

Prepared By:

- DRAFT (FOR REVIEW BY COUNCIL) -



## Municipality of Brockton Greenock Structure No. 0011

### Schedule 'B' Environmental Assessment - Project File (Version 3)

**GMBP File: 212328**

**May 9, 2019 (DRAFT)**



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**SCHEDULE 'B' ENVIRONMENTAL ASSESSMENT - PROJECT FILE (VERSION 3)****GREENOCK STRUCTURE NO. 0011  
MUNICIPALITY OF BROCKTON****MAY 9, 2019 (DRAFT)****GMBP FILE: 212328**

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**1. INTRODUCTION**

GM BluePlan Engineering Limited (GMBP) was retained by the Municipality of Brockton to undertake a planning process toward addressing the deteriorated condition of Bridge No.11 (Greenock), located south of Paisley on Concession Road 20 between Baseline North and Greenock Elderslie Road, just east of Bruce Road 1, where shown on **Figure 1**. The Municipal Engineers Association (MEA), in cooperation with the Ministry of the Environment, Conservation and Parks (MECP), has developed a Municipal Class Environmental Assessment (EA) process to assist in planning projects of this nature.

The EA planning process develops a Project Statement, considers alternative solutions, and documents the public consultation process toward the selection, by Council, of a *Preferred Solution* to the Project Statement in a Project File. Since the alternative solutions consider alteration of a structure that is over 40 years old, which has been determined to have cultural heritage value and which would likely be less than \$2.4 M (limited to bridge replacement), a Schedule 'B' EA process is considered appropriate for this undertaking at this time.

The Project Statement is considered as follows:

*'Inspection Reports for the aging Greenock Bridge No. 11 note advanced deterioration of the superstructure and substructure to a point where the bridge may no longer be able to fulfill its intended function and, therefore, consideration should be given to addressing a long-term solution with consideration also to address the deficient road approaches.'*

The Project File is considered a "living document". The *Notice of Project Initiation* was advertised on May 17, 2018. The Notice included an invitation to the public to review and provide comments on the Project File. Version 1 of the Project File was also distributed to First Nation and various Agency groups. The Project File (Version 1; May 2018) presented the Project Statement; identified the range of Alternative Solutions considered to address the problem or opportunity; evaluated the anticipated 'environmental' effects and proposed mitigation; and provided a preliminary assessment and evaluation of alternative solutions and the rationale for the consideration of a *Preliminary Recommended Solution*, which was not clear at that time. Following additional review and in consideration of the public and agency comments received as part of the initial consultations, this process was subsequently considered as the Phase 1 – Discretionary Public Consultation.

The Project File was updated and re-issued in January 2019 (i.e. Version 2). Version 2 of the Project File provided further evaluation of the 'environmental' effects and proposed mitigation, a more in-depth assessment of the alternative solutions considered, a summary of the key comments/feedback obtained following the initial consultation period and presented the rationale for the selection of a revised *Preliminary Recommended Solution*. A *Notice of Project Update* was advertised on January 8, 2019. The Notice included an invitation to the public to review and provide comments on the updated Project File. The Notice was also distributed to First Nation and Agency groups. This portion of the process was considered to address the Phase 2 Mandatory Public Consultation.

This Version 3 of the Project File (Final Report) updates the previous Version 2 (January 22, 2019) and is completed as part of Phase 2 of the EA Process. It includes a summary of the key comments/feedback received following the consultation period completed in January 2019, commitments to mitigate any remaining negative impacts of the project, and a re-assessment of the *Recommended Solution*. The documentation provided in this Version of the Project File continues to support the *Recommended Solution* presented to Council on January 22, 2019. A brief presentation to Council is scheduled for May 28, 2019, during which an overview of the public and agency comments received and how they were considered will be provided. Should Council accept the *Recommended Preferred Solution*, the completion of Phase 2 of the EA process will proceed. This will include finalization of the Project File and issuance of the *Notice of Completion*.

## 2. MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PLANNING PROCESS

Municipal infrastructure projects are subject to the Ontario Environmental Assessment Act (EA Act). The Class Environmental Assessment (Class EA) 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 and 2015) applies to municipal infrastructure projects including roads, water and wastewater.

The Municipal Class EA outlines a comprehensive planning process (illustrated in **Figure 2**) that provides a rational approach to consider the environmental and technical advantages and disadvantages of alternatives and their trade-offs in order to determine a *Preferred Solution* to address an identified problem (or opportunity), as well as consultation with agencies, First Nations, 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 classification of projects and activities under the Municipal Class EA is as follows:

**Schedule A:** Includes normal or emergency operational and maintenance activities, which are limited in scale and have minimal adverse environmental effects. These undertakings are pre-approved, and the proponent can proceed without further assessment and approval.

**Schedule A+:** Introduced in 2007, these minor projects are pre-approved. The public is to be advised prior to the implementation of the project.

**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.

**Schedule C:** Includes the construction of new facilities and major expansions to existing facilities. These undertakings have the potential for significant environmental effects and must proceed under the planning and documentation procedures outlined in the Municipal Class EA document.

This Version 3 of the Project File includes documentation of the Schedule 'B' EA process, which is in accordance with the requirements of the Municipal Class EA process and includes Phases 1 and 2, depicted on **Figure 2**:

- Phase 1 consists of identifying the problem or opportunity, and optional (discretionary) public consultation if deemed suitable.
- Phase 2 involves identifying reasonable alternatives to the problem or opportunity, compiling an inventory of the natural, cultural, social, technical and economic environments, evaluating each alternative and recommending a preferred alternative that will address the problem, and provide any measures necessary to mitigate potential environmental impacts. As part of the Phase 2 process, public and agency consultation is required before the preferred solution is selected to ensure all possible impacts are identified, and assessed, as part of the evaluation process. A summary of the key comments/feedback obtained during the Phase 2 consultation period is provided.

For Schedule 'B' or 'C' projects, a *Notice of Project Initiation* is advertised and the *Preferred Solution* (and for Schedule 'C' projects, the *Preferred Design*) is developed through the process; to be confirmed by Council. The entire process is documented in a Schedule 'B' Project File, or Schedule 'C' Environmental Study Report, which is made available for public and agency review during a 30 calendar day period following the issuance of the *Notice of Completion*. Project Notices are provided in **Appendix 'A'**.

For Schedule 'B' or 'C' projects, if concerns are raised during the 30 calendar day review period, following advertisement of the *Notice of Completion*, that cannot be resolved through discussions with the Municipality, then members of the public, interested groups or technical agencies may request the Minister of the Environment, Conservation and Parks (MECP) to issue a '*Part II Order*' for the project. Within the Part II Order request, the Minister may be requested to refer the matter to mediation, impose additional project conditions, and/or request an elevated scope of study. A Part II Order request requires the completion of a 'Part II Order Request' Form (i.e. form ID No.012-2206E). The form can be found online on Service Ontario's Central Forms Repository website (<http://www.forms.ssb.gov.on.ca/>) by searching 'Part II Order' or '012-2206E' (i.e. the form number).

The completed form and any supporting information must be submitted to the MECP (formerly the MOECC), 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  
Ferguson Block, 77 Wellesley Street West, 11<sup>th</sup> Floor  
Toronto, ON M7A 2T5  
Fax: 416-314-8452  
[Minister.MECP@ontario.ca](mailto:Minister.MECP@ontario.ca)

Copies of the request must also be sent to the Director of the Environmental Approvals Branch at the MECP and Municipality of Brockton at the addresses below:

Director, Environmental Assessment and Permissions Branch  
Ministry of the Environment, Conservation and Parks  
135 St. Clair Avenue West, 1<sup>st</sup> Floor  
Toronto, ON M4V 1P5  
[enviropemissions@ontario.ca](mailto:enviropemissions@ontario.ca)

Municipality of Brockton  
Attn: John Strader, Roads Superintendent  
100 Scott Street  
P.O. Box 68, Walkerton, ON N0G 2V0  
[jstrader@brockton.ca](mailto:jstrader@brockton.ca)

The decision whether or not a Part II Order is appropriate or necessary rests with the Minister of the Environment, Conservation and Parks. If no Part II Order request is 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 Municipality may proceed



to design and construct the project subject to resolving any commitments documented in this Project File during the subsequent design phases and obtaining any other outstanding environmental approvals.

For further information regarding Part II Order requests and process, please refer to:

<https://www.ontario.ca/environment-and-energy/class-environmental-assessments-part-ii-order>

### 3. EXISTING CONDITIONS

#### 3.1 Site Surroundings

Bridge No.11 (Greenock) is located on Concession Road 20/2A, east of Bruce Road 1, approximately 2 kilometers south of the Village of Paisley, where shown on **Figure 1**. More specifically, the bridge is situated along the boundary that divides Lot 46 and Lot 47, Concession A in the former Township of Greenock. The bridge crosses the Teeswater River approximately 3.4 kilometers south of its confluence with the Saugeen River in Paisley. The municipal boundary with Arran-Elderslie is situated approximately 350 meters east of the bridge location.

Land use in the general area is agricultural/rural. The bridge and its surroundings fall within the Saugeen Valley Conservation Authority (SVCA) screening limits. This area is designated as Environmental Protection and/or Hazard Lands, as defined by the Bruce County Official Plan (Schedule A, 2013) and the Municipality of Brockton Zoning By-Law (2013-06).

The site is situated in the physiographic region known as the Saugeen Clay Plains (Chapman and Putnam, 1984). This region is characterized by fine-textured glaciolacustrine deposits of silt and clay and till moraines with an area of more coarse-textured glaciolacustrine deposits of sand in the southern portion of the region. According to Map 2224 from Chapman and Putnam, the local native soils in the vicinity of Bridge No.11 consist of silt and clay deposits. This is consistent with Report No.16 of the Bruce County Soil Survey, which defines the native soils in proximity to the bridge as silty clay loam of the Saugeen series.

The topography consists of rolling hills both to the east and west of the structure through which the Teeswater River meanders. As shown in **Figure 3**, each approach to the bridge, along Concession Road 20, is relatively steep with the bridge being at the bottom of a hollow, within the river valley. The main channel of the Teeswater River runs relatively straight through the bridge and varies in width from 20m to 30m. The bed of the river consists of gravel and stone. Normal water levels are approximately 3.0m below the soffit.

#### 3.2 Road Approaches

Each of the narrow easterly and westerly road approaches are gravel-surfaced with limited ditch drainage. The horizontal alignment is relatively straight across the bridge. The vertical alignment varies significantly.

Road grades on each side of the bridge are quite steep at about 10%. The sag vertical curves on the east and west sides are about K=8 and K=2 respectively. The existing road does not meet any design criteria, which reduces driver safety. Therefore, bridge alternatives should also consider correcting the road approaches to an appropriate design standard.

The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (June 2017) notes that "...a design speed of 80 km/hr and a posted speed of 80 km/hr is the normal practice for rural municipal roads...". The TAC Guide provides Design Classification for Rural, Local, Undivided (RLU) roads with Design Speeds ranging from 50 km/hr to 110 km/hr, but also encourages Operating Speed uniformity.



For RLU roads, the TAC Design guide provides the following:

Design Speed (km/hr)	Maximum Gradient (%)		Vertical Curve	
	Rolling	Mountainous	Sag	Crest
50	7	11	13	7
80	6	8	30	26

As illustrated in **Figure 4**, an 80 km/hr Design Speed would require considerable earth works in order to achieve the appropriate design road profile, and is unlikely to be financially achievable, if technically achievable. Therefore, only a 50 km/hr Design Speed may be considered, which may introduce variability to the road design and affect driver safety. In other words, Operating Speed uniformity along Concession Road 20/2A may not be feasible.

**Figure 5** illustrates two alternative road profiles for a 50 km/hr Design Speed. One road profile maintains a bridge at the same elevation as the existing bridge. Significant earth excavation would be required through each hill top to achieve this road profile. The second road profile considers raising the elevation of the bridge, so the new road profile would intersect the existing road profile near the top of the hills. In this case, significant fills would be necessary sufficiently to elevate the bridge to achieve the appropriate design road profile. Since the Regulatory Flood Elevation is above the existing bridge, any fill below the flood elevation would affect upstream floodline elevations. If this alternative is to be considered in greater detail, a floodline mapping study would be necessary to determine the upstream impacts to property, under this scenario.

### 3.3 Bridge Structure

The subject single-lane bridge was reportedly built in about 1920. The structure is a steel pony truss bridge with steel floor beams and stringers supporting a laminated timber deck. Although it is not known how the existing structure is founded (i.e. piles or spread footings), the bridge is supported by cast in place concrete abutments and wingwalls with an overall span of 30.9 meters. The overall width of the existing structure is approximately 4.5m with flex beam guiderails on each side. The flex beams are fastened directly to the steel truss. The available clear roadway width is approximately 4.0 meters which accommodates one lane of traffic. There are no deck drains.

Recent inspections have observed the bridge to be in overall fair to poor condition and it has been recommended that the Municipality close or perform a major rehabilitation on the bridge within 1 year. Recent bridge inspection reports are included in **Appendix 'B'**.

To date, several repairs have been completed, more specifically the bottom cords at all four bearing points have been replaced along with the cross-ties which connect the bottom chords at the abutments. However, the lower steel members, including the steel floor beams and stringers that support the wooden deck, have severe section loss with severe corrosion throughout. In addition, the vertical truss members, which were damaged by a snow plow, have been repaired. However, these truss members remain out of alignment with a significant bow outward at mid-span. The concrete in the abutments and wingwalls is also in poor condition.



**Photo 1:** View of the structure from the west showing the steep road approaches to Bridge No.11.



**Photo 2:** Image showing the single lane steel pony truss bridge.

## 4. ALTERNATIVE SOLUTIONS

Alternative solutions considered to address the Project Statement are summarized as follows:

1. Do Nothing
2. Rehabilitate the Existing Structure
3. Replace the Existing Bridge
4. Bridge Removal
5. Retention of Existing Structure Adapted for Walkways, Cycling and Scenic Viewing

A summary and discussion of each of these alternative solutions is presented in the following sections.

### 4.1 Alternative 1: Do Nothing

The 'Do Nothing' alternative maintains existing conditions. It does not address the issues identified in the *Project Statement* but is considered as a base-line against which to compare other alternative solutions. The 'Do Nothing' alternative would permit the structure to remain in service until it can no longer perform its intended function. Currently, the recommended load posting is 7 tonnes which limits its usefulness as a route for emergency and agricultural vehicles. As it continues to deteriorate, maximum load postings may need to be further reduced. It is estimated that within five years the bridge may have to be closed entirely to vehicular traffic.

Ultimately, a 'Do Nothing' approach would lead to a catastrophic failure, which is considered inappropriate and, therefore, consideration and a decision for action will be necessary moving forward. The 'Do Nothing' alternative may be implemented at any time during the planning process prior to implementation of the *Preferred Solution*.

## 4.2 Alternative 2: Rehabilitate the Existing Structure

Rehabilitation of the existing structure would entail completing repairs to the various elements of the bridge that have been identified as deficient in order to extend the useful life of the bridge. As noted previously, the existing structure displays considerable deterioration with exposed reinforcing steel in many areas of the abutments and wingwalls and severe corrosion of the floor beams and stringers. As a result, it is anticipated that major repairs would be necessary to maintain the structures functionality as a vehicular bridge. The deficiencies and rehabilitation options were outlined in the report entitled '*Structure No.0011 Rehabilitation Options*' dated April 2017. A copy of that report is provided in **Appendix 'B'**. A rehabilitation effort would not address the noted deficiencies with the approach road profiles.

## 4.3 Alternative 3: Replace Existing Structure

The existing single lane bridge and the road approaches to the bridge do not meet the Ontario Provincial Standards for Road and Public Works, the Canadian Highway Bridge Design Code (CHBDC), nor the County or municipal standards.

The bridge replacement alternative would involve the complete removal of the existing structure, and replacement with a structure that meets the Standards/Design Code. This alternative considers multiple variables starting with the physical geometry of the structure to achieve the intended function while simultaneously addressing the issue of the steep road approaches. The steep approaches may be designed to meet the road standards in several ways including, but not limited to, the following:

- i. Flattening the road grade by lowering the elevation at the top of the slope (i.e. cutting the banks);
- ii. Raising the surface grade along the river banks by adding fill within the floodplain (i.e. maintaining the existing span); or
- iii. Raising the surface grade of the bridge along the river banks without adding fill within the floodplain (i.e. raising the bridge grade and increasing the span).

