be in accordance with the Canadian Highway Bridge Design Code, (CHBDC) S6-06. Section 6.1 of the Geotechnical Investigations Report (Appendix C.10) outlines the recommended backfill properties for design purposes.

In order to avoid retaining wall systems, it is recommended that the steep slopes consist of reinforced earth slopes (such as the Tensar Sierra Slope Retention System).

It is understood that retained soil system (RSS) walls will be adopted for the wing walls. The RSS walls must be designed and constructed by a specialty contractor. The designer of the RSS walls should evaluate the stability and safety of the walls in terms of bearing capacity, global stability, overturning and horizontal sliding.

Prior to the construction of the RSS walls, all existing fill and other unsuitable materials below the wall base levels must be removed and replaced with engineered fill. The engineered fill should consist of approved, acceptable earth fill. Underneath the footing base, a granular pad founded on engineered fill or competent native soil will be required to support the footings.

### 6.6.5 Excavation and Dewatering

Excavations can be carried out with heavy hydraulic backhoe. Excavation of the shale (if any) can be carried out using heaviest available single tooth ripper equipment. It may be necessary at some locations to utilize jackhammer type equipment to "open" the limestone layers for the ripper. All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). Provisions must be made in the excavation contract for the removal of possible boulders in the till or obstructions in the fill material. The excavation has to be supported if the excavation walls are not flatted as required by the Regulation 213/91.

Positive dewatering will be required prior to any excavations in sandy fill or native sandy soils below groundwater table; otherwise, it will result in an unstable base and flowing sides. A contractor specializing in dewatering should be retained to design the dewatering systems. Groundwater table must be lowered to at least 1.0 m below the lowest excavation level / trench base.

### 6.6.6 Cycling Path/Car Parking Pavement

The driveway and parking area are anticipated to be paved with asphalt concrete.

The topsoil and loose foreign materials should be completely stripped. The underlying native soil should be stripped as much as required for grade and inspected for soft spots. Soft spots should be sub-excavated.

Low area should be brought to grade by backfilling with granular materials or free draining clean fill materials approved by the geotechnical staff. Fill material should be applied in a lift of not more than 200 mm and be compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD) throughout.

The completed subgrade should be inspected for signs of rutting or displacement. Areas showing signs of rutting or displacement should be recompacted and retested, or the material should be sub-excavated and replaced with free draining clean fill materials approved by the geotechnical expert.

The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

It is understood that both driveway and parking lots will be used by light vehicles. Based on provincial practices and geotechnical expert experience, the pavement structure for the driveway and parking lots is recommended in Table 6-2.

**Table 6-2: Pavement Structure**

| Material | | Thickness of Pavement (mm) | |
|---|---|---|---|
| | | Driveway | Parking Lot |
| **Hot-Mix Asphalt (OPSS 1150)** | HL3 Surface Course | 40 | 40 |
| | HL8 Binder Course | 50 | 50 |
| **Granular Materials (OPSS 1010)** | Granular A Base (19 mm Crusher Run Limestone) | 150 | 150 |
| | Granular B Type II Subbase | 300 | 300 |

### 6.6.7 Pipe Bedding and Support

The recommended minimum thickness of granular bedding below the invert of the pipes is 150 mm. The thickness of the bedding may, however, must be increased depending on the pipe diameter or in accordance with local standards or if wet or weak subgrade conditions are encountered, especially when the soil at the trench base level consists of wet, dilatant silt. The bedding material should consist of well graded granular material such as Granular 'A' or equivalent. It is recommended that geotechnical engineering experts be on site during excavations to assess the suitability of the subgrade materials to support the pipes.

### 6.6.8 Design Review, Monitoring and Inspection

Designs of different stages and design changes during construction should be reviewed by the geotechnical engineer to confirm that the geotechnical recommendations and comments have been properly interpreted and implemented, and that the intention of the report has been met, and to provide geotechnical input as required.

During construction, full-time engineered fill monitoring, sufficient foundation inspections, slope inspection, subgrade inspections, in-situ density testing, and materials sampling and testing should be carried out by the geotechnical engineer to confirm that the conditions exposed and encountered are consistent with those encountered in the boreholes and assumed in the report, and to monitor conformance to the pertinent project specifications.

Additional details on the geotechnical recommendations are provided in the *Geotechnical Investigations Report* in **Appendix C.10.**

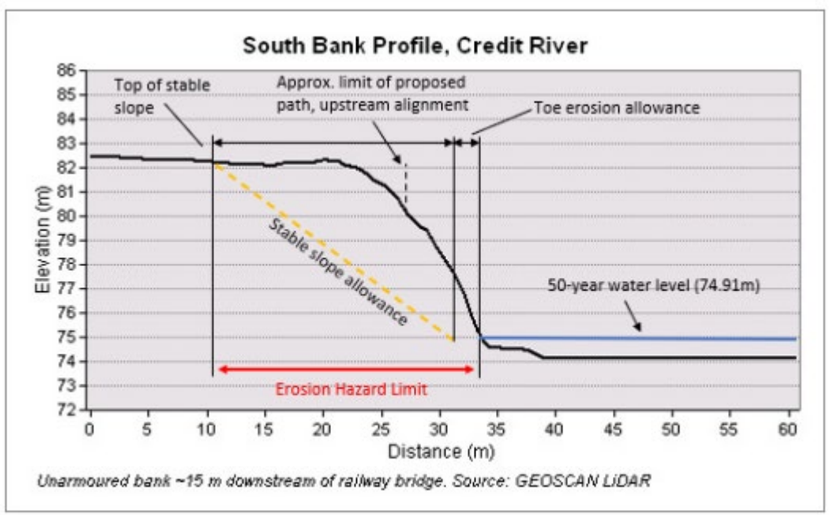
## 6.7 Fluvial Geomorphic Impact

The proposed AT Bridge is a clear-span bridge, which is a preferred structure type per CVC's 2015 and 2019 guidelines. The proposed span of 66 m is approximately 10 m wider than the existing Lakeshore Road bridge (56 m span), and 6 m wider than the opening width of the rail bridge upstream, which has an opening width of approximately 60 m between its piers per the CVC HEC-RAS model. The alignment of the bridge over the river is not perpendicular, which results in a longer structure. The bridge abutments are located 3.4 – 7.9 m from the edge of water at the 50-year water level. As the abutments are also not aligned with the riverbanks, a parallel skew to the banks would provide more distance from the water.

The bridge is located within a reach that is not geomorphically active overall; the reach is actively managed with bank armouring and is controlled by lake backwatering rather than active lateral migration processes. However, some localized bank erosion was noted on the south bank through the bridge footprint, which has been documented and mapped as part of the local erosion hazard area (Figure 6-1). The mapped erosion hazard is related to the expansion of flows downstream of the train bridge, which acts as a pinchpoint, the lack of bank protection in that location, and oversteepening of the bank.

