

# MIDDLEBROOK PLACE BRIDGES

## Schedule C Phase 2 Consultation

### Municipal Class Environmental Assessment

### Public Consultation Centre

### Township of Woolwich and Centre Wellington





# **Public Consultation Centre**

## **MIDDLEBROOK PLACE BRIDGES**

**Schedule C – Phase 2 Consultation**

**Municipal Class Environmental Assessment**

**Bethel Mennonite Church  
Basement Hall**

**November 27, 2018**

**5:30 to 8:00 pm**

# Presentation Summary

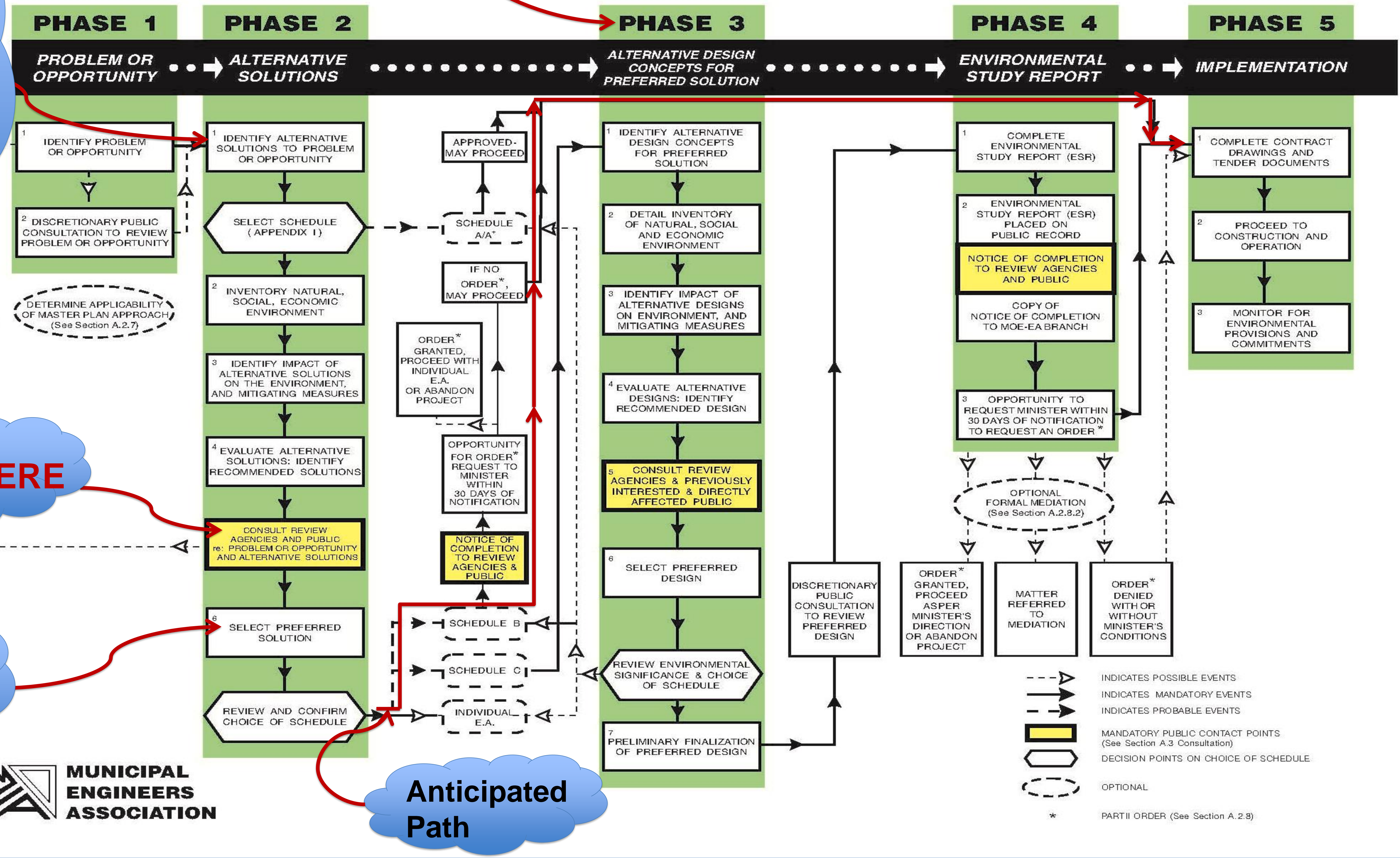
- Overview of EA Process
- Study Objectives
- Problem and Opportunity Definition
- Background Studies
- Alternative Solutions
- Evaluation of Alternative Solutions
- Preliminary Recommended Solution
- Next Steps (EA Process and Timeline)



Alternative Design Concepts to be Determined, If Replacement is Preferred.