To simultaneously address the bridge replacement and address the issue of the steep road approaches, the following four replacement options are considered:

- Option A: Replacement with a single span, single lane bridge at existing location/grade and lowering the elevation at the crest of each approach.
- Option B: Replacement with a single span, two-lane bridge, at existing location/grade and lowering the elevation at the crest of each approach.
- Option C: Replacement with a single span, two-lane bridge, at a raised elevation coupled with the addition of fill within the floodplain.
- Option D: Replacement with a multiple span bridge at a raised elevation, without adding fill to the floodplain.

The maintenance of a river crossing for vehicular use at this location only considers replacement with a bridge type structure. A culvert type crossing is not considered. Culverts, which are defined as structures that form an opening through the soil (i.e. reinforced concrete box culvert, steel pipe), may be considered for smaller waterways and short spans. Even if several culverts were installed, the hydraulic capacity would be restricted. Consequently, upstream flooding and/or flooding over the road would be likely during high flows. Also, the natural river bed would be greatly affected by any culvert and fill around them (i.e. the fill may extend beyond current property limits, thus requiring additional property acquisition). Therefore, for mainly technical (span length of greater than 30m) and environmental reasons, a culvert type structure is not considered a reasonable alternative for the replacement of Bridge No.0011 and is not considered further herein.



#### **4.4 Alternative 4: Remove Existing Structure**

This alternative considers that the existing single lane bridge carries a relatively small volume of traffic and, given the relatively long span of the structure, the relative costs of significant repairs or replacement could outweigh the relative benefits. Under this alternative, the bridge would be removed, and the road would be closed with turn around opportunities provided at the crest of the bluff on each side. Further, the river banks on both sides of the Teeswater River would be restored to a more natural condition.

#### **4.5 Alternative 5: Retention of Existing Structure Adapted for Walkways, Cycling, Viewing**

Following the presentation to Council on January 22, 2019, GMBP was requested further to consider the continued use of the bridge in-situ for non-vehicular use. This alternative considers that bridge closure will be required in the near future. At such a time, the bridge will no longer be safe for vehicular use, however the structure could be adapted for active transportation (i.e. walking and cycling) and viewing purposes. Adaptations to ensure the bridge meets the Standards/Design Code for walking and cycling purposes would be required (i.e. railings, barriers, etc.).

### **5. BACKGROUND STUDIES**

The following background studies were prepared to inventory the technical, social, natural, cultural and economic 'environments', and to inform the impacts of alternative solutions. Copies of these background study reports are provided in the Appendices.

#### **Appendix 'B'**

- i) Bridge Inspection Reports (2009, 2014, 2016 and 2018). Lot 46/47 Concession A, Greenock Survey. Prepared by GMBP.
- ii) Structure No. 0011 Rehabilitation Options. The Municipality of Brockton. Prepared by GMBP (April 2017).
- iii) Geotechnical Investigation: Brockton Bridge 11 Replacement, Concession 20, Municipality of Brockton. Prepared by Chung and Vander Doelen Engineering Limited (September 19, 2017).

#### **Appendix 'C'**

- iv) Bridge No. 0011 (Greenock) EA, Municipality of Brockton. Scoped Environmental Impact Study. Prepared by Aboud & Associates Inc. (Aboud) (January 15, 2018).
- v) Existing Conditions Flood Study: Greenock Bridge No. 0011, Lot 46/47 Concession A. Prepared by GMBP (April 12, 2018).

#### **Appendix 'D'**

- vi) Stage 1 and Stage 2 Archaeological Assessment – Proposed Bridge Replacement or Upgrade: Part Lots 47 and 48, Concession A, Former Geographic Township of Greenock. Prepared by Scarlett Janusas Archaeology Inc. (July 13, 2017).
- vii) Cultural Heritage Evaluation Report and Preliminary Cultural Heritage Impact Assessment: Brockton Bridge (Bridge 11). Prepared by Scarlett Janusas Archaeology Inc. (July 20, 2017; Revised September 12, 2018).
- viii) Cultural Heritage Evaluation Report and Preliminary HIA (ADDENDUM) and Heritage Impact Assessment. Prepared by GMBP (May 1, 2019).

In addition, the County of Bruce initiated a Bridge Infrastructure Master Plan process in July 2011 to define the best strategy for resolving deficiencies identified with a group of bridges situated in central Bruce County.

Brockton Bridge No.0011 was included in this assessment. As a result, the following reports were considered relevant to this EA and were used to inform the impacts of alternative solutions. Copies of the Bridge Infrastructure Master Plan reports are provided in **Appendix 'E'**.

- i) Ministry of Tourism, Culture and Sport Stage 1 Archaeological Assessment: Central Bruce County Bridge Infrastructure Master Plan. Prepared by William R. Fitzgerald (April 20, 2012).
- ii) Heritage Evaluation of Eight Bridges: Bridge Infrastructure Master Plan. Municipalities of Arran-Elderslie and Brockton, Bruce County, Ontario. Prepared by Golder Associates (January 2012).
- iii) County of Bruce: Bridge Infrastructure Master Plan – Central Bruce County. Prepared by B.M. Ross and Associates Limited (April 24, 2013).

A summary discussion of background information, including the findings for each study, is provided in the following sections.

## 6. INVENTORY OF ENVIRONMENTS

### 6.1 Technical Environment

#### 6.1.1 Bridge Condition Assessment

In 2016, GMBP completed a bridge inspection report which identified several bridge deficiencies and recommended that the Municipality consider completing major rehabilitation work in the 'near-term'. In conjunction with the evaluation of rehabilitation options, a more detailed structural assessment of the bridge was completed. Within the April 2017 Rehabilitation Options report, it was ascertained that repairs to the trusses, abutments, wingwalls and decks would be required in the short-term to extend the useful life of the bridge. In general, the report outlined two options for bridge rehabilitation, including the following:

- The useful life cycle of the structure could be extended by approximately 20 years with the replacement of the steel pony trusses, floor beams and stringers. This would involve replacing the wood deck with a concrete deck. Concrete elements (i.e. abutments, ballast walls and wingwalls) would be reused by chipping and patching, as practicable.
- The useful life of the structure could be extended by approximately 10 years by removing or repairing the critical elements only, including the steel floor beams, stringers and deck.

The most recent Bridge Condition Assessment was completed in May 2018. Consistent with past inspections, the assessment identified several deficiencies and concluded that the structure is in overall poor condition. Recommendations included the completion of a load posting evaluation to confirm the load posting, reducing the speed limit to avoid additional impact to the structure, and closing or completing major rehabilitation within one year. Copies of recent Bridge Inspection/Review Reports and the Bridge Rehabilitation Options report (April 2017) are provided in **Appendix 'B'**.

#### 6.1.2 Road Approach Deficiencies

The Official Plan for the County of Bruce designates Concession Road 20 as a Municipal Road (i.e. local road). Although the Right-of-Way width available for Concession Road 20/2A is 20 meters, the existing gravel road is approximately 6.5 meters wide. In general, appropriate right-of-way widths should be provided for existing and anticipated traffic volumes, on-going maintenance, and emergency access. Generally, the number and width of through lanes should be the same on the bridge deck as on the approach roadway. The usual minimum acceptable bridge cross-section is 8.5 meters to accommodate two-way traffic. According to the MTO Geometric Design Standards, provision for single-lane bridges may be permitted on very low-volume roadways.

According to the County of Bruce Official Plan Schedule 'A', the study area is within lands designated as Environmental Protection/Hazard. Consequently, the location and size/footprint of the bridge may not be altered without a SVCA permit. Furthermore, in consideration of the signage provided at the crest of each hill, which indicates that there is a steep hill ahead and posts a speed limit of 30 km/hr, the approach on the east side of the bridge is generally satisfactory for slow moving vehicles (i.e. at speeds of less than 40 km/hr). However, the approach on the west side of the bridge is more significantly sloped (**Figures 4 and 5**) and would require more extensive modification to adhere to the MTO and/or TAC Geometric Design Guidelines (**Appendix 'B'**).

From an engineering perspective, it is considered prudent only to recommend bridge replacement alternates that simultaneously address the issue of the steep approaches and that meet the Standards/Design Code. Therefore, in conjunction with the bridge reconstruction activities, bridge replacement options include consideration of options to reconstruct the approach roads on either side of the bridge in order to match a wider bridge deck and address the existing horizontal and vertical deficiencies. The steep approaches may be designed to meet the road standards by either raising the surface grade along the river banks with or without adding fill within the floodplain or flattening the road grade by lowering the elevation at the top of the slope (i.e. cutting the banks).

### 6.1.3 Geotechnical Investigation

To inform the bridge replacement alternative, a geotechnical investigation was completed by Chung & Vander Doelen Engineering to assess the subsurface conditions at the Site and provide geotechnical recommendations for the design and construction of the foundation elements for a replacement structure. The report is included in **Appendix 'B'**.

As part of the investigation, two boreholes were advanced, one directly to the east and one to the west of the existing bridge, to verify sub-surface soil, bedrock and groundwater conditions. The report generally concludes that appropriate bearing capacity may be available to support conventional spread footings, but that pile foundations (i.e. H-piles) would be required under certain circumstances. Where cut slopes intersect groundwater conditions, slope flattening to 2H:1V may be necessary. Embankment widening should be constructed with side slopes of not steeper than 2.5H:1V. Should a multiple span bridge greater than approximately 31 meters be considered, additional geotechnical investigations would be required.

## 6.2 Social Environment

### 6.2.1 Bruce County Bridge Infrastructure Master Plan (2013)

The County of Bruce initiated a Bridge Infrastructure Master Plan process in July 2011 to define the best strategy for resolving deficiencies identified with a group of bridges situated in central Bruce County. These structures, which spanned the main branches of the Saugeen and Teeswater Rivers within an area located immediately south of Paisley, represented a significant capital commitment to the County which was considered to be unsustainable given that they did not form part of the County road network (i.e. are local roads) and experienced relatively low traffic volumes. As a result, given the close physical proximity of the structures and other similarities, such as age, condition and capacity, the Master Plan process was completed to inform the preferred long-term strategy for transportation infrastructure within the defined area. Excerpts from the Bruce County Bridge Infrastructure Master Plan are provided in **Appendix 'E'**.

Of the eight bridges examined in the Master Plan, only one bridge was municipally-owned, the subject of this EA (i.e. Bridge No.11), the remainder were County-owned and were situated on former Municipal boundaries between the former Townships of Brant, Greenock and Elderslie. Six of the bridges were at least 80 years in age and exhibited extensive deficiencies. The Master Plan was subject to approval from the County of Bruce, as well as support from the Municipalities of Brockton and Arran-Elderslie, however it did not require formal approval under the EA Act.

The Guiding Principles for the Master Plan considered that the 20<sup>th</sup> Concession Bridge (i.e. Bridge No.11) would be rehabilitated by the Municipality. Major repairs were recommended, since the 'Do Nothing' approach would reduce the load capacity and eventually lead to closure. Further, remediation costs were estimated to be about \$416,000 versus replacement costs of about \$2,509,000, for a 3-span (16m / 23m / 16m) structure with significant road fill placement within the wetland area to improve the vertical alignment. Bridge retirement costs were estimated to be about \$100,000 at that time.

## 6.2.2 County of Bruce Official Plan: Transportation Planning

Section 4.6 of the Official Plan outlines transportation policies. The OP *'encourages all jurisdictions to consult with each other in transportation and upgrading maintenance programs'*. In consideration of the various alternatives and the potential implications on the local and regional road network, the Municipality consulted directly with the County to determine whether Concession Road 20 (Brockton)/Concession Road 2A (Arran-Elderslie), and Bridge No.0011 was being considered as part of the County's larger-scale road network. The September 26, 2018 and November 21, 2018 exchange of correspondence is provided in **Appendix 'G'**.

As part of the consultation process, and in cooperation with the Municipality of Arran-Elderslie, the Municipality of Brockton requested the County to consider the following (as shown below):

1. That the County of Bruce assume jurisdiction over Bridge 11 and the sections of Concession 2A Elderslie and Concession 20 Greenock necessary to maintain the link between County Roads 3 and 1; and
2. That the Municipalities of Brockton and Arran-Elderslie assume proportional jurisdiction over sections of Bruce Road 1 between Concession 20 and the community of Paisley and of the Stark's Bridge.



The County estimated that costs associated with achieving a County standard for the required road improvements and bridge replacement would be in the range of 2M to 3.25M. As a result, the Bruce County Transportation and Environment Services Committee did not support the proposed exchange. Further, at this time it appears that the County is not in a position to consider the road and bridge as part of its larger-scale road network. Therefore, Concession Road 20/2A will continue to be considered a municipal road allowance.



### 6.2.3 Bridge Usage

Currently, the bridge has a triple load posting of 9/12/18 tonnes which limits its economic value and its usefulness as a route for emergency and agricultural vehicles. As it continues to deteriorate, maximum load postings may need to be further reduced. Based on the 2018 biennial review of the structure, the load posting should be reduced to 7 tonnes. Should the bridge be left as is, it is estimated that within three to five years the bridge may have to be closed entirely to vehicular traffic.

Based on traffic counts completed by Paradigm Transportation Solutions in 2010 and 2012, Bridge No.11 was observed to accommodate an estimated 126 and 88 vehicles per day, respectively. The Municipality's Road and Bridge Needs Study reports the Annual Average Daily Traffic to be in the range of 50 to 199 Vehicles per Day. Recent daily traffic counts on Concession Road 20/2A were reported to be  $\pm 150$  (Bruce County Committee Report dated November 15, 2018). Therefore, this link between Bruce Road 3 (Municipality of Arran-Elderslie) and Bruce Road 1 (Municipality of Brockton) is considered to accommodate a low volume of traffic.

Feedback provided following the initial public consultation period in June 2018 suggests that winter traffic volumes along Concession Road 20/2A may be slightly greater than those during other times of the year. In consideration of the bridge removal option, several comments from the public regarding the poor winter visibility on Bruce Road 1, just north of Concession Road 20 were presented, both verbally and in writing. Reportedly, Concession Road 20 is often used in the winter by residents to access Bruce Road 3 which apparently does not suffer the same winter visibility issues. The County was consulted and has indicated that it does not have any planned initiatives to address the reported poor winter visibility on Bruce Road 1 between Concession 20 and Paisley. Public and agency feedback is included in **Appendix 'G'**.

### 6.2.4 Traffic Movement

The Concession 20/2A right of way is not considered to be a primary transportation corridor. However, the bridge is situated in close proximity to numerous County roads. Bruce Road 1 is located approximately 650 meters to the west and Bruce Road 3 (north  $\leftrightarrow$  south) is located within approximately 1.5 kilometres to the east of Bridge No.0011. In addition, Bruce Road 15 (west  $\leftrightarrow$  east) is situated approximately 7 kilometers to the south of Concession Road 20/2A. As a result, in consideration of the low traffic volumes experienced, it is not anticipated that bridge closure, whether it be short-term (i.e. for bridge rehabilitation or replacement) or long-term (i.e. bridge removal), will have a significant impact on the regional transportation network.

### 6.2.5 Local Impacts and Alternate Routes

As noted in the County of Bruce Master Plan, regardless of low traffic volumes and the availability of alternate routes, road closure will have some impacts. Residents living in proximity to the bridge or on a connecting road will experience the greatest impacts to bridge closure including increased travel times and decreased accessibility. To assess the potential impacts, consideration was given to the number of properties potentially affected and the length of the alternate routes.

Concession Road 20/2A between Bruce Roads 1 and 3 directly services a limited number of rural-residential properties including 289 Concession 20, situated approximately 150 m east of the bridge, and 352 Concession 20, approximately 400 meters west of the bridge (**Figure 7**). In terms of local traffic that may use this link more frequently, there are an additional 7 properties to the south, along Greenock-Elderslie Road, between Concession 20/2A and Concession 18/Brant-Elderslie Townline Road. Further, there are several properties to the north and south of Concession Road 20/2A, along Bruce Road 1 and Bruce Road 3 that may use this local road as an east  $\leftrightarrow$  west connection.