Based on this mapping (Figure 6-1), the western abutment of the concept design bridge would be expected to be within this erosion hazard area. The proposed bridge does not span the top of the south bank, which is steep and shows some signs of instability. The south abutment will be constructed on the face of the south bank within the local erosion hazard area. To address potential erosion risks in this location, river and geotechnical engineering will be required at detailed design to ensure that the south bank is stable and that it ties in with the rail bridge upstream and existing erosion control works downstream. This will be particularly important under future conditions when the stabilizing influence of tree roots are lost due to tree removals.

**Figure 6-1 Local Erosion Hazard of Unarmoured South Riverbank ~15m Downstream of Train Bridge**




Notes: Blue line = water level, orange line = 3:1 slope, red line = Local erosion hazard limit (3:1 setback + 2 m toe erosion allowance); erosion limit linework shown is schematic

While it is preferable per CVC guidelines to design new structures outside the erosion hazard limit such that hardening is not required, it is appropriate in this context to mitigate the erosion hazard with bank protection works, informed by a geotechnical and further engineering studies, due to the specific characteristics of the sites:

- The riverbanks within this reach are entirely armoured outside of the local erosion hazard area. In practical management terms, the river is being managed as a port, and engineering controls on bank erosion are being maintained through the great majority of the study reach. Erosion protection works near the proposed western bridge abutment will tie into and provide a consistent bank management approach throughout the reach.
- Bank protection will protect the upstream train bridge from erosion, as well as the adjacent private properties inland and downstream, including the existing downstream bank armouring.
- Bank protection may be integrated with the replacement or rehabilitation of the existing stormwater outfall near the proposed western abutment, which is in poor condition.
- Given the context of the bridge abutment within an actively managed, low energy reach, the erosion risk to the AT bridge structure can be managed by bank protection works. After installation of appropriate erosion mitigation measures, the bridge abutment will no longer be considered within the erosion hazard arealimit assuming continued maintenance of the bank.

The current general arrangement drawing depicts the abutments outside of the 50-year water level (74.91 m), and notes that existing shorelines are to be retained below this water level. The banks above the 50-year water level are proposed to be lined with riprap to provide stability per the current general arrangement drawing.

The design of the bank protection on the embankments below the abutments must be confirmed at detailed design with input from CVC. The following preliminary recommendations are provided as initial guidance for the erosion protection design:

- It is recommended that a stable rounded riverstone gradation be used as a more natural riprap material, which is consistent with CVC guidelines for restoration of natural watercourses. Other materials, such as armourstone, may be considered as appropriate based on the results of updated hydraulic modeling. Bioengineering or vegetated of the upper slope may also be considered.
- The west unprotected bank is anticipated to require some regrading to provide a stable and protected slope.
- The design should tie into the bridge upstream and the bank armouring downstream.
- The installation of riprap or other stone erosion protection measures may require in-water or near water works, which will require additional technical analysis and submissions for CVC permitting. A more detailed analysis to be done during the detailed design phase.
- The depth of the proposed bridge abutments will be determined at detailed design with input from a scour assessment, geotechnical study, and input from CVC.
- The foundational depth of the abutments will impact the staging and equipment required for their construction. This will also impact whether construction will occur within the high-water level. The work is anticipated to require some impact within the high-water level. Any adjustments to the abutment foundation depth based on the scour assessment could impact the construction footprint and may require a marine assessment (i.e., a bathymetric survey and geotechnical/geophysical substrate characterization).

- It is expected that the City will acquire land rights through purchase or easements where necessary to construct and maintain and bank protection works associated with the AT bridge and abutments

The preliminary bridge design is not anticipated to have permanent impacts on the form of the channel through the crossing. Indirect effects could result from changes in hydraulics during flows above the 50-year water level due to bank protection works, however these are anticipated to be minor. As well, potential changes in lake levels over the design life of the bridge should be considered at detailed design.

**Impact Mitigation**

To mitigate potential impacts of the proposed works, the following considerations should be made at detailed design:

- Confirm water levels and velocities near the proposed AT Bridge
- Confirm hydraulic conveyance is met under all flood conditions and lake water levels
- Complete river and geotechnical engineering of the south bank through the bridge is stable, and that it ties in with the train bridge upstream and existing erosion control works downstream
- Identify the scour hazard limit at the proposed bridge through completion of a scour assessment to determine appropriate bridge footing depths, acceptable based on geotechnical criteria in the engineering design, and erosion hazard policy criteria by CVC and stakeholders
- Confirm the extent and type of bank protection below the proposed bridge and along the unprotected part of the bank based on the results of the geotechnical engineering study, consultation with CVC, and updated hydraulic information
- Confirm land ownership of the bank work area. It is expected that the City will acquire land rights through purchase or easements where necessary to construct and maintain and bank protection works associated with the AT bridge and abutments
- Confirm the alignment of the bridge abutments, path, and the disturbance limits of construction
    - Additional assessment and planning will be required to isolate the work area and mitigate impacts if installation of the bank protection and/or the construction of the abutments require in-water work.
    - The configuration of the path along the south bank should be confirmed, and the associated slope stability, bank erosion risks, and mitigation techniques will need to be considered, with potential works reviewed and approved by CVC and impacted stakeholders.
    - Drainage in the area of the existing parking lot and storm outfall on the south bank will also need to be considered at detailed design with respect to the alignment of the path, bridge abutment and associated works to ensure stability of the channel bank and slope.

The proposed bridge appears to span the high-water level of the river, but hydraulic model conditions require further confirmation as the design progresses. The south abutment of the proposed bridge is situated on a portion of the riverbank that locally exhibits evidence of instability and erosion, without existing erosion control structures, and possibly due to hydraulic impacts of the train bridge upstream. The abutment lies within the calculated local erosion hazard area. The abutment and path alignments may be refined, and limits of construction should be determined to confirm no in-water work. A scour assessment and detailed hydraulic conveyance study are also recommended to be completed at detailed design or at earlier stages as the design progress. See **Appendix C.5.** for the *Fluvial Geomorphology Assessment Report*.

## 6.8 Drainage & Stormwater Management

**Stormwater Management**

A pavement area analysis was conducted to assess the change in impervious area resulting from the proposed improvements to Front Street, the parking lot, and the pedestrian bridge. A summary of the analysis is provided in Table 6-3.

**Table 6-3: Pavement Area Analysis**

| Drainage Area | Impervious Area ($m^2$) | | Increased Area ($m^2$) | % Increase |
|---|---|---|---|---|
| | Existing | Proposed | | |
| **Front Street** | 2,320 | 2,557 | 237 | 10% |
| **Legion Parking Lot** | 1,621 | 1,842 | 221 | 14% |
| **Total (Front Street and Parking Lot Only)** | 3,941 | 4,399 | 458 | 12% |
| **New Pedestrian Bridge** | 0 | 1072 | 1072 | - |
| **Total (Including Pedestrian Bridge)** | 3,941 | 5,471 | 1530 | 39% |

The increase in impervious area on Front Street is 237 $m^2$, which results in a 10% increase, and the increase in impervious area in the parking area is 221 $m^2$, which results in a 14% increase. This minimal increase is not anticipated to generate a substantial impact to the volume and peak flow of runoff within these areas. Furthermore, due to the proximity to the Credit River, no additional quantity control measures are required.

During detailed design, LID measures are to be considered in the parking lot to provide water quality control and water balance, and mitigate the increase in paved area in the parking lot and Front Street, if feasible (i.e., sufficient clearance to the groundwater table can be achieved). LID measures that should be investigated include permeable pavers in the parking lot, or bioretention facilities in the landscaped area of the parking lot. The treated pavement area is to exceed the increase in pavement area on Front Street and the parking lot.

The increase in impervious area associated with the new pedestrian bridge is 1072 $m^2$. Since the pedestrian bridge will drain directly to the Credit River, and will not be supporting vehicular traffic, it is not anticipated to impact the drainage system on Front Street. Due to the proximity to the Credit River, no additional stormwater management measures are proposed.

**Hydraulic Assessment**

AECOM undertook a hydraulic assessment of the existing three span CN railway bridge over Credit River upstream of the proposed bridge[2]. Although the proposed bridge is a pedestrian bridge, same criteria is used in this assessment, since these two structures will be spatially close. Since the Credit River is regulated by the Credit Valley Conservation (CVC), the Technical Guidelines for Watercourse Crossings (2019) is also included in the assessment of the pedestrian bridge to confirm that the crossing meets CVC criteria.

**Assessment Criteria**

Hydraulic assessments of the watercourse crossings were undertaken in accordance with the Canadian Highway Bridge Design (CHBDC), the Ontario Ministry of Transportation's Highway Drainage Design Standards (2008), and the CVC Technical Guidelines for Watercourse Crossings (2019).

**Design Flows**

The CHBDC and MTO Standards do not provide specific design flow return periods for pedestrian bridges. CHBDC specifies a 50-year design peak flow for bridge crossings, which has been adopted for the subject crossing structure. CVC also specifies a 100-year design peak flow for pedestrian crossings, which has been included in the analysis. The Regional storm peak flows were included in the assessment of the bridge to ensure that the railway tracks are not overtopped during major rainfall events.

**Freeboard**

Section 1.9.8.2 of the CHBDC and MTO Standard WC-1 require a minimum freeboard of 1.0 m for freeway, arterial roads, and collector roads for the design storm. The CVC requires a minimum freeboard of 0.3 m for the 100-year design storm for pedestrian crossings. A freeboard criterion of 1.0 m for the bridge crossings during the 50-year design flow has been adopted, and the CVC freeboard criterion of 0.3 m for the 100-year design storm was also included in the assessment.

**Clearance**

The CHBDC requires a clearance of 1.0 m from the upstream 25-year water level to the bridge soffit. MTO Standards stipulate a minimum clearance of 1.0 m during the design flow sufficient to prevent damage to the structure by the action of flowing water, ice jam/flows, or debris. There is no clearance criterion from the CVC. A minimum clearance of 1.0 m during the 50-year design flow has been adopted for the subject bridge crossing.

**Hydraulic Assessment of Preferred Alternative**

A HEC-RAS hydraulic model of the Credit River was obtained from Credit Valley Conservation (CVC) for this study. The design peak flows from the existing model are maintained for use in the hydraulic assessment of the proposed bridge. It is recommended that during detailed design, the design flows be reviewed and verified to confirm any changes to the land use and associated hydrologic information that may affect the peak flows presented in this study. A summary of the storm design peak flows at the crossing is presented in Table 6-4.

**Table 6-4: Design Peak Flows**

| Watercourse/ Drainage Crossing | Type | Peak Flow ($m^3/s$) | | |
|---|---|---|---|---|
| | | 50 Year Storm | 100 Year Storm | Regional Storm |
| **Proposed AT Crossing** | Bridge | 468.2 | 557.1 | 732.6 |

The existing HEC-RAS hydraulic model of the Credit River obtained from CVC has been reviewed and revised to develop the Basis of Comparison (BOC) model as well as

[2]Oakville Subdivision Culvert and Bridge Assessment Hydrology and Hydraulics Design Report, AECOM, October 2020.

proposed condition model for this study. Two additional cross sections based on the topographic survey were included in the BOC model upstream and downstream of the proposed bridge to better reflect the current site conditions. The proposed bridge was included in the proposed condition model.

Based on criteria mentioned above, proposed bridge capacities were assessed based on the 50-year design storm event for structure to determine the freeboard between the water surface elevation and the road and the vertical clearance between water surface elevation and the lowest point of soffit. The 100-year freeboard was also included to confirm that the CVC criterion is met.

Table 6-5 summarizes the hydraulic analysis results for the proposed crossing. The results indicate that the proposed bridge meets the freeboard and clearance criteria of minimum 1.0 m from the design high water level under the 50-year storm event and the 100-yr and Regional Storm event do not result in overtopping at the crossing. The proposed bridge also meets the minimum 0.3 m from the design high water level under the 100-year storm event.

**Table 6-5:** Hydraulic Assessment Results for Proposed AT Crossing

| Crossing | Span | Width | Deck Elev. (m) | Lowest Soffit Elev. (m) | Water Surface Elev. (m) | | | Freeboard (m) | Clearance (m) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 50-yr | 100-yr | Reg. | | | |
| Proposed AT Bridge | 66.0 | 7.0 | 80.0 | 77.7 | 74.90 | 75.39 | 76.21 | 5.1 (50-yr) | 2.8 (50-yr) | Meets freeboard and clearance criteria |

The water levels under various storm events obtained from the BOC and the proposed models are compared in Table 6-6. The maximum increase in flood levels as a result of constructing the bridge is 0.01 m at a few upstream cross sections, which can be considered as negligible. No change in the water surface elevations was observed at the remaining cross sections within the Study area. The proposed design is not considered to generate a negative impact on flood levels under the full range of storm events.