With the closure of the bridge, either short or long-term, a resultant increase in travel distance via alternate routes would be expected. Travel distance, measured as the distance from the intersections of Concession Road 20/2A with Bruce Road 1 and with Greenock-Elderslie Road, not utilizing the bridge, was determined and is presented

in the following **Table 1**. Due to the variation in road maintenance levels, travel distances include consideration for roads that experience partial to no winter road maintenance, as shown on **Figure 7**.

**TABLE 1: Review of Available Alternate Routes**

Route	Season	Description	Distance
North	All Seasons	Via Paisley, Bruce Roads 1 and 3	8 kilometers
South	All seasons, not including the winter	Via Greenock-Elderslie Road, Conc. Rd. 18 and Baseline North (partial winter maintenance)	5 kilometers
South	Winter route	Via Greenock-Elderslie Road, Conc. Rd. 18 and Greenock Sideroad 5	9 kilometers

Further, between Concession 20/2A and Bruce Road 15, which is located approximately 7 kilometers to the south, several additional alternate routes providing other potential east ↔ west connections, that are maintained in the winter, are available. A Figure outlining the network of roads and viable river crossings (i.e. bridges) between Concession Road 20/2A and Bruce Road 15 are outlined on **Figure 8**.

## 6.2.6 Emergency Services

At this time, the load postings for Bridge No.11 prevent the use of the bridge by larger emergency vehicles. However, emergency vehicle usage and added travel time was cited as a concern by local residents during the initial consultation efforts (discussed in **Section 9**) should bridge rehabilitation or removal be considered. To address these concerns, an overview of the emergency services provided by the Municipality, including the location of the stations/departments, was completed, as is summarized below.

1. **Fire Protection Services:** Fire protection is provided by two departments within the Municipality including the Walkerton Fire Department and the Elmwood Fire Department. Fire protection agreements are also provided by the Town of Hanover and by the three fire departments operated by the Municipality of Arran-Elderslie, including one situated in Paisley.
2. **Police Services:** The Municipality of Brockton is serviced by the South Bruce detachment of the Ontario Provincial Police (OPP) in Kincardine. An additional OPP detachment is located in Walkerton.
3. **Paramedic Services:** Bruce County Paramedic Services provide access to ambulances to local residents. This service provides multiple ambulance stations throughout Bruce County with the most proximal stations located in Walkerton, Chesley and Kincardine.

The locations for each of the emergency services are shown on **Figure 9**. Based on the locations of the various stations/departments, and the maximum design speed that may be attained of 50 km/hr, the use of Bridge No.11 as an alternate route for emergency vehicles would not likely provide for significantly improved access or significantly decreased travel times for emergency vehicles.

## 6.2.7 Active Transportation

Adapting the bridge for non-vehicular purposes such as walking, cycling and scenic viewing assumes that there is community interest in the structure and that it has the potential to be considered as a destination and/or attraction. Therefore, should retaining the bridge for non-vehicular purposes be considered, the Municipality would need to weigh the level of community interest in the structure, or its potential to attract others to the community, relative to other factors (i.e. cost, naturalize river banks, etc.).

While the structure itself could be maintained for walking and cycling, there is limited potential for the bridge to be integrated with adjacent or nearby trail systems. The closest trail system, which is part of the rail trail that parallels Bruce Road 3 into Paisley, is situated approximately 1.5 kilometers to the east. In essence, the structure and its environs would itself be limited to non-vehicular movements, however, access to the bridge would be by way of the existing narrow gravel road. However, the Municipalities of Brockton and Arran-Elderslie could consider a joint effort in expanding the trail system from the rail trail, along Concession Road 20/2A, to Bridge No.0011.

It is noted that although not previously quantified, under the existing conditions there is reportedly limited non-vehicular traffic that currently uses Concession Road 20/2A between Bruce Roads 1 and 3. Further, public feedback provided, in which a preference for the bridge replacement alternative is stated, has focused on retaining a vehicular crossing to better accommodate local traffic movements, rather than other active forms of transportation.

## 6.3 Natural Environment

### 6.3.1 Natural Heritage Environmental Impact Study

A "Scoped Environmental Impact Study" (EIS) was completed by Aboud in January 2018 to characterize and document natural heritage features within the study area, assess impacts, and to propose reasonable measures to mitigate potential impacts to natural heritage features. A copy of the EIS Report is provided in **Appendix 'C'**. The EIS contains the following conclusions:

#### Site Constraints

- i. No Species at Risk were detected in the study area.
- ii. No significant Wildlife Habitat was identified within the study area.
- iii. The study area includes a warm/cool water fish habitat (Teeswater River).
- iv. The study area includes Environmental Protection/Hazard Lands.

#### Impact Assessment

Impacts of the bridge alternatives as well as generalized impacts from the construction of the bridge were assessed to determine their extent and mitigation guidelines. A summary was provided in Table 5 of the EIS (**Appendix 'C'**) and can be summarized as follows:

- i. Impacts primarily involve the removal of trees, naturalized weedy herbaceous vegetation communities, site grading, impact to fish habitat, and wildlife disturbance.
- ii. Trees close to the bridge location may require an assessment of stability for the retained trees and may include some selective tree removal and pruning.
- iii. There are opportunities in the study area for edge enhancement, restoration, invasive species management and compensation planting to mitigate and offset potential impacts.

#### Avoidance, Mitigation and Compensation Recommendations

Recommendations specific to the natural heritage features are provided to ensure protection and maintenance of natural heritage features and function within and adjacent to the proposed bridge. Through the implementation of the proposed mitigation, restoration, and compensation, no negative impacts are expected to the natural heritage system. Recommendations are outlined in Section 7.0 of the EIS (**Appendix 'C'**) and can generally be summarized as follows:

- i. Erosion and Sediment Control planning should be completed as part of the detailed design. Several installation and inspection recommendations are further outlined in the EIS.
- ii. The area of construction disturbance should be kept to a minimum, with works and the use of heavy equipment minimized and/or removed from sensitive areas and natural feature boundaries.
- iii. The implementation of comprehensive restoration and compensation measures within areas impacted is recommended. All disturbed areas should be re-vegetated or restored with appropriate indigenous plants.
- iv. Activities should be timed to avoid wildlife disturbance during critical life stages, as follows:
  - a. No in-water works are permitted from March 15 to July 15 (spring timing restrictions) and October 1 to May 31 (fall timing restrictions), as per DFO fisheries timing windows.

- b. Avoid removal of trees and vegetation during the generalized breeding bird nesting period from April 1 to August 31. If removal of vegetation is to occur during the general nesting period, a nest search should be carried out by a skilled and experienced biologist.
- c. Installation of Barn Swallow exclusion measures (e.g. netting) is recommended prior to the beginning of the generalized breeding bird nesting period (April 1).

The report concludes that, through implementing the mitigation measures identified, none of the project alternatives to repair, replace or remove Bridge No. 0011 (Greenock) would result in significant long-term negative impacts to natural heritage features identified within and adjacent to the bridge location. The natural features within the study area will be protected and enhanced through mitigation and restoration recommendations. This will result in long-term positive effects on the natural heritage features within the study area.

### 6.3.2 Regulations and Requirements

#### **Saugeen Valley Conservation Authority**

The Study Area is located within the jurisdiction and Screening Limits of the Saugeen Valley Conservation Authority (SVCA) and is adjacent to unevaluated wetlands, both north and south of the bridge. It is regulated under Ontario Regulation 169/06: *Regulation and Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. Under this regulation a permit would be required for building construction/redesign, site grading, and/or the temporary or permanent placing, dumping, or removal of materials from the Site. A permit would also be required for straightening, changing, diverting or in any way interfering with the river.

The existing bridge and potential bridge replacement meets the SVCA policy as it is considered Public Infrastructure. Consistent with the findings of the EIS, Public Infrastructure is permitted within water courses subject to being approved through an EA process and/or the interference on the natural features and hydrologic and ecological functions of the watercourse has been deemed acceptable by the SVCA.

Based on comments received from the SVCA dated September 11, 2017 and included with the EIS (**Appendix 'C'**), the SVCA will have no objection to the proposed project if the replacement bridge does not change the constriction of the river flow at that location. Further, *'if the bridge design conforms with the existing parameters of the existing bridge, and the hydrology will not be altered, SVCA staff will not require a Hydrologic Assessment for review. Additionally, SVCA staff will not require an EIS for review for this replacement. If the plans for the bridge change from what is existing or further restrict flow, an Engineered Hydrology Report will need to be provided for SVCA review'*.

#### **Department of Fisheries and Oceans Canada (DFO)**

As part of the EIS, Aboud consulted with the DFO as it was identified that the bridge spans waters that contain habitat for Rainbow Mussels. According to the DFO, a specific study was not necessary as Fisheries and Oceans Canada (DFO) had previously sampled the site and observed that Rainbow Mussels are present at this location. However, should in-water works be deemed necessary for the repair, replacement or removal of the structure, a *Request for Review* would need to be submitted to the DFO for approval during the detailed design phase. A 90-day review period for this Approval would be required.

In addition, a DFO letter of authorization would be required for any project alternative that would result in a permanent alteration to fish habitat. Examples would include the use of a series of culverts, a new centre pier to support a multi-span bridge and/or an encroachment of the bridge footing/abutment further into the river than presently exists. Two of the bridge replacement alternatives considered may permanently impact fish habitat within the Teeswater River.

### 6.3.3 Flood Elevation Study

In order to inform the alternatives under consideration an *'Existing Conditions Flood Study'* was prepared by GMBP to approximate the floodline elevations at the location of Bridge No.11 under Regional and 100-year storm events. The purpose of the study was to identify a high-water level to determine if flow hydrology might be altered under certain project alternative conditions. The Flood Elevation Study is included in **Appendix 'C'**.

The study reports that the existing bridge deck across the river ranges in elevation between 228.1 and 228.5 m. Further, the 100-year and Regional event flood water surface elevations were estimated to be 228.9 and 230 m, respectively. The study concludes that *'based on the results of the flood model backwater analysis, the existing bridge deck would be significantly submerged in the Regional event by 1.47 m to 1.87 m of flood water'. Therefore, any planned encroachment into the floodplain below elevation 230.00 m should be reviewed for potential impacts to backwater effects'.*

### 6.3.4 Source Water Protection and Climate Change

Recent amendments to the Municipal Class EA require proponents to consider whether or not the project is located within a Source Water Protection Area, and if so, to document whether or not any project activities are a prescribed drinking water threat. Consequently, this project was reviewed with respect to the requirements under the Clean Water Act, 2006. Based on a review of the 'Saugeen Valley Source Protection Area Approved Assessment Report' (October 2015), the Study Area is not located within a well head protection area, intake protection zone, groundwater recharge area, or highly vulnerable aquifer.

The natural environment also includes potential impacts of the project on Climate Change, and of Climate Change on the project. In consideration of the various factors associated with each alternative, including the potential to maintain reduced travel time for local residents and improve traffic safety with bridge replacement, which would result in reduced greenhouse gas emissions relative to removing the bridge crossing, or reduced construction efforts and on-going winter maintenance requirements associated with bridge removal, the bridge alternatives being reviewed will have an overall net neutral effect with respect to climate change. Further, any of the alternatives would, at minimum, maintain existing flow environments.

## 6.4 Cultural Environment

### 6.4.1 Archaeological Study

In consideration of Section 1.3.1 of the 2011 Standards and Guidelines for Consultant Archaeologists (S&G) administered by the Ministry of Tourism, Culture and Sport (MTCS), which lists criteria that are indicative of archaeological potential, the study area meets the following criteria indicative of archaeological potential:

- Presence of water sources (i.e. the Teeswater River);
- The presence of nearby elevated topography;
- Early historic transportation routes (i.e. the river and its environs); and
- Areas of early Euro-Canadian settlement.

Scarlett Janusas Archaeology Inc. was retained to complete a Stage 1 and Stage 2 Archeological Assessment for Bridge No.0011. A copy of the Report (July 13, 2017) is provided in **Appendix 'D'**. The assessment was conducted under the S&G. In a letter dated July 25, 2017, the MTCS confirmed the entry of the Stage 1 and Stage 2 Assessment Report into the Ontario Public Register of Archaeological Reports (**Appendix 'D'**).

The Stage 1 work included a review of historical background information and concluded that the study area exhibits archaeological potential based on the proximity to the Teeswater River, the presence of nearby elevated topography (although these are adjacent not in the study area), possible prehistoric use of the river and its environs and early use by Euro-Canadians. As a result, Stage 2 investigation work was recommended.



The Stage 2 archaeological assessment of the study area was conducted on July 6<sup>th</sup>, 2017 using a test pitting methodology. The study area was limited to an area of 20 meters by 20 meters from each corner of the bridge. Of the study area, only 35% was subject to field testing, the remainder consisted of previously disturbed steep slopes in excess of 20-degrees (i.e. 15%) or was observed to be permanently wet (i.e. 50%). No potential archaeological sites were located during the Stage 2 assessment.

Based upon the background research of past and present conditions and the Stage 2 archaeological assessment, the following is recommended:

- There are no archaeological resources located within the study area and there is no requirement to conduct additional archaeological assessment;
- Compliance legislation must be adhered to in the event of discovery of deeply buried cultural material or features.

However, it is noted that should re-grading of the road be incorporated into the design (i.e. change from existing road profile), additional archaeological investigations may be required.

#### 6.4.2 Built Heritage Resource and Cultural Heritage Landscape Evaluation

Cultural Heritage assessments are required to satisfy Section 2(d) of the Planning Act which necessitates *'the conservation of features of significant architectural, cultural, historical, archeological or scientific interest'*. A preliminary cultural heritage evaluation, limited in scope, was completed by Golder in 2012 as part of the Bruce County Master Plan. A copy of this report is provided in **Appendix 'E'**. Based on the bridge scoring criteria/system previously used by the Ministry of Transportation as a management tool, Bridge No. 0011 was identified as having a 'low' cultural heritage value or interest (i.e. a score of less than 60 out of 100). However, the need for further research to evaluate the historical association (i.e. builder, date of construction, settlement history etc.) of the bridge was identified. The MTCS now requires evaluation under O. Reg. 9/06.

Scarlett Janusas Archaeology Inc. was retained to complete a Cultural Heritage Evaluation Report (CHER) and a Preliminary Heritage Impact Assessment (HIA) for Bridge No.11. A copy of the Report dated July 20, 2017 and revised September 12, 2018, is provided in **Appendix 'D'**. An addendum to the report, which forms part of the CHER/HIA and is included in **Appendix 'D'**, was prepared to satisfy outstanding comments outlined by the MTCS in email correspondence dated April 15, 2019 (**Appendix 'I'**). The Addendum provided the following:

- i. A response to the outstanding MTCS Comments outlined in a Summary Table provided to GM BluePlan in the April 15, 2019 correspondence.
- ii. A summary of the Municipality's community engagement efforts, including consultation with the Brockton Municipal Heritage Committee.
- iii. A Heritage Impact Assessment based on the *Recommended Solution* to the Schedule 'B' Environmental Assessment, including a more specific review of the potential impacts and mitigation measures.

The CHER evaluates the potential of a "property" to be designated under the Heritage Act, if it meets "one or more of the following criteria...":

1. *The property has design value or physical value because it,*
  - i. *is a rare, unique, representative or early example of a style, type, expression, material or construction method,*
  - ii. *displays a high degree of craftsmanship or artistic merit, or*
  - iii. *demonstrates a high degree of technical or scientific achievement.*
2. *The property has historical value or associative value because it,*
  - i. *has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community,*

- ii. *yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or*
  - iii. *demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.*
3. *The property has contextual value because it,*
- i. *is important in defining, maintaining, or supporting the character of an area,*
  - ii. *is physically, functionally, visually or historically linked to its surroundings, or*
  - iii. *is a landmark."*

Based on the results of the cultural heritage evaluation, as updated in the Addendum, Bridge No.0011 was determined to retain cultural heritage value. Its heritage significance centres on its historical relationship with the Hamilton Bridge Works Company, its design/physical attributes, and its historical link as a Bridge crossing along Concession Road 20 (Brockton), across the Teeswater River, south of the Village of Paisley. As such, the structure was found to meet at least one of the criteria of Regulation 9/06 under the *Ontario Heritage Act* (OHA).