**Table 6-6**: Comparison of Proposed and BOC Hydraulic Models

| Cross – Sections | Storm Event | Water Surface Elev. (m) | | |
|---|---|---|---|---|
| | | **BOC Model** | **Proposed Model** | **Comparison** |
| 0.690 | Regional | 76.2 | 76.21 | 0.01 |
| | 100 year | 75.38 | 75.39 | 0.01 |
| | 50 year | 74.89 | 74.9 | 0.01 |
| | 25 year | 74.27 | 74.28 | 0.01 |
| | 10 year | 73.72 | 73.73 | 0.01 |
| | 5 year | 73.18 | 73.19 | 0.01 |
| | 2 year | 72.15 | 72.16 | 0 |
| 0.715 | Regional | 76.19 | 76.2 | 0 |
| | 100 year | 75.39 | 75.4 | 0.01 |
| | 50 year | 74.9 | 74.91 | 0.01 |
| | 25 year | 74.29 | 74.3 | 0 |
| | 10 year | 73.75 | 73.75 | 0.01 |
| | 5 year | 73.21 | 73.21 | 0 |
| | 2 year | 72.19 | 72.2 | 0.01 |
| 0.722 | Regional | 76.29 | 76.29 | 0 |
| | 100 year | 75.48 | 75.49 | 0 |
| | 50 year | 74.99 | 75 | 0.01 |
| | 25 year | 74.38 | 74.38 | 0.01 |
| | 10 year | 73.83 | 73.84 | 0.01 |
| | 5 year | 73.29 | 73.3 | 0.01 |
| | 2 year | 72.26 | 72.26 | 0.01 |
| 0.889 | Regional | 77.57 | 77.57 | 0.01 |
| | 100 year | 76.59 | 76.59 | 0 |
| | 50 year | 76.01 | 76.02 | 0 |
| | 25 year | 75.29 | 75.29 | 0.01 |
| | 10 year | 74.64 | 74.64 | 0.01 |
| | 5 year | 73.99 | 74 | 0 |
| | 2 year | 72.75 | 72.75 | 0.01 |

During detailed design, the hydraulic assessment will be reviewed based on any revisions to the design of the proposed pedestrian bridge crossing. Any additional fill within the floodplain will be minimized, and cut-fill balance calculations will be provided.

## 6.9 Archeological Impacts

The Stage 1 Archaeological Assessment (found in **Appendix C.7.)** provides the following mitigation measures:

- A Stage 2 test pit survey will be conducted in the Study area in order to confirm the extent of existing disturbances.
- Following comments received from the MCM in October 2022 on an earlier draft of this PFR and its appendices, a *Criteria for Evaluating Marine Archaeological Potential* checklist was completed and it was identified that a Marine Archaeological Assessment shall be completed once construction impacts to the Credit River have been identified during detailed design.
- The remainder of the Study area does not require further archaeological assessment; and
- Should the proposed work extend beyond the current Study area or should changes to the project design or temporary workspace requirements result in the inclusion of previously un-surveyed lands, these lands shall be subject to a Stage 2 archaeological assessment.

## 6.10 Built Heritage Resources and Cultural Heritage Landscapes

Based on the results of the assessment, the following mitigation measures have been developed:

- Construction activities and staging will be suitably planned and undertaken to avoid unintended negative impacts to the identified BHRs and CHLs. Avoidance measures may include, but are not limited to: erecting temporary fencing, establishing buffer zones, issuing instructions to construction crews to avoid identified cultural heritage resources, etc. When construction staging and lay down areas are determined during the detailed design phase, the identified BHRs will be reviewed by a qualified heritage professional to assess impacts and confirm recommended conservation and/or mitigation measures.
- Indirect impacts to the Port Credit Railway Bridge (BHR 1), 35 Front Street North (BHR 2), the Mississauga Road Railway Bridge (BHR 5), the Old Port Credit CHL (CHL 1), the Credit River Corridor CHL (CHL 2), and the Mississauga Road Scenic Route CHL (CHL 3) are anticipated as a result of their location adjacent to the proposed alignment. To ensure these properties are not adversely impacted during construction, a baseline vibration assessment will be undertaken during detailed design. Should this advance monitoring assessment conclude that the structure(s) on these properties will be subject to vibrations, a vibration monitoring plan will be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction.
- Indirect impacts due to the construction of the AT bridge adjacent to BHR 1 (Port Credit Railway Bridge) are anticipated to include impacts to the views of the Port Credit Railway Bridge. As the Port Credit Railway Bridge is a Provincial Heritage Property of Provincial Significance and there are indirect impacts anticipated due to construction adjacent the subject resource, a resource-specific heritage impact assessment (HIA) is required as per the *Standards and Guidelines for Conservation of Provincial Heritage Properties* (Ministry of Tourism, Culture and Sport, 2010). This HIA will be completed by a qualified cultural heritage professional with recent and relevant experience in railway bridges as early in detailed design as possible, and be submitted to the City of Mississauga, Metrolinx, and the Ministry of Citizenship and Multiculturalism (MCM) for review, and to any other local heritage stakeholders that may have an interest in this project.
    - This HIA will consider and address the views to and from the Port Credit Railway Bridge, the scale and massing of the AT bridge, as well as AT bridge finishes and palettes, grading plans, and post-construction landscaping plans. Consideration will be given to using materials, colours, and finishes that will make the AT bridge physically and visually compatible with, subordinate to, and distinguishable from the surrounding landscape and the Port Credit Railway Bridge.
- As the property at 35 Front Street North (BHR 2) is listed by the City of Mississauga and there are indirect impacts anticipated due to encroachment on to the property, property acquisition, reconfiguration of the parking lot, and construction onto the subject property, including AT bridge approaches, a resource-specific HIA is required as per the City of Mississauga Official Plan clause 7.4.1.10. However, given that no structures or apparent landscape features of significant CHVI are anticipated to be impacted on the property, it is recommended that the City of Mississauga consider waiving the requirement of a HIA in this case in favour of suitable mitigation measures including post-construction rehabilitation which could include sympathetic plantings where required. Consultation will be completed by the proponent with the Royal Canadian Legion Branch 82 to ensure appropriate parking requirements and access is maintained.
- Indirect impacts to CHL 2 (Credit River Corridor CHL) are anticipated to include grading, the installation of a cycling path, pedestrian sidewalk, the reconfiguration of the parking lot at 35 Front Street North (BHR 2), the construction of a parking lot on the east side of the river at 22 Stavebank Road, the removal of some vegetation, and construction of the AT bridge across the Credit River, and property acquisition within the CHL. The construction of the AT bridge is also anticipated to

impact view of the Credit River corridor from the surrounding area. The scenic and visual quality of the corridor is one of the identified heritage attributes of the Credit River Corridor CHL. As there are properties within the Credit River Corridor CHL listed by the City of Mississauga and there are indirect impacts anticipated due to construction, a resource-specific HIA will be completed as per the City of Mississauga Official Plan clause 7.4.1.10. In order to reduce indirect impacts to the Credit River Corridor, a resource-specific HIA will be conducted to help inform subsequent design stages.

    - Such a study will consider and address the views of the Credit River Corridor CHL, the scale and massing of the AT bridge, as well as AT bridge finishes and palettes, grading plans, and post-construction landscaping plans. Consideration should be given to using materials, colours, and finishes that will make the AT bridge physically and visually compatible with, subordinate to, and distinguishable from the surrounding landscape.

- As the properties within the Old Port Credit CHL (CHL 1) and the Mississauga Road Scenic Route CHL (CHL 3) are listed by the City of Mississauga and there are indirect impacts anticipated, a resource-specific HIA may be required as per the City of Mississauga Official Plan clause 7.4.1.10. However, given that no structures or apparent landscape features of significant CHVI are anticipated to be impacted on any of the properties, it is recommended that the City of Mississauga consider waiving the requirement of a HIA in these cases in favour of suitable mitigation measures including post-construction rehabilitation which could include sympathetic plantings where required.
- Should future work require an expansion of the Study area then a qualified heritage consultant will be contacted in order to confirm the impacts of the proposed work on potential heritage resources.

Additional mitigation measures and recommendations can be found **Appendix C.8**.

## 6.11 Property Impacts

Property impacts were identified and summarized in Table 6-7. Figures detailing the areas of potential property takings are enclosed in **Appendix D.**

**Table 6-7 Property Impacts**

| Alignment | Impacted Area | Description |
|---|---|---|
| **Alignment 1A - Modified Base Case: Multi-use path (MUP) in Parking Lot** | Property required from the Royal Canadian Legion: ~488.5 $m^2$ | Approximately up to 454 $m^2$ from the Legion's parking lot to accommodate the MUP connecting from the bridge to Front Street and 34 $m^2$ in their front yard if Parking Zone 2 is selected. |
| **Alignment 1B – Bridge only** | Property required from the Royal Canadian Legion: ~234.5 $m^2$ | Approximately 234.5 $m^2$ from the Legion in the wooded area along the shore to accommodate the proposed lookout area and abutment of the bridge as well as the transition zone into the parking lot. |

## 6.12 Utilities

Section 3.15 identifies the utility companies that confirmed existing infrastructure in the Study area. Further coordination with the utilities stakeholders will be required during detailed design to confirm the existing utility location and alignment, which may result in design adjustments and/or changes/relocation due to the roadway improvement. Formal definition of impacts on utilities will be determined during detailed design, in consultation with individual utility companies. At this stage, no significant utility impacts/relocations are anticipated.

## 6.13 Constructability, Staging and Implementation

Construction staging will maintain 2 lanes of traffic (one lane in each direction) including pedestrian movements equal to pre-construction levels during construction on Front Street. However, the nature of the required work is such that traffic disruption and delays cannot be entirely avoided. If deemed necessary, temporary, short-term road or lane closures may be required during construction.

Impacts will be temporary in nature and the City of Mississauga will attempt to mitigate impacts as much as possible. During detailed design, a traffic management plan will be developed to determine how traffic and pedestrian access will be accommodated during construction and how access to properties adjacent to new AT bridge will be maintained.

Access to the Royal Canadian Legion parking lot would be affected during construction for the duration of the construction to provide access and a laydown area on the west side of the river. The construction duration would be about one construction season plus a few months the following season to reinstate landscaping and final works.

The east side of the river would be used to assemble the bridge. The piling and abutment works would be done at both east and west side of the bridge. A potential requirement for in-water pier/ falsework during construction can be mitigated by floating a work barge up the river and have it tied off to the shores or use a spud-barge which would minimize disturbance to the riverbed.

Construction staging area would generally be on the east of the river. A crane is needed to lift the structure in place. Construction would be likely limited to night-time hours when all trains on the Metrolinx rail corridor are non-operational. Discussions with Metrolinx would be needed during design to determine logistics and restrictions.

## 6.14 Construction Monitoring and Maintenance Considerations

Table 6-8 below provides a summary of key monitoring and maintenance considerations during construction.

The impact assessment detailed within this report is based on preliminary design details. Potential impacts and recommended mitigation measures provided in Section 6 of this report and its appendices should be revisited at the detailed design stage of the project as designs are finalized to ensure that negative impacts are minimized or eliminated through implementation of appropriate mitigation or compensation measures.

**Table 6-8 Summary of Monitoring and Maintenance Considerations During Construction**

| Area | Monitoring and Maintenance Considerations |
|---|---|
| **Trees** | • Tree protection measures, once installed, should be inspected, and approved by the City Forestry Department.<br>• All tree protection measures must remain in place for the entire duration of the project, including demolition, construction, and restoration phases. They will not be removed or altered until authorization is given by the City Development and Design Division. |
| **Natural Heritage Features, Wildlife, and Habitat** | • **Timing Windows/Working in the Dry**<br>o 1A: Remove trees outside of the breeding bird window of April 10 to August 15. If trees are to be removed during the breeding bird window, then an avian biologist must conduct a nesting survey before tree removals. Nesting surveys during breeding season for mature canopy trees is not recommended due to the high likelihood of missed nests.<br>o 2A: Confine the contractor to the minimum area necessary to perform the work.<br>o 3A: No in-water works are anticipated. However, in the event work needs to take place in the river, no in-water work should occur between March 15 to July 15 to protect spawning fish. If in-water work is necessary, works during late summer or early fall will need to consider mitigation measures for migratory fish passage.<br>o 4A: Trees anticipated to be removed or otherwise impacted will need to be assessed for bat habitat features. Candidate bat snag trees are to be protected during construction. If impacts to snag trees cannot be avoided, acoustic surveys may be required at the direction of MECP to confirm the absence of SAR. It is recommended that any required snag removal occur between October 1 and March 31 of a given year.<br>o 5A: Dewatering activities to be avoided during sensitive timing windows (breeding and overwintering period for amphibians, birds, fish, turtles, and snakes).<br>o 6A: Dewatering activities to be avoided during the driest parts of the year to avoid placing additional stress on obligate wetland plant species.<br>• **Best Construction Practices**<br>o 1B: Control all equipment maintenance and refueling to prevent any discharge of petroleum products. Conduct vehicular maintenance and re-fueling at least 30 m from the watercourse, watercourse banks, and natural heritage features.<br>o 2B: Implement surface protection measures to minimize soil compaction.<br>o 3B: Store construction material, excess material, construction debris, and empty containers at least 30 m from the watercourse and banks to prevent entry.<br>o 4B: Enlist an environmental monitor onsite to provide advice and ensure that activities will not have any negative effects. Information for site-specific SAR should be posted in construction trailer.<br>o 5B: Implement a stormwater management plan to maintain pre-construction drainage patterns and flows during all project phases.<br>o 6B: Implement an emergency and response management plan to address the potential for spills.<br>o 7B: Implement Clean Equipment Protocol for Industry (Halloran et al. 2013) to inspect and clean equipment for the purposes of invasive species prevention.<br>o 8B: Works within areas overgrown with aggressive invasive species such as Garlic Mustard and Dog-strangling Vine should incorporate integrated invasive species management to facilitate the responsible removal and disposal of plant material and affected seedbanks.<br>o 9B: Reduce dewatering area, duration, and depth to the minimum required to complete proposed works.<br>• **Prevention of Wildlife Mortality and Disturbance**<br>o 1C: Demarcate wildlife habitat to avoid offsite disturbance and to restrict construction activities to the work areas.<br>o 2C: Implement traffic limits if onsite vehicle use is required.<br>o 3C: Install exclusionary fencing to prevent wildlife from entering the construction site. Exclusionary fencing should not prohibit access to nearby habitats. Where required, redirect wildlife to areas where they can avoid the potential for incidental take and still have access to habitats. Exclusionary fencing should be monitored daily throughout construction. |