A preliminary Heritage Impact Assessment (HIA) was included in the CHER, better to inform the alternatives considered in the EA process. The preliminary HIA identifies where a project alternative may impact on an identified cultural heritage resource, and considers preliminary mitigation measures, which should be considered in context of the overall project planning process. In general, impacts to the Cultural Heritage environment become greater as alterations to the existing bridge become more pronounced, with the alternatives under consideration.

The following nine conservation options/alternatives are arranged according to the level or degree of intervention from minimum to maximum. The conservation options are based on the Ontario Heritage Bridge Program (1991), which is reportedly regarded as current best practice for conserving heritage bridges in Ontario and ensures that heritage concerns, and appropriate mitigation options, are considered.

**TABLE 2: Ontario Heritage Bridge Conservation Options**

Ranking	Option	Description
1	Retain in Service	Retention of existing bridge and restoration of missing or deteriorated elements where physical or documentary evidence (e.g., photographs or drawings) can be used for their design.
2		Retention of existing bridge with no major modifications undertaken.
3		Retention of existing bridge with sympathetic modification.
4		Retention of existing bridge with sympathetically designed new structure in proximity.
5	Retain for Other Uses	Retention of existing bridge no longer in use for vehicular purposes but adapted for pedestrian walkways, cycle paths, scenic viewing etc.
7		Retain bridge as a heritage monument for viewing purposes only.
6	Relocation	Relocation of bridge to appropriate new site for continued use or adaptive re-use.
8	Replace or Remove	Replacement/removal of existing bridge with salvage elements/members of heritage bridge for incorporation into new structure for future conservation work or displays;
9		Replacement/removal of existing bridge with full recording and documentation of the heritage bridge.

In general, when the nature of the proposed works is such that adverse impacts are unavoidable (i.e. public safety, cost, etc.), it is necessary to implement management or mitigation strategies that alleviate the detrimental effects to cultural heritage resource, such as sympathetic modifications/design, documentation and/or commemoration strategies. Mitigation measures are intended to lessen (or negate) anticipated impacts to cultural heritage attributes identified.



**Brockton Municipal Heritage Committee Review and Comments:**

In March 2019 the Municipality requested the Brockton Municipal Heritage Committee to review the Cultural Heritage Evaluation Report and Preliminary Heritage Impact Assessment for Bridge No.11, as well as the Schedule 'B' Environmental Assessment Project File (Version 2: January 2019). Following the Brockton Heritage and Library Committee meeting on April 1, 2019, the Committee indicated that they concurred with the *Preliminary Recommended Solution* outlined in the Project File provided, to remove the bridge, and generally concurred with the mitigation measures proposed in the CHER/HIA. Confirmation is included in the Request of Review and Comment document provided in the Addendum/HIA (**Appendix 'D'**).

Within the meeting minutes, also included in the Addendum/HIA, the Committee more specifically discussed the mitigation measures and indicated that the Committee *'supports the mitigation measures proposed in the CHER/HIA, with the amendment that the plate indicating the name of the builder be removed if possible and stipulating that a simple commemorative plaque replace the proposed architectural drawings'*. As a result, in consideration of bridge removal, documentation of Bridge No.0011 and commemoration, which entails the installation of a historical plaque at the site, where considered to adequately mitigate the effects of bridge removal on the cultural heritage resource (i.e. Bridge No.0011).

## **6.5 Economic Environment**

The economic environment considers relative construction costs and longer term operating and maintenance costs. Bridge No.11 is municipally owned and maintained. Based on the 2018 biennial review of the structure, the load posting should be reduced to 7 tonnes. The load posting limits its usefulness as a route for emergency and agricultural vehicles, impacting its current economic value. Cost estimates for bridge rehabilitation and various bridge replacement options have been presented in various reports over the past 5-years. A summary of the cost estimates, including a general description of the options previously considered, is provided below.

**Section 6.5.2** provides updated costs estimates for the alternatives currently being considered as part of this EA. It is noted that the 'Do Nothing' option would lead to future costs.

### **6.5.1 Previous Cost Estimates**

**County of Bruce: Bridge Infrastructure Master Plan (BM Ross, April 2013)**

Review of the County of Bruce Master Plan suggests that bridge rehabilitation was the only option considered for Bridge No.0011 within the County's Master Planning process. It is assumed that this was based on an analysis of bridge rehabilitation versus replacement costs, which were reported to be \$416,000 versus 2.5-million, respectively. Bridge rehabilitation costs were described as the short-term cost to the Municipality to *'replace all deteriorated components of the structure with sympathetic components in accordance with established standards (i.e. CHBDC)'*. The bridge replacement costs reportedly included the cost of approach reconstruction (i.e. the placement of significant road fill) and a three-span bridge (16m/23m/16m). The measures outlined were reportedly sufficient to achieve a posted speed limit of 60 km/hr.

**Structure No.0011 Rehabilitation Options (GMBP, April 2017)**

The purpose of the Report outlining the rehabilitation options was to document the existing bridge deficiencies and to compare bridge replacement costs to two different rehabilitation options. Provided that limited bridge repairs have been completed since the cost estimates were completed by BM Ross and the bridge has continued to deteriorate, bridge rehabilitation costs were updated to reflect 'existing' conditions. Cost estimates considered that there is a trade-off between incurring large up-front expenditures (i.e. full replacement) and expending smaller, more frequent amounts (i.e. rehabilitation). Therefore, cost estimates included the expenditures that may be incurred in the next 20-years.

In consideration of the high bridge replacement costs estimated by BM Ross and the low traffic volumes, a preliminary cost estimate to replace the existing structure with a structure of similar geometry and construction was prepared by GMBP. The alternative to replace the bridge with a one-lane structure in the same location was estimated to be \$1.1M, with additional costs in the short-term being minimal. This estimate did not include road approach improvements.

Two bridge rehabilitation options were reviewed and included the following:

1. **Replace Steel Elements Only:** The report considered that replacing the steel elements only (circa 2017), with repairs to the abutments and wingwalls required by 2037, would extend the useful life of the structure by more than 20-years, at a cost of about \$1.3M to 2037.
2. **Replace Deck Supporting Members Only:** Replacing the deck supporting members only (circa 2017) would extend the useful life of the structure by about 10 years with additional repairs required to potentially further extend the useful life in 2027 (i.e. trusses) and 2037 (i.e. abutments and wingwalls), at a cost of about \$1.5M to 2037.

However, while the cost estimates for rehabilitation assume that the useful life of the bridge could be extended by greater than 20-years, it is noted that the useful life would ultimately be dependent upon the future bridge condition (i.e. inspection findings) and whether the extent of future repairs would continue to be considered a cost-effective approach to maintaining the existing structure as a vehicular crossing. Further, it is unlikely that bridge rehabilitation efforts would effectively allow for the load posting restrictions to be removed.

Based on the cost-estimates, the report recommended that if the Municipality was evaluating the options presented (i.e. removal, rehabilitation and replacement) based solely on the long term financial considerations, permanent bridge closure should be considered. However, if permanent bridge closure was not desired, then bridge replacement was recommended in lieu of bridge rehabilitation due to the longer-term cost implications of bridge rehabilitation.

## 6.5.2 Updated Cost Estimates

### i. Rehabilitation

As previously discussed, rehabilitation of the existing structure would entail completing repairs to the various elements of the bridge that have been identified as deficient. The rehabilitation cost estimates from 2017 were updated based on the most recent bridge inspection completed in 2018. Further, unit prices for several items were adjusted based on 2018 pricing and quotations from local suppliers. The cost of dewatering, cofferdams and approach excavation were removed resulting in superstructure repairs only and were deferred to 2038 during foundation replacements. The cost of temporary signage and traffic control was reduced since the project will most likely be completed during a full road closure. Site restoration and environmental protection were also reduced during construction periods resulting in superstructure repairs only. The total rehabilitation cost, as updated herein, for each option previously considered in the assessment of Rehabilitation Options (April 2017) is provided below. A detailed cost estimate, as updated, for each rehabilitation option is included in **Appendix 'B'**.

Option 1 – Replace Steel Elements	\$770,000 (+\$370,000 future costs)
Option 2 – Replace Deck Supporting Elements	\$360,000 (+\$680,000 future costs)

Therefore, while Option 2 provides the opportunity to defer bridge rehabilitation costs, it is estimated that bridge rehabilitation will cost the Municipality in the range of \$1.0M to \$1.2M in the next 10 years to extend the useful life of the bridge by an additional 20 years (i.e. until circa 2038).

**ii. Bridge Replacement**

The report completed in April 2017 by GMBP included a cost estimate for a single span, single lane structure and Version 1 of the Project File included cost estimates for various one and two-lane structures. The replacement cost estimates previously presented in the Project File (Version 1) have been updated. Unit prices for several items were adjusted based on 2018 pricing and quotations from local suppliers. The cost of temporary signage and traffic control was reduced since the project will most likely be completed during a full road closure. The bridge costs estimated for single span structures include for a reinforced concrete deck supported by precast girders, and are as follow:

Option A – Single Span, Single Lane	\$1,000,000
Option B/C – Single Span, Two Lane	\$1,070,000

Detailed cost estimates for the single span replacement options are included in **Appendix 'B'**. These cost estimates may be subject to further review.

A fourth bridge replacement option (i.e. Option D) includes for a multiple span bridge, with no infilling within the floodplain (i.e. SVCA regulated area). As shown in **Figure 6**, a conceptual structure length of approximately 144 meters would be required to achieve this replacement option. It is estimated that the cost for a structure of this length would be greater than \$4,000,000. It is acknowledged that the bridge length could be reduced with the provision for some level of infilling within the floodplain, similar to that presented in the Master Plan for the County. Optimizing the costs and benefits with respect to the bridge length, infilling efforts and road reconstruction requirements needed to address the road approaches on either side of the bridge could be further evaluated should this bridge replacement option be further considered.

**iii. Road Works**

The cost estimates for bridge replacement do not include for road works required to achieve the Standards/Code. In conjunction with the bridge reconstruction alternatives, approach roads on either side of the bridge would also require reconstruction in order to match the wider bridge deck and address the existing road approach deficiencies. Preliminary conceptual road profiles were prepared to aid in the review of the implications of the various design options, including bridge elevation, length, and design speeds. **Figure 4** illustrates the road profiles required to achieve the 80 km/hr design speed criteria. It is considered that an 80 km/hr design speed would be neither technically, socially, environmentally or financially acceptable and is not considered further.

Although an 80 km/hr design speed is preferred, the Municipality as the Road Authority may choose a reduced design standard to as low as a 50 km/hr design speed. Road profiles which achieve these criteria are illustrated in **Figure 5** and are considered further. Assuming a 50 km/hr design speed, the steep approaches may be designed to meet the road standards, as follows:

**Replacement Options A and B:**

These options maintain the structure at the existing location and elevation and would require flattening the road grade by lowering the elevation at the top of the slope (i.e. cutting the banks). In order to achieve the design criteria for a 50 km/hr road system, significant earth cuts at the crests of the approaches, estimated to be in the range of 7 meters to the west and greater than 2 meters to the east, would be required to achieve a suitable design profile across the bridge. Further, based on the Flood Elevation Study, at the existing elevation, the structure would be subject to flooding during the 100-year and regional flood water events.

**Replacement Option C:**

This option involves replacement with a similar single-span structure at a raised elevation. Raising the surface grade along the river banks can be achieved by adding fill within the floodplain. Although this option would reduce the efforts required to improve the road approaches, significant work would still be required to the west of the bridge. In order to achieve the design criteria for a 50 km/hr road system, it is estimated that the top of slope to the west of the bridge would need to be cut by 4 meters. This option

would be subject to additional hydrologic assessment to review the effect infilling may have upstream of the bridge and would require SVCA approval.

**Replacement Option D:**

This option considers replacement with a multiple span bridge, at a raised elevation, without adding fill to the floodplain, and increasing the bridge span. In order to achieve the design criteria for a 50 km/hr road system, it is estimated that the top of slope to the west of the bridge would need to be cut by greater than 6 meters and to the east by greater than 4 meters. Additional geotechnical investigations would be required.

In summary, in addition to the bridge replacement, significant road works would be required to achieve a minimum design speed of 50 km/hr. Depending on the bridge replacement option considered, roads works could potentially include infilling within the floodplain, which would be subject to additional hydrologic analysis and SVCA approval, significant reduction of the top of bank elevations (i.e. cutting) and road widening. These measures would likely require the acquisition of lands along Concession Road 20/2A, beyond the existing 20-meter right-of-way. Further, the Municipality may wish ultimately to establish a 2-lane road along the 2-kilometer section between County Roads 1 and 3. In general, the costs associated with land acquisition would be dependent on several factors including:

- i. The assessed land values.
- ii. The extent of the road upgrades. More specifically whether the road upgrades would extend between the road approaches and the bridge or along the 2-kilometer section between County Road 1 and 3.
- iii. Community cooperation. Administrative and legal costs increase significantly if the expropriation process is required to acquire the required lands.

Due to the range of factors that would need to be considered to develop a detailed cost estimate to complete the road works along the approach roads on either side of the bridge, a detailed cost estimate has not been developed. However, it is estimated that the costs to complete the engineering, design, and construction for the road alignment improvements would be greater than \$1.5 million. This does not include the costs for the required land acquisitions along Concession Road 20/2A. Therefore, costs to complete the bridge replacement and road works for all Options considered are, at minimum, estimated to be greater than an estimated \$3 million, which would require a greater degree of assessment (Schedule 'C') under the Class EA process.

**Bridge Removal**

Based on the traffic counts, which suggest that fewer than  $\pm 150$  vehicles per day use the bridge, the significant cost to replace the bridge, and the alternate routes available, bridge removal is considered a viable option. This would also address the existing sub-standard bridge design and traffic safety issues associated with the bridge and Concession Road 20/2A. Bridge closure costs (i.e. removal), not including the construction of a cul-de-sac adjacent to each end of the bridge, are estimated to be in the range of \$150,000 to \$200,000.

**Bridge Re-Adaptation**

Bridge re-adaptation also considers that vehicular traffic can be accommodated on the existing framework of local roads, however, rather than removing the bridge, the structure would be re-adapted for pedestrian walkways, cycle paths, other forms of active transportation and/or scenic viewing. To accommodate pedestrian traffic and scenic viewing, railings would need to be installed as a safeguard. These would need to meet the Standards/Design Code. Further, based on the cultural heritage value of the bridge, sympathetic upgrading of the railings could be considered to retain the character of the bridge. In addition, similar to bridge removal, the construction of a cul-de-sac adjacent to each end of the bridge would be required.

Costs associated with ongoing maintenance, although difficult to quantify, should also be considered. Maintenance costs may include, but not be limited to, the following:

- i. Bridge inspections by a qualified consultant, every two years.
- ii. General maintenance and regular inspections by the Municipality to ensure that the bridge remains closed to vehicular traffic (i.e. barriers remain in-situ). This has been identified as a significant issue at other locations where the Municipality has attempted to close a river crossing to vehicular traffic, particularly in remote areas.
- iii. Level of service: winter maintenance, subject to the Municipality's discretion.

As the bridge condition continues to deteriorate, should eventual bridge removal, rehabilitation (as possible) or replacement be desired, the Municipality may be required to, once again, complete an Environmental Assessment (EA) process for the structure.

In the short-term, the costs associated with the installation of railings and general bridge maintenance would likely be less than or equal to the bridge removal costs. However, the costs associated with on-going maintenance and the deferral of the bridges ultimate fate has the potential to have significant budgetary implications for the Municipality.

## 7. INITIAL ASSESSMENT OF ALTERNATIVES

The Municipal Class EA outlines a comprehensive planning process (illustrated in **Figure 2**) that provides a rational approach to consider the advantages and disadvantages of various alternatives and their trade-offs in order to determine a *Preferred Solution* to address an identified problem (or opportunity), as well as consultation with agencies, directly affected stakeholders and the public throughout the process.

The EA for Bridge No. 0011 is being completed to assess the various options for this bridge crossing. Since a 'Do Nothing' approach would result in closing the bridge in the near term and would lead to a catastrophic failure, which is considered inappropriate, consideration and a decision for action will be necessary moving forward.

The background studies were prepared to help inform the impacts each alternative would have on each of the environments. The process toward the selection of a *Recommended Solution* involves the following:

- i) Identification of the impacts and mitigating measures of an alternative solution on each environment;
- ii) An assessment of the degree of impact each alternative would have on each environment; and
- iii) An evaluation based on comparative analysis of the alternative which best addresses the *Project Statement*.

While the original bridge replacement alternatives recognized that road profile improvements should be considered as part of the future road works, consideration for the required road approach improvements was not included in the overall assessment of alternatives originally presented. The alternatives originally considered included bridge rehabilitation, bridge removal and three different bridge replacement options including the following:

- i. Replace bridge with a single span, single lane structure.
- ii. Replace bridge with a single span two lane structure.
- iii. Replace bridge with a multiple span structure.

The overall assessment of alternatives originally presented in Version 1 of the Project File, based on the relative ranking of the various bridge alternatives considered at that time, regarded bridge rehabilitation, removal and replacement, with a single span structure, as viable alternatives. As a result, an initial consultation process was initiated in May 2018 in order to provide an opportunity for the public and agency groups to provide important



feedback to further inform the selection of a *Recommended Preferred Solution*. Based on the feedback provided, additional bridge replacement options and alternatives were considered in the subsequent documentation (i.e. Project File: Versions 2 and 3). The consultation process is outlined in **Section 8**, public and agency feedback is summarized in **Section 9** and a re-assessment of the alternative solutions is presented in **Section 10**.

## 8. CONSULTATION: SCHEDULE 'B' EA

Consultation early in and throughout the process is a key feature of environmental assessment planning. The Schedule 'B' Municipal Class EA process has two mandatory points of contact; the Notice of Project Initiation (Consultation - Phase 2) and the Notice of Completion. As part of the Notice of Project Initiation, the public was invited to attend a Public Information Centre on June 4, 2018 (i.e. PIC No.1). This initial public consultation provided an opportunity to discuss the problem and/or opportunities specific to those potentially affected parties (i.e. nearby property owners) at an early stage and provided the Municipality and GMBP an opportunity to identify other factors that may be considered in the selection of a *Recommended Solution*. Subsequently, in consideration of the level of interest shown by the community and the additional project developments, an additional information session (i.e. PIC No.2) was organized by the Municipality on January 22, 2018 to consider the issues identified and to present the findings and rationale of the re-assessment of alternatives.

### 8.1 Notice of Project Initiation and Public Information Centre (PIC No.1)

A Notice of Project Initiation was prepared and first issued on May 17<sup>th</sup>, 2018. The Notice invited the public, various agency groups and First Nation groups to review the Schedule 'B' EA Project File (Version 1) and to provide comment. The Notice also included an invitation to a Public Information Centre (PIC No.1), to be held on June 4<sup>th</sup>, 2018. A copy of the Notice and the letters issued to First Nations groups is provided in **Appendix 'A'** and a copy of the poster boards displayed at PIC No.1 are provided in **Appendix 'F'**.

The Notice was advertised in the Walkerton Herald-Times and the Hanover Post and was circulated to utility companies and various agencies via email. It was also mailed to property owners within a 2-kilometer radius surrounding the bridge. Circulation lists summarizing the project consultations are also provided in **Appendix 'A'**.

Upon receipt of comments, new information was incorporated into the review and assessment of alternatives. The public and agency comments received, following the initial consultation efforts, and additional consultation between the Municipality and the County of Bruce is included in **Appendix 'G'**. In consideration of the comments received and the additional level of review, which included a re-assessment of alternatives, a follow-up information session was organized by the Municipality (i.e. PIC No.2), as discussed in the following Section.

### 8.2 Notice of Project Update: Public Information Centre (PIC No.2)

A Notice of Project Update (MCEA: Phase 2 – Mandatory Consultation) was issued to agencies and First Nations groups on January 8<sup>th</sup>, 2019. The Notice was also mailed to property owners within and surrounding the Study Area (i.e. within a 2 km radius of the bridge), as well as to individuals that had provided comments following PIC No.1. The information session (i.e. presentation of findings) was advertised in the Walkerton Herald-Times and the Hanover Post. A copy of the Notice of Project Update is provided in **Appendix 'A'**.

The Notice of Project Update included an invitation to the presentation to Council (i.e. PIC No.2), scheduled for January 22, 2019. A copy of the presentation delivered at PIC No.2 is provided in **Appendix 'H'**. The presentation included a review of the EA assessment process, an inventory of the environments, a review and assessment of the alternatives considered, and the selection of a *Preliminary Recommended Solution*. Within the Notice and at the information session, the public, agency groups and First Nation groups were encouraged to review the Project File (Version 2), and to provide further comment/feedback.

The public comments received, following the second consultation efforts, and the feedback provided from agency groups, are included in **Appendix 'I'**. Upon receipt of comments, new information was incorporated into the review and assessment of a *Recommended Preferred Solution*, presented to Council on May 28<sup>th</sup>, 2019.

### 8.3 Agency Consultation

Agencies with a regulatory role that may require future permits/approvals, or may have a direct interest in the study, were contacted to invite feedback. The Schedule 'B' EA Project File was circulated to key agencies/groups on May 17, 2018 and was posted on the Municipality's website following the presentation to Council on January 22, 2019 to solicit agency comments and feedback. A circulation list, including a complete list of agencies and a summary of the project consultation efforts, is included in **Appendix 'A'**. Comments received were incorporated into the assessment of the *Recommended Preferred Solution* for consideration and acceptance by Council. Comments received during the consultation periods from agency groups are summarized in **Section 9.2** of this Report.

## 9. CONSULTATION: FEEDBACK

With the circulation of the *Notice of Project Initiation*, the *Notice of Project Update*, and associated project information, as well as the invitation to PIC No.1 and PIC No.2, the public, agency groups, and First Nations groups were encouraged to provide comments regarding the *Preliminary Recommended Solution(s)* initially considered. A summary of the Public Comments received (recorded sic erat scriptum) and feedback from agencies, First Nations and utility companies following the initial consultation (i.e. May 2018) and the presentation to Council on January 22, 2019 are included in **Appendix 'G'** and **Appendix 'I'**, respectively. Comments received are summarized in the following Sections.

### 9.1 Public Feedback: Summary and Discussion

#### 9.1.1 Initial Consultation (May2018)

A summary of the comments received following the Information Session completed for Bridge No.0011 on June 4, 2018 is provided in **Appendix 'G'**. A review of alternatives, based on the feedback/comments provided, was incorporated into the re-assessment of the *Preliminary Recommended Solution* presented to Council in January 2019. The seven (7) comments received from the public following the initial consultation in May 2018 were generally summarized as follows:

1. The majority of the respondents indicated that bridge replacement would be their preference, with a two-lane bridge generally being cited as the preferred option due to the steep approaches and visibility constraints. Further, it is noted that one of the respondents indicated that the Municipality should consider *'complete replacement with a new 2-lane bridge that would be up to proper (including looking at the challenge of the slope of the road) specifications OR to go with option D and close the bridge permanently'*.
2. Four of the respondents indicated that they have land parcels on each side of the Teeswater River. This bridge is used as the property connection and facilitates access to their land(s). While it is recognized that one person may own several different properties, which may be situated on each side of the river, review of available information indicates that only two Brockton properties have land on each side of the Teeswater River, of which one has workable fields on both sides (i.e. 352 Concession 20).
3. The primary concern was that Concession Road 20/2A is used as a linkage between Bruce Road 1 and Bruce Road 3. The respondents cited the following rationale for the need to maintain this connection:
  - a. Bruce Road 1 between Concession Road 20 and Paisley is treacherous in the winter due to poor visibility resulting from high winds.
  - b. Emergency vehicle usage and added travel time should the bridge be removed.



- c. Alternative routes are extensive.
- d. The Paisley Bridge will need to be replaced in the coming years. Without Bridge No.0011 and the Paisley Bridge crossing, the detour routes will be onerous.

In response to the winter road conditions along Bruce Road 1, between Concession 20 and Paisley, GMBP requested comment from the County. The County has indicated that it does not currently have any planned initiatives to address winter visibility on Bruce Road 1. The remainder of the comments were addressed within the updated Project Files (i.e. Version 2 and 3).

### 9.1.2 Follow-Up Consultation (January 2019)

A summary of the public comments received following the presentation to Council (i.e. PIC No.2) completed for Bridge No.0011 on January 22, 2019 is provided in **Appendix 'I'**. A review of alternatives, based on the feedback/comments provided, both immediately following the presentation and in writing, was incorporated into the re-assessment of the *Recommended Preferred Solution* presented to Council on May 28, 2019. The comments received from Council and the public in conjunction with PIC No.2 are summarized below.

1. Following the presentation to Council (i.e. PIC No.2), feedback provided can generally be summarized as follows:
  - a. Consideration for the installation of a culvert type structure was requested.
  - b. Within the presentation the land acquisition costs were estimated to be up to \$500K. GMBP indicated that while this estimate was intended to include the legal, administrative and purchasing costs, the actual costs associated with land acquisition were difficult to quantify as costs would be dependent upon the alternative selected and the desired level and scope of road approach improvements.
  - c. Daily traffic counts for the bridge were estimated to be  $\pm 150$  vehicles. It was suggested that this number may vary depending on the season. However, while GMBP acknowledges that the daily traffic may fluctuate depending on the day and/or season, the link along Concession Road 20/2A between Bruce Roads 1 and 3 is still considered to accommodate a low volume of traffic.
  - d. Consideration to closing the bridge to vehicular traffic and maintaining the structure for pedestrian use and scenic viewing was requested. This is presented as Alternative 5 in this updated Version 3 of the Project File.
2. Following PIC No.2, three public comments were received. These comments are summarized below:
  - a. One of the respondents re-iterated that the Municipality should consider *'complete replacement with a new 2-lane bridge that would be up to proper specifications as well as ensuring safe approaches from both directions OR to go with option D and close the bridge permanently with cul-de-sacs on both roads'*.
  - b. Two of the respondents indicated that bridge replacement is their preference, with one respondent suggesting that if the bridge was two lanes and had better approaches, it would likely be used more often and citing that *'closing another road access makes it more difficult for alternative routes and emergency access. This could potentially affect the safety of our communities'*. Emergency access and alternate routes are discussed in Section 6.2 and presented on **Figures 7, 8 and 9**.

This additional feedback was addressed within the updated Project File (i.e. Version 3).

## 9.2 Agency Comments

**TABLE 3A: Summary of Comments from Agencies**

Agency (Issue Date)	Overview of Comments	Response and/or Follow-up Requirements
<b>MECP (MOECC)</b> (May 28, 2018)	<ol style="list-style-type: none"> <li>1. Aboriginal Consultation Requirements identified for the Project.</li> <li>2. Source Water Protection (SWP) Review Requirements.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correspondence provided to First Nations on May 17, 2018 and January 8, 2019 (<b>Appendix 'A'</b>)</li> <li>2. Study area is not located within a SWP area. Consultation with SVCA Risk Management not required.</li> </ol>
<b>Bruce County</b> (June 18, 2018)	Response to correspondence from GMBP dated June 11, 2018 regarding the County's intentions to address concerns regarding poor winter visibility on Bruce Road 1, north of Concession Road 20.	The County does not have any planned initiatives to address winter visibility on Bruce Road 1 between Concession 20 and the west limits of Paisley.
<b>Bruce County</b> (Nov 21, 2018)	Response to letter from the Municipality regarding the proposed exchange of jurisdiction of the Bridge 11, Concession 2A Elderslie Road and Concession 20 Greenock, for Bruce County Road 1.	<ol style="list-style-type: none"> <li>1. The Bruce County Transportation and Environment Services Committee did not support the proposed exchange.</li> <li>2. The County considers it reasonable to request that the bridge and road section be brought up to County standards and to a very good condition before accepting responsibility.</li> <li>3. A decision to exchange a road or bridge jurisdiction should be part of a larger assessment that would consider other roads and bridges that could benefit from an exchange in jurisdiction.</li> </ol>
<b>Historic Saugeen Metis (HSM)</b> (May 18, 2018)	HSM comments provided regarding their review of the information available.	Following a review of the information provided on the Municipality's website, the HSM have indicated that they have ' <i>no objection or opposition to the proposed development, land re-designation, rezoning, land severance, Official Plan and/or Zoning By-Law amendments</i> '.
<b>Ministry of Tourism, Culture and Sport (MTCS)</b> (December 2018)	Request for a status update of the environmental assessment process for Brockton Bridge No.0011.	Project status updated provided by GMBP in email correspondence dated December 17, 2018.
<b>MTCS</b> (February 2018)	The MTCS requested that the Municipality provide confirmation that the Brockton Municipal Heritage Committee reviewed the CHER/HIA for Bridge No.0011 and the Project File and that the Committee provide comment on the findings of the subject reports.	The EA Report, the CHER/HIA and a copy of the presentation to Council was issued to the Brockton Municipal Heritage Committee. A summary of the findings and a Request for Review and Comment was also provided. The committee provided review confirmation and comment in early April. This was subsequently forwarded to the MTCS.

Agency (Issue Date)	Overview of Comments	Response and/or Follow-up Requirements
<b>MTCS</b> (April 2018)	Following discussions with the MTCS, comments pertaining to the CHER/HIA were provided to GMBP in April 15, 2019 email correspondence.  On May 8, 2019 the MTCS confirmed that they have no further comment.	An Addendum to the CHER/HIA and a Heritage Impact Assessment was issued to the MTCS on May 1, 2019 to address the outstanding comments/issues. The Addendum is to form part of the CHER/HIA and is included in <b>Appendix 'D'</b> of this Project File.
<b>First Nations Groups</b>	<i>With the exception of the HSM, no comments received.</i>	
<b>SVCA</b>	SVCA consultation was completed in conjunction with the Environmental Impact Study (EIS) completed by Aboud. This report is provided in <b>Appendix 'C'</b> .	SVCA comments are discussed in <b>Section 6.3.2</b> of this Project File.
<b>Ministry of Natural Resources and Forestry</b> (January 2019)	MNRF identified a number of Species at Risk concerns in the area. Following a review of the Scoped EIS completed by Aboud, the MNRF confirmed that there are no additional SAR concerns, beyond those outlined in the EIS.	Scoped EIS report was sent directly to MNRF outlining the SAR information/assessment included in the report.

Note: Notification correspondence is included in **Appendix 'A'** and Consultation correspondence is provided in **Appendix 'G'** and **Appendix 'I'**.

## 9.3 Utility Comments

**Table 3B: Summary of Comments from Utilities**

Provider (Issue Date)	Overview of Comments	Response / Follow-up Requirements
<b>Union Gas</b> (May 17, 2018)	Union Gas does not have any infrastructure in the area. Union gas can be removed from the project distribution list going forward.	Noted

## 10. RE-ASSESSMENT OF ALTERNATIVES

### 10.1 Impact Assessment

As previously discussed, the EA for Bridge No. 0011 is being completed to assess the various alternatives for this bridge crossing. Since a 'Do Nothing' approach would result in closing the bridge in the near term and would lead to a catastrophic failure, which is considered inappropriate, consideration and a decision for action will be necessary moving forward. Therefore, the alternatives carried forward into this re-assessment include bridge rehabilitation, bridge removal, the four different bridge replacement options (which include consideration for road approach improvements) and bridge retention/adaptation.

The process toward the selection of a *Recommended Preferred Solution* involves the following:

- i) Identification of the impacts and mitigating measures of an alternative solution on each environment;
- ii) An assessment of the degree of impact each alternative would have on each environment; and
- iii) An evaluation based on comparative analysis of the alternative which best addresses the *Project Statement*.

The following summarizes the impacts and re-assessment of each of the alternative solutions presented in this updated Project File (i.e. Version 3) on each of the environments by providing a relative ranking of the alternatives. The first step of the process includes an assessment of the four bridge replacement options being considered, with the most 'favoured' option being carried forward into the assessment of alternatives. The evaluation and assessment of the bridge replacement options is provided in **Table 4A**.