| Area | Monitoring and Maintenance Considerations |
|---|---|
| | ○ 4C: Inspection of construction area for wildlife each morning before the commencement of construction activities. Is to be carried out by a qualified wildlife biologist. Removal of trapped wildlife from construction areas should be completed by a qualified wildlife biologist.<br>○ 5C: Educate workers to be aware of potential wildlife occurrences and measures to take to minimized potential for injury or incidental take. Maintain a log to record and report incidents of injury and/or mortality.<br>○ 6C: A visual survey for stick nests must be completed by a qualified avian biologist prior to tree removal within CUW and FOD areas to confirm absence of Bald Eagle and/or Osprey within candidate SWH habitat.<br>• **Prevention of Terrestrial Disturbance**<br>○ 1D: Identify setbacks from natural features and trees with the installation of tree protection fencing along the disturbance limit (10 m). No construction activities are to occur outside of these fences (including overhead) nor the piling of construction materials. Suitable setbacks are to be confirmed by a certified arborist.<br>○ 2D: Minimize the construction disturbance area to the extent feasible.<br>○ 3D: Retain an arborist during detailed design to create a tree preservation plan to protect as many healthy, native trees as possible through the process.<br>○ 4D: Implement a dust management plan for the suppression of fugitive dust.<br>○ 5D: Ensure that temporarily disturbed areas are restored with native vegetation and monitored during construction and post construction based on the conservation authority and the City's specifications.<br>○ 6D: Develop a restoration plan at detailed design to prescribe when and how disturbed areas will be restored. Plantings should consist of native trees, shrubs, and seed mixes. Replace tree species at the ratios specified within the arborist report. The restoration plan is to explore bioengineering and slope stability enhancement along the Credit River embankment. A component of the restoration plan is to include an invasive species management strategy.<br>• **Erosion and Sedimentation Control**<br>○ 1E: Develop an ESC plan to minimize the potential for erosion and construction-related sediment release into nearby natural features/water bodies and prepare ESC plan condition reports as part of the monitoring and maintenance plan.<br>○ 2E: Install ESC measures before ground-breaking.<br>○ 3E: Monitor and maintain ESC measures as per specifications.<br>○ 4E: Delineate storage, stockpiling, and staging areas prior to construction and inspected. Storage, stockpiling, staging, and maintenance areas are not to be located within the riparian area.<br>○ 5E: Install sediment control fence along the channel margins to prevent the entry of sediment into the watercourse.<br>○ 6E: Avoid construction during high volume rain events or significant snow melts/thaws. Construction will resume once soils have stabilized to avoid risk of erosion, soil compaction, or the potential for sediment release into nearby natural features/watercourses.<br>○ 7E: Direct discharge from sediment clean out to a filter bag or taken offsite for disposal.<br>○ 8E: Implement construction monitoring to ensure erosion and sediment measures are in place and working effectively. ESC should be checked weekly and after major rain events (>10 mm) to ensure it is installed and functioning properly. Daily monitoring will be completed by the contractor. Any deficiencies should be repaired immediately. A construction monitoring log should be maintained to ensure any deficiencies and corrective actions are documented.<br>○ 9E: Remove all temporary ESCs following construction once disturbed areas have stabilized.<br>○ 10E: Debris netting, or a suitable containment measure, should be installed where bridge decking may have potential aquatic impacts if the debris is not contained.<br>○ 11E: Dewatering process and impact mitigation is to be prepared in accordance with all applicable policies and guidelines and incorporated into the ESC plan. |

| Area | Monitoring and Maintenance Considerations |
|---|---|
| **Fluvial Geomorphic Impact** | • Requirements for construction monitoring and maintenance to be confirm during detailed design, and shall be implemented per requirements stipulated by the CVC and other relevant environmental agencies |
| **Air Quality** | • See Section 6.4 for Recommendations on Air Quality Impacts from construction<br>• A record keeping procedure should be implemented by the contractor to track daily information. Records are to be kept by the contractor's designated individual responsible for completing daily site inspections. The designated individual should be trained in the requirements and objectives of the BMPP. All records are to be kept on-site at the site office. Reporting will include:<br>o Confirmation that the inspection has been completed and that the items on the checklist have been addressed.<br>o Weather conditions, such as wind speed and direction, cloud cover, precipitation, and temperature.<br>o Any actions taken to control nuisance issues on-site.<br>o A summary of any on-site spills that were reported to the MECP.<br>o A summary of complaints received.<br>• The construction manager should ensure that all formal complaints are recorded, kept on file, and addressed. When a formal complaint is made, the following information should be recorded:<br>o Employee name and title receiving the complaint.<br>o Personal information of the complainant, such as name, address, and telephone number.<br>o Date and time the complaint was made.<br>o Nature and description of the complaint.<br>o Corrective action taken to resolve the issue.<br>o Follow up with complainant in the form of a formal response.<br>• Formal complaints should initiate an inspection of the suspected cause of the complaint. Corrective action should be implemented to mitigate the cause of the complaint wherever possible. |
| **Noise and Vibration** | • Construction has the potential to create noise and dust for the adjacent property owners. Construction noise is temporary and will vary periodically during the construction depending on the specific activities being performed. Contract specifications will include provisions to define the allowable work hours, in accordance with local by-laws to minimize impacts to the adjacent landowners in the evenings. However, some considerations will be given to the ability of completing the work in a lesser duration by allowing longer work hours. The impact of construction noise will vary based on the type of equipment used, number of pieces of equipment, time and duration of operation, and the proximity to noise sensitive receivers in question. Construction noise will be kept to a minimum through the use of well-maintained equipment with appropriate noise controls by the contractors.<br>• See Section 6.5 for Recommendations on Noise and Vibration Impacts from construction |
| **Archeological Impacts** | • 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 sec. 48 (1) of the *Ontario Heritage Act*. |
| **Built Heritage Resources and** | • Identified BHRs should be reviewed by a qualified heritage professional to assess impacts and confirm recommended conservation and/or mitigation measures. |