The recommended bridge replacement option, to replace the existing structure with a single span, two-lane bridge either at the existing grade or at a raised elevation (i.e. Bridge Replacement Options B and C), was carried forward into the assessment of alternatives presented in **Table 4B**. Impact assessments for each alternative was provided by a relative ranking of the four (4) alternatives including bridge rehabilitation, replacement, removal and retention/adaptation numbered between 1 and 4, with 1 being the least favoured and 4 being the most favoured in each case. Ultimately, the alternative with the highest total ranking would be considered as the *Recommended Preferred Solution*.

## 10.2 Assessment of Alternatives: Considerations

**Tables 4A and 4B** present a summary of the assessment of alternative solutions for the bridge replacement options and the four bridge alternatives carried forward. The following was considered in the assessment of alternatives:

### 1. Technical Environment:

The technical environment considers road and bridge design parameters, floodplain impact, constructability, and sustainability. Road profile improvements are considered as part of the assessment.

### 2. Social Environment:

Considerations of the social environment intend to capture the impact project alternatives would have on the community. The social environment may include such uses as local traffic, commuter traffic, cyclists, pedestrians, and recreational users. It is typically considered that maintaining a bridge in this location for a greater number of uses is generally more favourable from a social environment perspective.

### 3. Natural Environment:

Table 4 in the Environmental Impact Study (EIS) completed by Aboud provided a comparison and rating of impacts to natural heritage for each alternative. The rating provided in the EIS informed the Natural Environment ranking provided in **Table 4A and Table 4B**.

### 4. Cultural Environment:

- i. The Stage 2 Archaeological Assessment concluded there are no archaeological resources within the Study Area that would be impacted by any project alternative.
- ii. The Cultural Heritage Evaluation Report (CHER) concluded that the bridge retains cultural heritage value. Based on the Heritage Impact Assessment provided as part of the CHER, impacts to the Cultural Heritage environment would become greater as alterations to the existing bridge become more pronounced, with the alternative under consideration.

#### 5. Economic Environment:

The economic environment considers the relative construction costs and longer-term operating and maintenance costs. The evaluation of the economic impact may be influenced by the potential funding that may be available to support the bridge replacement alternatives.

### 10.3 Recommended Preferred Solution

The existing single lane bridge and the road approaches to the bridge do not meet the Ontario Provincial Standards for Road and Public Works, the Canadian Highway Bridge Design Code (CHBDC), nor the County or municipal standards. The previously proposed maintenance of a single lane structure and the steep approaches would perpetuate the inadequacy of the existing road and bridge and would continue to place the Municipality in a position of liability. Therefore, for mainly technical and social reasons (i.e. liability), repairing or replacing the bridge with a similar single-lane structure, and maintaining the steep approaches, is not recommended. Further, public comments received generally indicated that, given the location of Bridge No.11 between two steep approaches and the visibility constraints, a 2-lane structure would be preferred. During the initial consultation period one resident further suggested *'either complete the replacement with a new 2-lane bridge that would be up to proper (including looking at the challenge of the slope of the road) specifications or close the bridge permanently'*.

Based on the results of the relative ranking presented in **Table 4B**, Alternative 4, to Remove the Existing Bridge, has been identified as the *Recommended Preferred Solution* for consideration and acceptance (or otherwise) by Council. As Brockton Bridge No.0011 is considered to have Cultural Heritage value, and it is anticipated that costs associated with the 'alterations' (i.e. bridge removal) will be less than \$2.4 million, the removal of the structure is considered to be a Schedule 'B' activity under the Municipal Class Environmental Assessment Roads Project Schedule No.30.

As an alternative, with the direction of Council as the Road Authority, a road profile based on a reduced design speed of 50 km/hr could be considered in greater detail, which would include the following:

- i. Additional topographic survey to include/identify lands that would be affected by the cut/fill.
- ii. Determination of a road profile which would balance cut/fill volumes.
- iii. In consultation with the SVCA, assessment of impacts to the floodplain due to infilling.
- iv. Additional Archaeological assessment.
- v. Additional EIS assessment.
- vi. Completion of Phases 3 and 4 if the EA process including review of alternative designs, additional consultation, and preparation of an Environmental Study Report (ESR).

### 11. NEXT STEPS

Upon acceptance by Council of the *Preferred Solution* (or otherwise), the Project File will be finalized, and a *Notice of Completion* will be advertised, advising participants of the outcome to the Schedule 'B' EA Process. Subsequently, the next steps in the process are summarized as follows:

- i) A 30 calendar day public review period will follow the *Notice of Completion* date of issue to permit opportunity for any participant to request the Minister to enact Part II of the Act (Part II Order), which would require additional study to verify the project direction.
- ii) If a Part II Order request is not made during the 30-day public review period, the *Preferred Solution* to the Schedule 'B' EA process may proceed to implementation (i.e. Phase 5 of the EA process as outlined in **Figure 2**).



TABLE 4A: BRIDGE REPLACEMENT  
COMPARISON AND EVALUATION OF REPLACEMENT OPTIONS  
BRIDGE NO.0011, FORMER TOWNSHIP OF GREENOCK

COMPARISON AND EVALUATION OF REPLACEMENT OPTIONS  
BRIDGE NO.0011, FORMER TOWNSHIP OF GREENOCK

ALTERNATIVE 3: BRIDGE REPLACEMENT

		OPTION A	OPTION B	OPTION C	OPTION D		
Bridge Span # of Lanes Elevation Design Speed		Single Span Single Lane Same as Existing <50 km/hr (Sub-standard)	Single Span Two Lane Same as Existing 50 km/hr	Single Span Two Lane Raised to ±231 masl 50 km/hr	Multiple Span Two Lane Raised to ±231 masl 50 km/hr		
CRITERIA							
ENVIRONMENT	SOCIAL	Impacts to Traffic Patterns	Would maintain continued use of the bridge. Some impacts to traffic movement would be expected during construction periods only. However, overall traffic movement would remain similar to existing conditions.		Would maintain continued use of the bridge, with minimal disruption to the local vehicular traffic along this low volume road. Some impacts to traffic movement would be expected during construction periods only. However, a two lane structure would improve the overall traffic movement.		
		Construction Impacts	Temporary nuisances due to construction with long duration expected. In the long-term, reduced nuisances as maintenance and future repairs are reduced.				
		Impacts to Local Communities and Businesses	Ease of access to adjacent and nearby properties would be maintained.	Ease of access to adjacent and nearby properties would be maintained and improved.			
		Municipal/County Transportation Network	One of the Guiding Principles for the County of Bruce Bridge Infrastructure Master Plan was to rehabilitate Bridge No.0011 and maintain this river crossing location. Based on a cost analysis, bridge replacement was not considered. In consideration of the use of this road as an east-west connecting link between County Roads 1 and 3, the Municipality consulted with the County regarding the exchange of jurisdiction involving Concession Road 20/2A (including Bridge No.11). The County did not wish to pursue such an exchange, primarily due to the low traffic volumes and the costs to bring the road and bridge to a County standard.				
		Accessibility	Would possibly remain inaccessible to emergency and large agricultural vehicles.	Could be designed to include for use by emergency and large agricultural vehicles.			
		Traffic Safety	Would not meet the Design Standards, visibility across the single lane bridge may still be an issue.	Would address the noted road approach deficiencies. Existing visibility constraints would not be an issue with a two-lane structure.			
		OVERALL	Not Favoured	Favoured			
	NATURAL	Flood Elevation	The existing bridge deck elevation is at an elevation of between 228.1 and 228.5 m. Alternatives that consider the placement of the bridge deck at an elevation below 230m will experience flooding during the Regional and 100-year flood events. Would require additional Study.		Any planned encroachment into the floodplain should be reviewed for potential backwater effects.	A multispan bridge with no infilling within the floodplain would have limited encroachment on the Teeswater River.	
		Aquatic habitat and Fish Passage (Table 4: EIS)	Provided that bridge replacement remains in-situ, no impact to river flow, channel processes or fish movement potential are anticipated.	Provided that bridge replacement remains in-situ, minimal impact to river flow, channel processes or fish movement potential are anticipated.	Encroachment into the river by infilling would result in a permanent alteration of fish habitat and river flow.	The placement of a pier(s) to support a multispan bridge would result in a permanent alteration to fish habitat and river flow.	
		Impacts of natural heritage (EIS: Table 4) (i.e. vegetation, SAR, wildlife habitat, etc.)	The level of impacts to the natural heritage is generally proportional to the area effected. Maintaining a single lane bridge and road would have less of an impact than the provision for a two lane road/bridge.	The level of impacts to the natural heritage is generally proportional to the area effected. In consideration of the recommended road approach improvements that would be required to meet the Standards/Design Code, two-lane bridge replacement alternatives would have the most significant impact to the natural heritage features. The magnitude of impacts would be determined during the detailed design phase.			
		OVERALL	Neutral (Favoured)		Not Favoured		
		CULTURAL	Archaeological Potential	Study area does not retain archaeological resources. Additional archaeological assessment would be required to include the area affected by road approach improvements.			
	Cultural Heritage		Bridge replacement with a sympathetically designed structure could be considered.			More challenging to address Cultural Heritage.	
	OVERALL		Favoured			Not Favoured	
	TECHNICAL	Construction Efforts and Maintenance	Construction would be substantially longer relative to bridge rehabilitation, however, bridge rehabilitation would result in more frequent periodic bridge closures. Overall, bridge replacement would provide a long-term solution to the issues noted.				
		Constructability	Would require significant earth works on east and west approaches to achieve geometric design standards.		Would decrease the amount of earth works required for east and west approaches, however significant infilling would also be required to raise the bridge elevation. A cut/fill balance approach could be applied.	Raising the bridge elevation without infilling within the floodplain would require significant earth works on east and west approaches to achieve geometric design standards.	
		Construction Methods	Modern construction methods could be used which would allow for more contractors to be qualified to complete the work.			Complexity of bridge construction increases with bridge length.	
		Design Standards	Would not achieve design standard. Provision for single-lane bridges is only permitted on very low-volume roadways and is not typically recommended.	With direction from the Road Authority, road approaches could be designed to Standards/Design Code for 50 km/hr, without a load posting, and could address road approach deficiencies. This would achieve a less than desirable design standard (i.e. 80 km/hr is preferable).			
		Utilities	No impacts to utilities.				
		MCEA Process/Schedule	Project costs would likely exceed 2.4 Million and would trigger a Schedule 'C' EA Process.			Bridge replacement costs (multi-span) would likely exceed 4M and would trigger a Schedule 'C' EA Process.	
		OVERALL			Favoured	Not Favoured	
		ECONOMIC	Capital Costs (Bridge and Road Construction)	Least costly bridge alternative estimated to be in the range of 1.0 M. The costs to improve the road approaches (i.e. steep slopes) would be considerable due to removal of surplus material.	Cost to replace the bridge with a two-lane single span bridge would only be marginally greater than replacement with a one-lane bridge of similar geometry (estimated to be \$1.07M). The costs to improve the road approaches would be considerable due to removal of surplus material.	Cost to replace the bridge with a two-lane single span bridge would only be marginally greater than replacement with a one-lane bridge of similar geometry (estimated to be \$1.07M). The costs to improve the road approaches would be considerable due to anticipated significant volume of fill to import.	Bridge construction costs would be most significant, estimated to be greater than \$4M.
	Funding		All bridge replacement options would likely require significant funding to proceed.				
	Maintenance and Operating Costs		Reduction in the long-term bridge maintenance costs to the Municipality.			A larger bridge would incur greater operations and maintenance costs.	
	Structure Longevity		Is assumed to have a service life of 75 years.				
	OVERALL		Neutral				
Overall Ranking			Favoured Bridge Replacement Options*				

\* Based on the preliminary assessment of bridge replacement options, a two-lane single-span structure, at or above the existing grade (i.e. at an elevation that would balance cut and fill volumes), is the preliminary favoured bridge replacement option. This bridge replacement option is carried into the overall assessment of alternatives for Bridge No. 11, presented in **Table 4B**.