| Area | Monitoring and Maintenance Considerations |
|---|---|
| **Cultural Heritage Landscapes** | |
| **Transportation Access** | • Construction should be staged to maintain local traffic. Any necessary road closures or interruptions to traffic should be kept brief and to a minimum during off-peak hours if possible. There should be close coordination with local property owners and EMS/fire/police operations to minimize impacts |
| **Property Impacts** | • Property owners and tenants may experience temporary interruptions to their property access during construction. To reduce this impact, all property owners will be notified prior to construction and/or in advance of work related to their access. |
| **Utilities** | • The location and alignment of existing municipal services is to be confirmed during Detailed Design, which may result in changes to the identified utility impacts. Formal definition of impacts on utilities will be determined during Detailed Design, in consultation with individual utility companies.<br>• All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary.<br>• During Detailed Design, meetings with utility companies should be held as required where potential impacts to existing or future services are identified. |

# 7 Future Commitments, Permits, and Approvals

It is recommended that the following be completed in advance of finalizing construction documents to ensure requirements are appropriately addressed and sufficient time is available to obtain the necessary permits. Table 7-1 provides details on future works, permits, and approvals anticipated at the detailed design stage.

**Table 7-1 Summary of Future Commitments, Permits and Approvals**

| Area | Future Commitments, Permits and Approvals |
|---|---|
| **Trees** | • **City of Mississauga Tree Removal Permit:** a tree removal application will need to be completed and provided to the City with an arborist report. |
| **Natural Heritage Features, Wildlife, and Habitat** | • **Recommended Future Works During Detailed Design**:<br>  ○ Snag survey within the FOD habitat should be completed to identify if there are any candidate snag trees which may be utilized by bats. Those trees identified as high-quality snag habitat should be protected where feasible.<br>  ○ Consultation with MECP with regards to the candidate SAR bat maternity roost habitat, if present. MECP will confirm if additional bat acoustic surveys should be completed to confirm the presence or absence of potential SAR bats in an individual tree or forested area identified as potential maternity roosting habitat that will be impacted or removed. If SAR bats are present, approval for SAR bat habitat removal from MECP will be required.<br>  ○ Consult with MECP regarding works being completed within Category 3 Barn Swallow habitat<br>  ○ Additional screening as required based on the future changes to species' listings or habitat regulations of the ESA.<br>• **CVC Permit:** any works with the regulation limit (under Ontario Regulation 160/06) will require a permit through the CVC. This includes the Credit River and the PSW. CVC permit will be required for works occurring within the 120 m AOI.<br>• **DFO Self-Assessment**: the determination of risk for death of fish or HADD to fish habitat is typically done through a self-assessment process. The self-assessment lists a number of criteria which identify whether or not the project may result in death of fish or HADD of fish habitat (DFO 2020)). If the self-assessment indicates that the project cannot avoid death of fish or HADD of fish habitat, then a formal request for review must be submitted to DFO.<br>• **DFO Request for Review**: for each crossing where works are anticipated within the adjacent natural or riparian corridor. This process will fully assess potential direct or indirect impacts to fish and fish habitat that may result from proposed works, as well as ensuring that suitable mitigation measures are utilized to ensure no negative impacts to aquatic habitats.<br>• **License to Collect Fish for Scientific Purposes**: Though no in-water works are anticipated to be required, in the event that in-water works are required, a License to Collect Fish for Scientific Purposes under the *Fish and Wildlife Conservation Act* will be required for the relocation of fish outside the work area.<br>• **Wildlife Collector's Authorization**: Though no in-water works are anticipated to be required, in the event that in-water works are required, a Wildlife Collector's Authorization under the *Fish and Wildlife Conservation Act* will be required for the relocation of wildlife (including amphibians and small mammals) outside the work area.<br>• **ESA Permit**: depending on the outcome of additional surveys for SAR, (see Recommended Future Works During Detailed Design) an Overall Benefit Permit under Section 17(2)(c) of the ESA would be required to avoid contravention of the ESA.<br>• It is recommended that MECP be consulted during detailed design, approximately 1 year prior to initiation of preparation and construction activities at the site to confirm that work to obtain the necessary permits and approvals is understood, and that changes to species listings, or applicable legislation/regulations have been addressed.<br>• The extent and nature of the proposed disturbance, as depicted on detailed design drawings, must be evaluated by MECP before a decision can be made regarding permit requirements.<br>• Additional field work or screening may be necessary to confirm the proposed works will not have an impact on SAR.<br>• Tree restoration plan will be available during the detailed design stage.<br>• Groundwater investigations will be required to assess the extent of groundwater drawdown and rebound from dewatering during footing installation. These investigations will further aid in targeting specific timing periods and duration for dewatering from a natural heritage perspective. Dewatering plan will need to address disposal of dewatering discharge as well to avoid impacts such as sedimentation and thermal shock. |
| **Fluvial Geomorphic Impact** | • Alignment of the bridge abutments, path, and the disturbance limits of construction should be reviewed and approved by the CVC<br>• Detailed design should consider the same design principles (CVC 2019b) but may require some adaptation for the low-energy estuary and highly modified urban environment, with consultation with and approval by CVC and other stakeholders.<br>Considerations to be made during detailed design include: |

| Area | Future Commitments, Permits and Approvals |
|---|---|
| | • Confirm water levels and velocities near the proposed AT Bridge<br>• Confirm hydraulic conveyance is met under all flood conditions and lake water levels<br>• Complete river and geotechnical engineering of the south bank through the bridge is stable, and that it ties in with the train bridge upstream and existing erosion control works downstream<br>• Identify the scour hazard limit at the proposed bridge through completion of a scour assessment to determine appropriate bridge footing depths, acceptable based on geotechnical criteria in the engineering design, and erosion hazard policy criteria by CVC and stakeholders<br>• Confirm the extent and type of bank protection below the proposed bridge and along the unprotected part of the bank based on the results of the geotechnical engineering study, consultation with CVC, and updated hydraulic information<br>• Confirm land ownership of the bank work area. It is expected that the City will acquire land rights through purchase or easements where necessary to construct and maintain and bank protection works associated with the AT bridge and abutments<br>• Confirm the alignment of the bridge abutments, path, and the disturbance limits of construction<br>  ○ Additional assessment and planning will be required to isolate the work area and mitigate impacts if installation of the bank protection and/or the construction of the abutments require in-water work.<br>  ○ The configuration of the path along the south bank should be confirmed, and the associated slope stability, bank erosion risks, and mitigation techniques will need to be considered, with potential works reviewed and approved by CVC and impacted stakeholders.<br>  ○ Drainage in the area of the existing parking lot and storm outfall on the south bank will also need to be considered at detailed design with respect to the alignment of the path, bridge abutment and associated works to ensure stability of the channel bank and slope.<br>  ○ Stormwater management system on the bridge to be explored so as to prevent the direct discharge of salt/sand/de-icer into the Credit River during winter maintenance.<br>  ○ Additional LID measures to be explored.<br>• Additional fill within the floodplain will be minimized<br>• Cut fill balance calculations to be provided |

| Area | Future Commitments, Permits and Approvals |
|---|---|
| | • Conduct a comparison of flow velocity for existing and proposed conditions, the proposed work must not increase flow velocities in the watercourse and should minimize channel erosion.<br>• Conduct a detailed bank protection analysis |
| **Air Quality** | • It is recommended that precautionary and mitigation approaches be considered when operating in close proximity to the identified sensitive receptor locations.<br>• The greatest potential for impacts would occur on dry and/or windy days, particularly when the winds are blowing from the west through northwesterly to north directions. During such meteorological events, consideration should be given to limiting or postponing operations that create fugitive dust emissions.<br>• As per guidance from the MECP, it is recommended that non-chloride dust suppressants be applied for all excavation, drilling and unpaved vehicle track movements to minimize fugitive dust. Regular cleaning of the construction site and vehicles and maintenance of equipment should be undertaken.<br>• Considerations should also be given to locating construction staging and storage areas away from identified receptors for both sides of the Credit River. |
| **Noise and Vibration** | • A baseline vibration assessment should be undertaken during detailed design. Should this advance assessment conclude that the any structures will be subject to vibrations, a vibration monitoring plan should be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction |
| **Archeological Impacts** | • The Study area requires a Stage 2 test pit survey in order to confirm the extent of existing disturbances.<br>• As identified through the MCM's *Criteria for Evaluating Marine Archaeological Potential* checklist, Marine Archaeological Assessment will be completed once construction impacts to the Credit River have been identified during detailed design.<br>• Should the proposed work extend beyond the current Study area or should changes to the project design or temporary workspace requirements result in the inclusion of previously un-surveyed lands, these lands will be subject to a Stage 2 archaeological assessment and any subsequent stages recommended in the Stage 2 archaeological assessment report as early as possible during detailed design.<br>• 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 |

| Area | Future Commitments, Permits and Approvals |
|---|---|
| | archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the *Ontario Heritage Act*. |
| **Built Heritage Resources and Cultural Heritage Landscapes** | • Complete an HIA per the Standards and Guidelines for Conservation of Provincial Heritage Properties (Ministry of Tourism, Culture and Sport, 2010) for the Port Credit Railway Bridge (Provincial Heritage Property of Provincial Significance)<br>• Complete an HIA per the City of Mississauga Official Plan clause 7.4.1.10 for 35 Front Street North (BHR 2). *However, given that no structures or apparent landscape features of significant CHVI are anticipated to be impacted on the property, it is recommended that the City of Mississauga consider waiving the requirement of a HIA in this case in favour of suitable mitigation measures including post-construction rehabilitation which could include sympathetic plantings where required.* |
| **Transportation Access** | • Detailed traffic management plan to determine how traffic and pedestrian access will be accommodated during construction and how access to properties adjacent to new AT bridge will be maintained |
| **Property Impacts** | • Detailed design plans should include details to describe how temporary accesses will be maintained, and contract specifications should specify the allowable lengths of closures and the notification requirements to property owners.<br>• Property owners who will experience permanent property impacts will be contacted by the City of Mississauga to initiate proceedings and negotiation in acquiring property from the owner at a fair market value.<br>• Permission to Enter Agreements<br>• **Metrolinx Work Permit**: As identified by Metrolinx staff, an onboarding meeting will be held between the City of Mississauga, Metrolinx's Capital Infrastructure Coordination Group, and Metrolinx's Technical Advisor:<br>  ○ Any work within 30 ft of Metrolinx's live rail tracks or work that may foul the rail tracks will be subject to Metrolinx' Third Party Process.<br>  ○ The design and work plan will be reviewed and Metrolinx will determine whether to issue a Metrolinx Work Permit, which will allow the City to schedule flagging for work within/adjacent to the rail corridor. |
| **Utilities** | • The location and alignment of existing municipal services is to be confirmed during detailed design, which may result in changes to the identified utility impacts. Formal definition of impacts on utilities will be determined during detailed design, in consultation with individual utility companies. All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary.<br>• During detailed design, meetings with be held with utility companies as required where potential impacts to existing or future services are identified.<br>• Detailed utility investigation works shall include:<br>  ○ Detailed subsurface utility investigation<br>  ○ Confirmation of leased ducts and vaults with locates and test pits during future phases of design |
| **Geotechnical Impacts** | • During detailed design, a detailed geotechnical study is recommended for this location to confirm or refine the erosion hazard limit and to inform the design and construction of the bridge abutment foundation, local grading, and potential erosion control works.<br>• Additional boreholes should be completed at the east/north abutment location during Detail Design to supplement boreholes completed during this EA Study, as they were not able to be completed due to site access issues.<br>• All recommendations and future commitments pertaining to the geotechnical environment are listed under **Section 6.6** of this report, guidelines to adhere to and specific permits to obtain are listed below:<br>  ○ The recommended foundation type and bearing capacities based on the borehole information are for preliminary design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. The foundation type is to be confirmed in future phases of the design.<br>  ○ The recommended geotechnical bearing resistance should be updated when the final structure assessment report becomes available.<br>  ○ Foundations must be inspected by the geotechnical expert prior to placing to confirm the founding soil conditions and the bearing capacity.<br>  ○ Section 4.6.5 of CHBDC requires that seismically induced lateral soil pressures on the back of abutment shall be included in design, where appropriate<br>  ○ Proper benching of the existing embankment slope should be implemented if and where abutting into the existing embankments. This can be constructed in accordance with OPSD 208.01 – Benching of Earth Slope. |

| Area | Future Commitments, Permits and Approvals |
|---|---|
| | ○ The materials used for the construction of the embankment fills should consist of approved, acceptable earth fill, i.e., select subgrade materials (SSM) or Granular 'B' – OPSS 1010.<br>○ Computation of earth pressures acting against bridge abutments, retaining walls and any wing walls should be in accordance with the Canadian Highway Bridge Design Code, (CHBDC) S6-06.<br>○ All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA).<br>○ The excavation has to be supported if the excavation walls are not flatted as required by the Regulation 213/91. |