TABLE 4B: COMPARISON AND EVALUATION OF ALTERNATIVE SOLUTIONS  
BRIDGE NO.0011, FORMER TOWNSHIP OF GREENOCK

		ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5
ALTERNATIVE DESCRIPTION CRITERIA		Bridge Rehabilitation	Bridge Replacement 2-Lane Bridge (refer to Table 4A)	Bridge Removal	Bridge Retention & Adaptation
SOCIAL	Impacts to Traffic Patterns	Would maintain continued use of the bridge, with minimal disruption to the local vehicular traffic along this low volume road. Some impacts to traffic movement would be expected during construction periods only. However, overall traffic movement will not be affected.	Would maintain continued use of the bridge, with minimal disruption to the local vehicular traffic along this low volume road. Some impacts to traffic movement would be expected during construction periods only. However, a two lane structure would improve traffic movements overall.	Bridge supports east-west traffic movements between Bruce Road 1 and Bruce Road 3, and supports a low volume of traffic. As a result, bridge removal would impact traffic movements for local residents.	Bridge supports east-west traffic movements between Bruce Road 1 and Bruce Road 3, and supports a low volume of traffic. Therefore, the use of the bridge solely for non-vehicular purposes would impact traffic movements for local residents.
	Construction Impacts	Temporary nuisances due to construction and on-going maintenance and small repairs to maintain structure.	Temporary nuisances due to construction with long duration expected. In the long-term, reduced nuisances as maintenance and future repairs are reduced.	Temporary nuisance during bridge removal and construction of turn-around areas and barriers.	Temporary nuisance during minor bridge upgrades, such as railings, and construction of turn-around areas and barriers.
	Impacts to Local Communities and Businesses	Compared to existing conditions, no impacts to adjacent and nearby properties.	Ease of access to adjacent and nearby properties would be maintained and improved.	Travel to adjacent and nearby properties would take longer than under existing conditions.	Travel to adjacent and nearby properties would take longer than under existing conditions.
	Municipal/County Transportation Network	One of the Guiding Principles for the County of Bruce Bridge Infrastructure Master Plan was to rehabilitate (i.e. maintain) Bridge No.11. Bridge rehabilitation is consistent with the recommendations of the Master Plan.	One of the Guiding Principles for the County of Bruce Bridge Infrastructure Master Plan was to maintain the river crossing. Bridge replacement would maintain the crossing. However, this local east-west connecting gravel road along Concession Road 20/2A, between Bruce Roads 1 and 3, is not considered to be part of the regional road network.	One of the Guiding Principles for the County of Bruce Bridge Infrastructure Master Plan was to rehabilitate (i.e. maintain) Bridge No.11. The removal of this bridge was not considered an Option in the Master Plan. Although not quantified, removal would not likely have a significant impact on the regional transportation network (based on the low traffic volumes).	One of the Guiding Principles for the County of Bruce Bridge Infrastructure Master Plan was to rehabilitate (i.e. maintain) Bridge No.11. The adaptation of this structure was not considered an Option in the Master Plan. Although not quantified, adapting this bridge for non-vehicular uses would not likely have a significant impact on the regional transportation network (based on the low traffic volumes).
	Emergency Vehicle Access	Will likely remain inaccessible to emergency vehicles.	Would permit use by emergency vehicles.	Will remain inaccessible to emergency vehicles, although alternate routes are available.	Will remain inaccessible to emergency vehicles, although alternate routes are available.
	Traffic Safety	Would not address the noted road approach deficiencies. Existing visibility constraints would continue to be an issue.	Would address the noted road approach deficiencies. Existing visibility constraints would not be an issue with a two-lane structure.	Removal of the substandard bridge design and road approaches would address traffic safety concerns noted.	Preventing vehicular access to the bridge would address traffic safety concerns noted. However, efforts to prevent vehicular traffic from using the bridge are often compromised (i.e. barriers are moved).
	Non-Vehicular Uses (i.e. walking, cycling, scenic views)	Bridge rehabilitation would maintain the one-lane bridge for both vehicular and non-vehicular movements. However, safety would remain an issue.	Improved visibility and consideration for a separate walkway would improve public safety.	Cyclists and pedestrians would be required to use the alternate routes. Scenic viewing would be limited to the river banks.	The adaptation of the bridge for pedestrians/cyclists would provide for a potentially shorter alternate route and would improve public safety.
	OVERALL	1	4	2.5	2.5
	Flood Elevation	The existing bridge deck elevation is between 228.1 and 228.5 m. Maintaining the bridge deck at an elevation below 230 m continues to subject the bridge to flooding during the Regional and 100-year flood events.	Alternatives that consider the placement of the bridge deck below 230masl will experience flooding during the Regional and 100-year flood events. Further, any encroachment into the floodplain should be reviewed for backwater effects. Would require additional Study.	Potential for river encroachment would be eliminated.	The existing bridge deck elevation is between 228.1 and 228.5 m. Maintaining the bridge deck at an elevation below 230 m continues to subject the bridge to flooding during the Regional and 100-year flood events.
NATURAL	Aquatic habitat and Fish Passage (Table 4: EIS)	Provided that the bridge remains in-situ, minimal impact to river flow, channel processes or fish movement potential are anticipated.	Encroachment into the river by infilling would result in a permanent alteration of fish habitat and river flow.	Bridge removal will eliminate the potential for impacts to river flow, channel processes or fish movement.	Provided that the bridge remains in-situ, minimal impact to river flow, channel processes or fish movement potential are anticipated.
	Impacts of natural heritage (EIS: Table 4) (i.e. vegetation, SAR, wildlife habitat, etc.)	It is unlikely that the bridge rehabilitation will have any significant long-term negative impacts to natural heritage features identified within and adjacent to the proposed bridge location.	As the level of impacts to the natural heritage is generally proportional to the area effected, bridge replacement alternatives that include for road approach improvements will have the greatest impact.	Bridge removal will not have any significant long-term negative impacts to natural heritage features identified within and adjacent to the proposed bridge location. River banks could be re-naturalized.	It is unlikely that the bridge retention/adaptation will have any significant long-term negative impacts to natural heritage features identified within and adjacent to the proposed bridge location.
	OVERALL	2.5	1	4	2.5
	Archaeological Potential	Study area does not retain archaeological resources.	Additional archaeological assessment would be required to include the area affected by road approach improvements.	Study area does not retain archaeological resources.	Study area does not retain archaeological resources.
CULTURAL	Cultural Heritage	According to the Conservation Options, retaining the bridge and restoring the missing/deteriorated elements is preferred.	Bridge removal/replacement would have the most significant impact on the Cultural Heritage value of the bridge. However, replacement with a sympathetically designed structure could be considered.	Bridge removal/replacement would have the most significant impact on the Cultural Heritage value of the bridge. Mitigation measures such as the placement of a commemorative plaque could be considered.	According to the Conservation Options, retaining the bridge adapted for pedestrian walkways, cycling, scenic viewing etc. would have less of an impact on the cultural heritage features than bridge removal/replacement.
	OVERALL	4	1	2	3
TECHNICAL	Construction Efforts and Maintenance	Would provide a short-term solution to the structural issues noted. Ongoing bridge monitoring and restoration efforts would be required. Would require replacement in the mid-term.	Construction would be substantially longer relative to bridge rehabilitation, however, bridge rehabilitation would result in more frequent periodic bridge closures. Overall, bridge replacement would provide a long-term solution to the issues noted.	Limited construction efforts and no long-term maintenance.	Minor upgrades, such as railings, would be required. Ongoing bridge inspection, monitoring and rehabilitation efforts would be required. Would require replacement or removal in the mid-term.
	Constructability	Does not address road approach deficiencies, therefore works limited to the bridge.	Road approach deficiencies, to the east and west of the bridge, would require significant earth works (i.e. cutting and infilling) to achieve geometric design standards.	Turn-around locations would need to be reviewed in terms of visibility and crests. May require approvals from the SVCA.	Turn-around locations would need to be reviewed in terms of visibility and crests. May require approvals from the SVCA.
	Construction Methods	In depth repairs may be necessary that involve unique and difficult construction practices. Eventually, some repairs may not be economically viable due to age and design of original structure.	Modern construction methods could be used which would allow for more contractors to be qualified to complete the work. Significant construction would be required to address the road approach deficiencies.	Bridge removal effort would be simple relative to rehabilitation and replacements options. Cul-de-sacs would be considered and would include for limited road works improvements.	Bridge upgrades would be simple relative to rehabilitation and replacements options. Cul-de-sacs would be considered and would include for limited road works improvements.
	Design Standards/Geometry	Road approach deficiencies would be maintained (i.e. steep slopes). Existing 30 km/hr speed limit would be maintained, and load postings would likely remain in place and be further reduced over time.	With direction from the Road Authority, road approaches could be designed to a reduced Standard/Design Code for 50 km/hr, without a load posting. This would achieve a less than desirable design standard (i.e. 80 km/hr is preferable).	The need to complete road improvements to meet the design standards would be eliminated.	The need to complete road improvements to meet the design standards would be eliminated.
	Utilities	No impacts to utilities.			
	MCEA Process/Schedule	Rehabilitation may potentially proceed under a Schedule 'A' MCEA process, subject to the Heritage Impact Assessment.	Project costs would likely exceed 2.4 Million and would trigger a Schedule 'C' EA Process, which includes a detailed review of design alternatives.	Removal would likely proceed under a Schedule 'B' EA Process.	Retention and adaptation would likely proceed under a Schedule 'B' EA Process.
	OVERALL	1	2	4	3
	Capital Costs (Bridge Construction)	Costs to rehabilitate the bridge in the short-term will be less. On-going costs will vary, and will be based on the level of rehabilitation and level of difficulty to complete various repairs. Regular capital investments into bridge repairs would be required every 10 to 20 years. Would require replacement in the mid-term.	Cost to replace the bridge with a two-lane single span bridge is estimated to be in the range of \$1.07M. The costs to improve the road approaches would be considerable due to the cutting and filling requirements. Additional study would be required.	Overall the least costly alternative	Cost associated with adapting the structure to accommodate non-vehicular uses are estimated to be similar to (or potentially less than) bridge removal costs.
ECONOMIC	Funding	Would not likely receive Provincial funding.	All bridge replacement options would likely require significant funding to proceed.	Would not be dependent on Provincial funding	Would not be dependent on Provincial funding
	Maintenance and Operating Costs	Would require the expenditure of smaller, more frequent amounts. Bridge replacement costs would eventually need to be considered.	Reduction in bridge maintenance costs to the Municipality.	Reduced maintenance costs would be realized as the structure would no longer need to be maintained or inspected.	Bridge inspection, monitoring and maintenance costs would be incurred. Bridge replacement or removal costs would eventually need to be considered.
	Structure Longevity	Rehabilitation would extend the useful life cycle of the structure by 10 to 20 years after which major repairs or replacement of the abutments would likely be required. Rehabilitation of the existing structure would delay the construction of a new structure.	Is assumed to have a service life of 75 years.	No longer a structure that the Municipality has to maintain.	Adaptation would extend the life cycle of the structure. Retaining the bridge would defer the decision to replace, remove or rehabilitate the structure to a later date. This would be subject to another EA Process.
	OVERALL	1	2	4	3
Overall Ranking		9.5	10	16.5	14

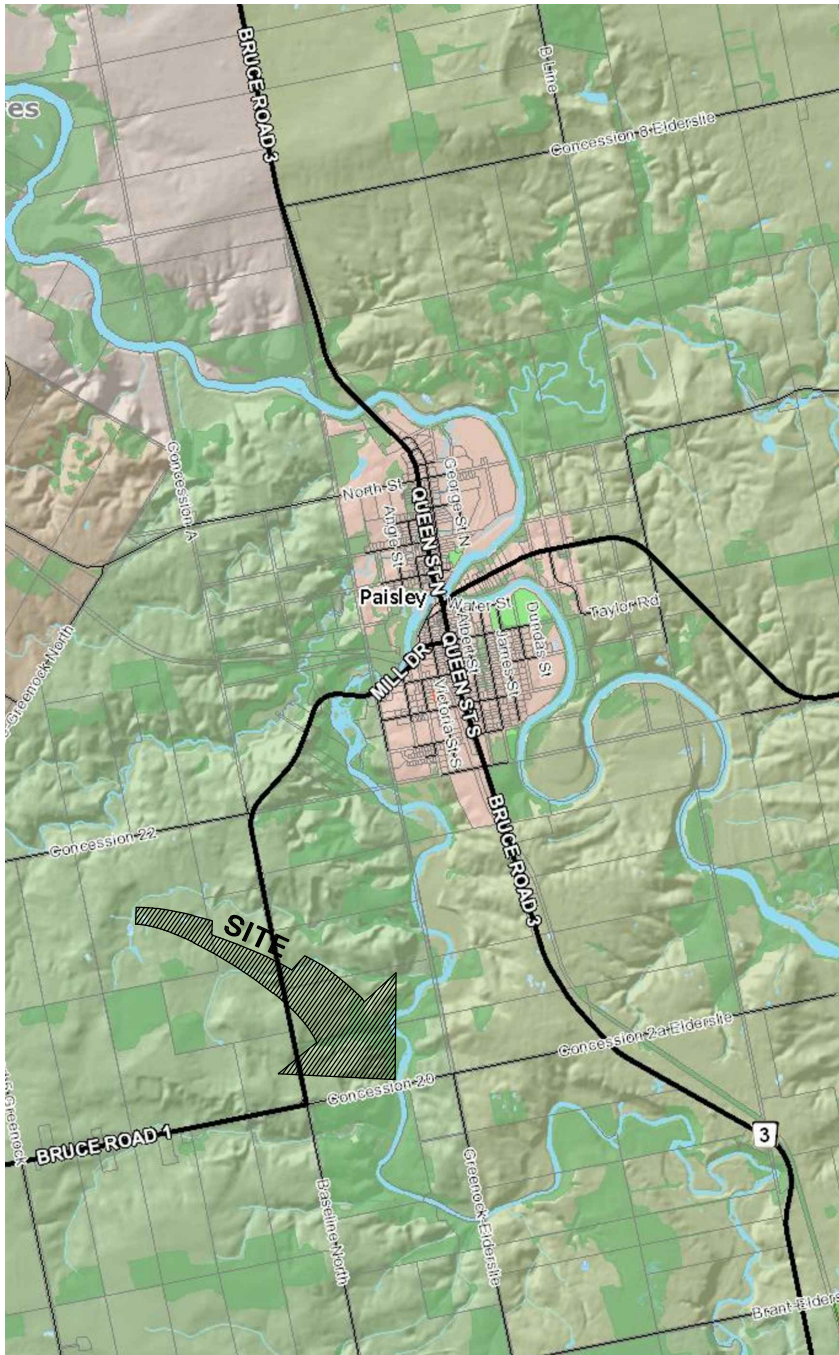
Based on the preliminary assessment of bridge replacement options, presented in **Table 4A**, a two-lane single-span structure, at an elevation that would balance cut and fill volumes and maintain the existing bridge span, is the favoured bridge replacement option.



- DRAFT (FOR REVIEW BY COUNCIL) -

**FIGURES:**

212328  
Greenock Bridge No. 0011  
Schedule B EA  
- DRAFT (FOR REVIEW BY COUNCIL) -



SCALE - N.T.S.  
OCTOBER 2017

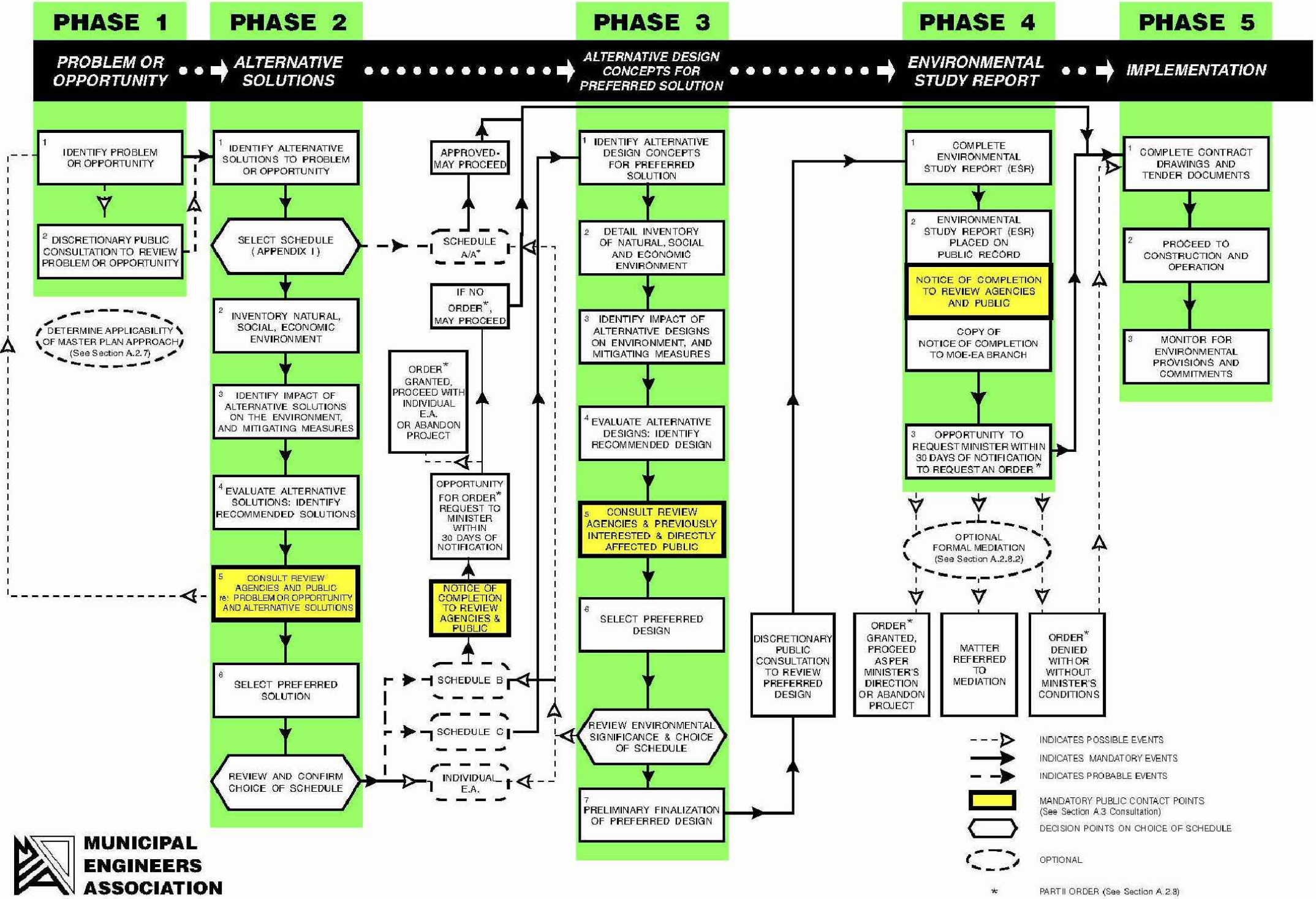
## SITE LOCATION MAP

Lot 46/47, Concession A  
Former Township of Greenock  
Municipality of Brockton

Figure No. 1

EXHIBIT A.2 MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



SCALE - N.T.S.  
OCTOBER 2017

EA PROCESS

Lot 46/47, Concession A  
Former Township of Greenock  
Municipality of Brockton

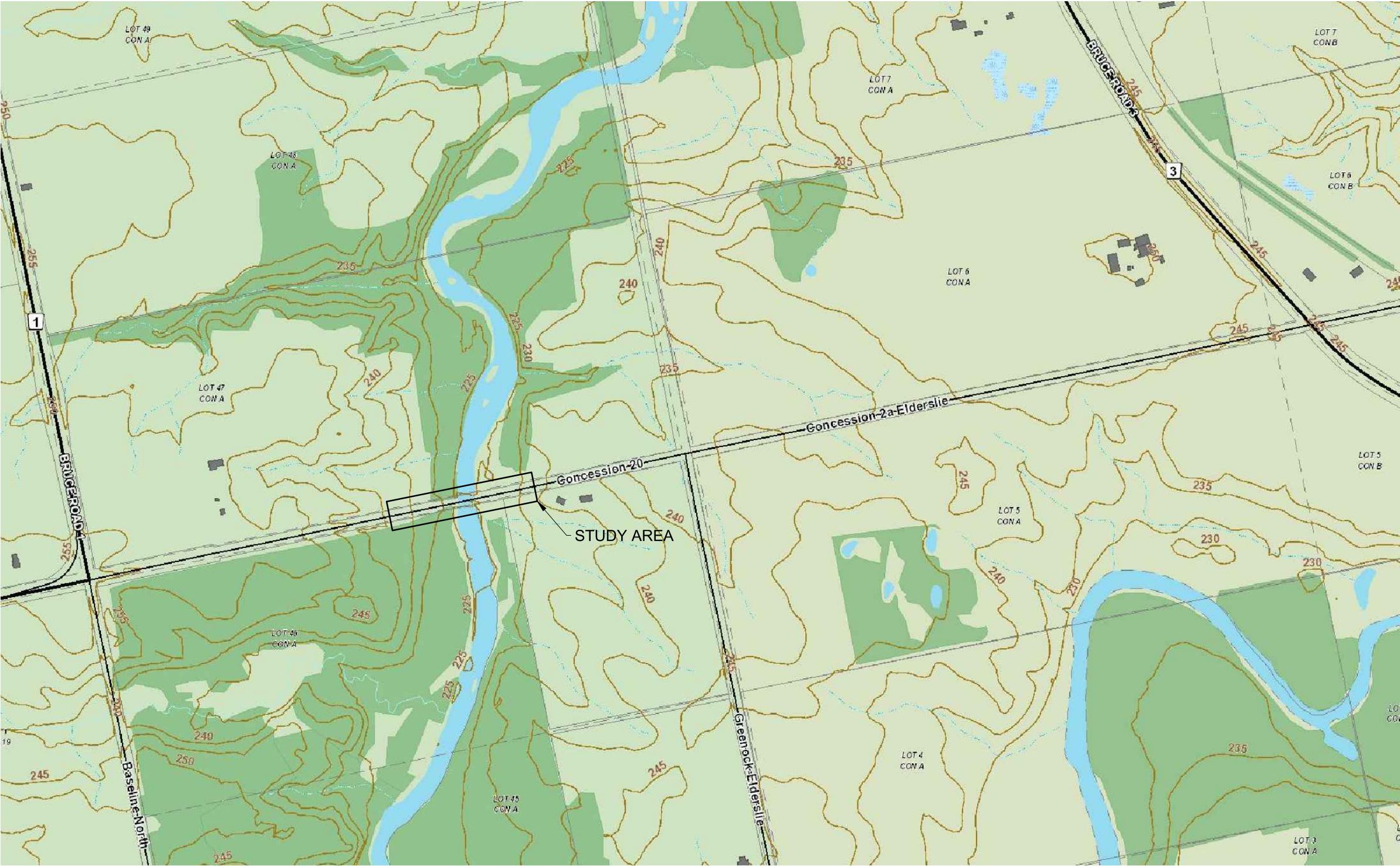
Figure No. 2





- DRAFT (FOR REVIEW BY COUNCIL) -

212328  
Greenock Bridge No. 0011  
Schedule B EA



SCALE - 1:7,500  
OCTOBER 2017

**SITE PLAN**

Lot 46/47, Concession A  
Former Township of Greenock  
Municipality of Brockton

Figure No. 3



- DRAFT (FOR REVIEW BY COUNCIL) -

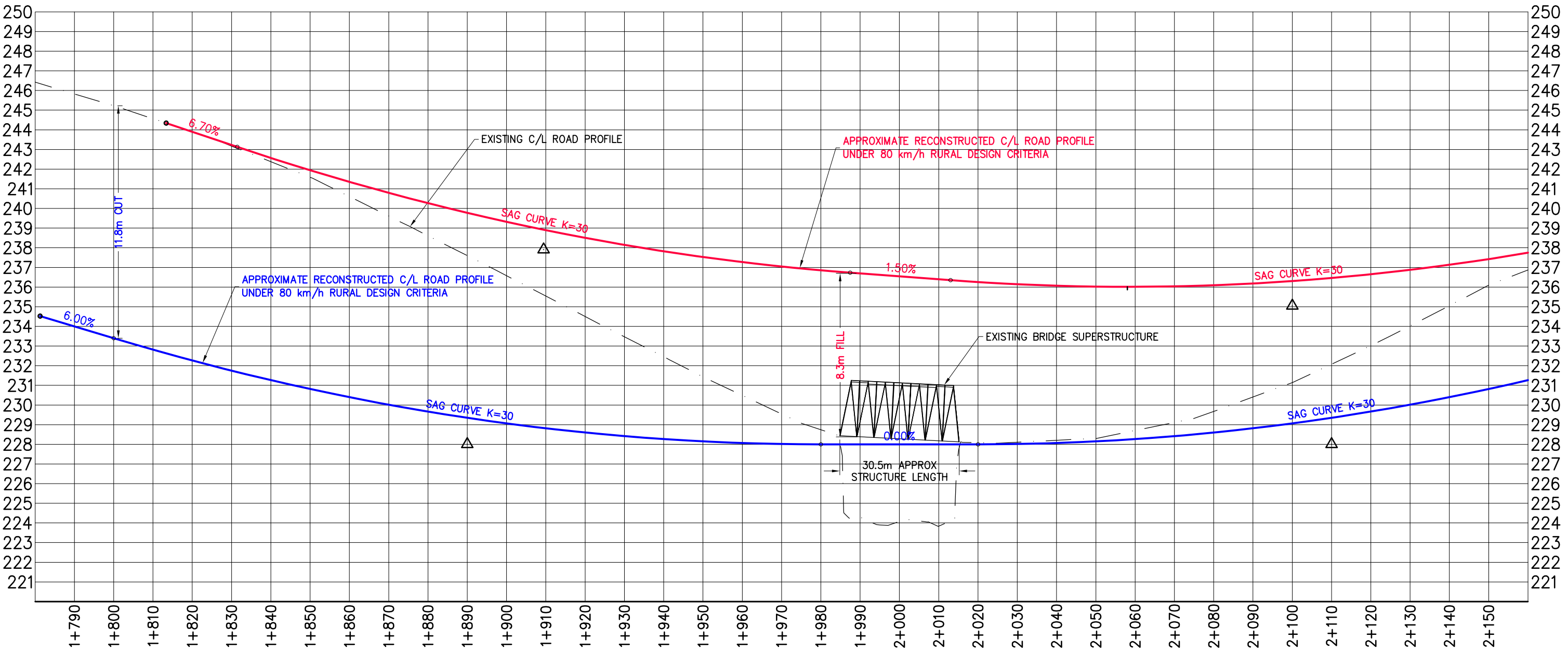


FIGURE 4  
CONCEPTUAL ROAD PROFILES - 80 km/h DESIGN SPEED

SCALE = 1:1,000 HOR  
1:200 VERT



- DRAFT (FOR REVIEW BY COUNCIL) -

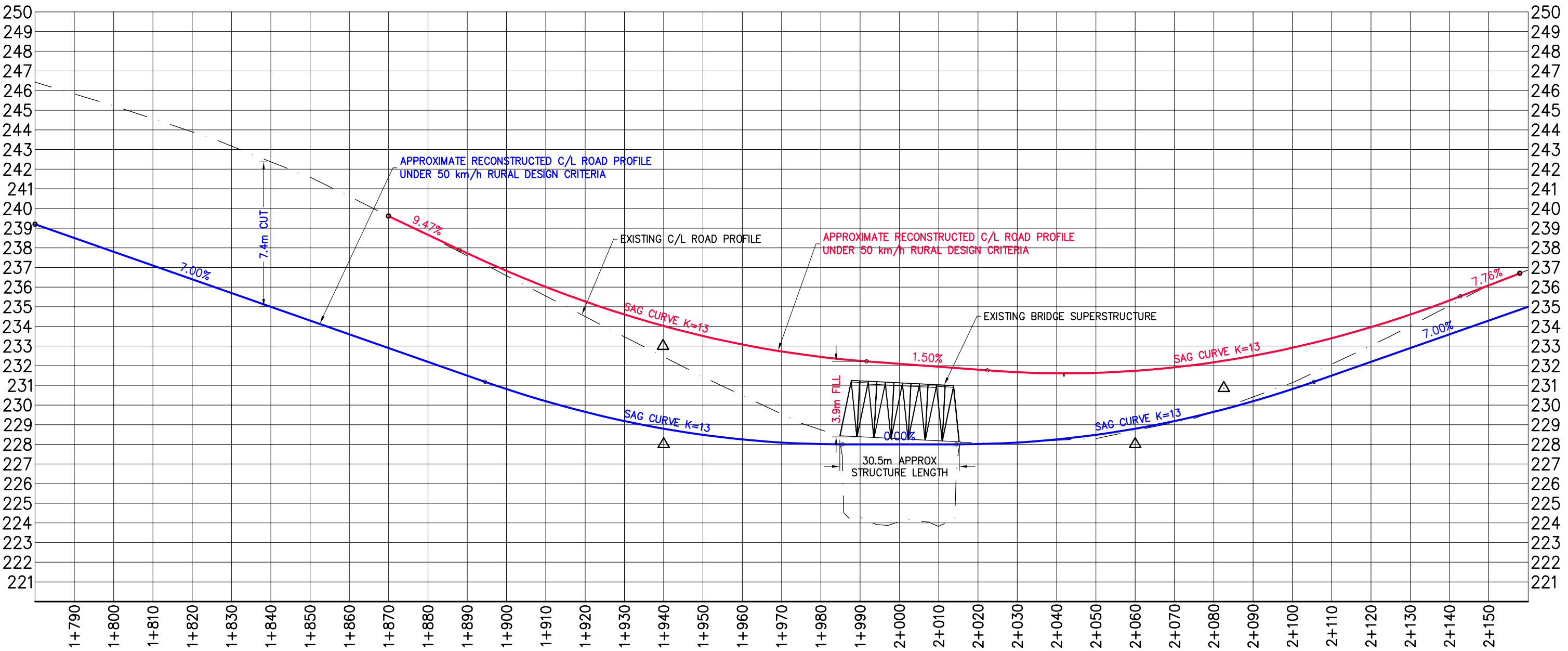


FIGURE 5  
CONCEPTUAL ROAD PROFILES - 50 km/h DESIGN SPEED

SCALE = 1:1,000 HOR  
1:200 VERT

- DRAFT (FOR REVIEW BY COUNCIL) -

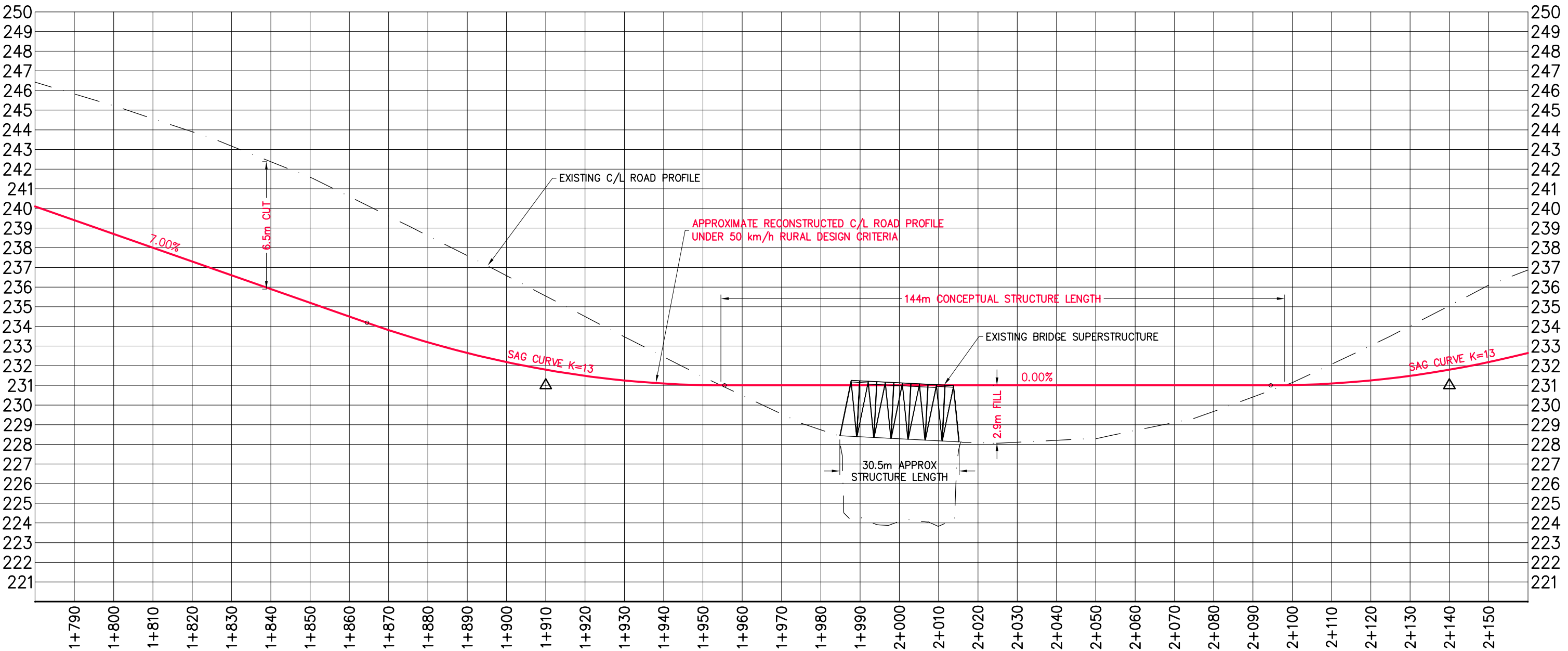


FIGURE 6  
CONCEPTUAL ROAD PROFILE - 50 km/h DESIGN SPEED

SCALE = 1:1,000 HOR  
1:200 VERT



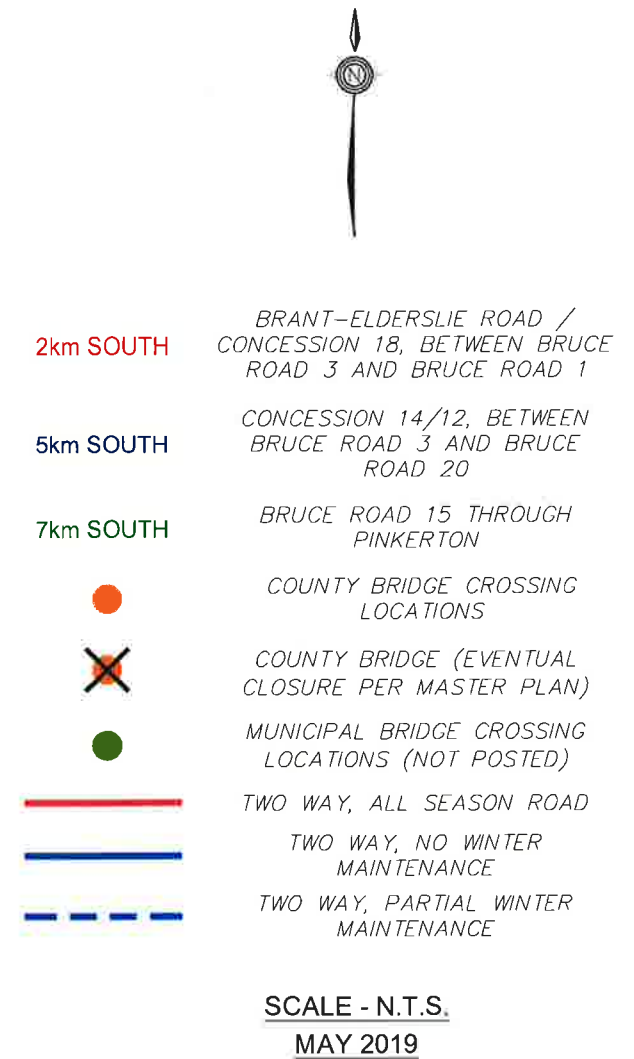
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## LAND USE, IMPACTED PROPERTIES AND ALTERNATE ROUTES

Figure No. 7





Lot 46/47, Concession A  
Former Township of Greenock  
Municipality of Brockton

Figure No. 8



- DRAFT (FOR REVIEW BY COUNCIL) -



FIRE DEPARTMENT  
LOCATIONS



OPP STATION  
LOCATIONS



PARAMEDIC STATION  
LOCATIONS

SCALE - N.T.S.  
MAY 2019

## EMERGENCY SERVICES LOCATIONS

Lot 46/47, Concession A  
Former Township of Greenock  
Municipality of Brockton

Figure No. 9