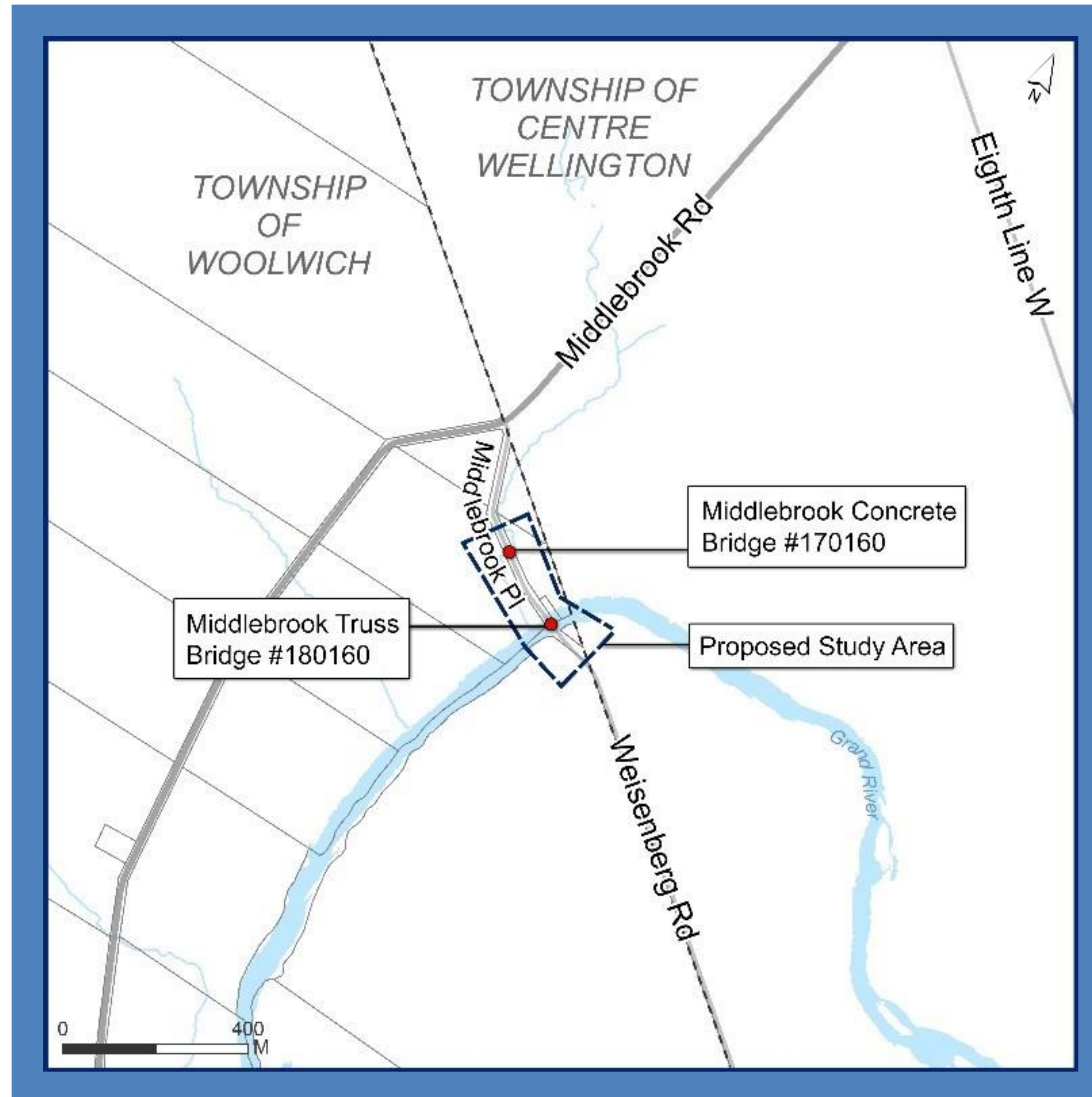
## Exhibit A.2 Municipal Class EA Planning and Design Process

- Truss Bridge Alternative Solutions**
- 1) Do Nothing
  - 2) Closure
  - 3) Removal
  - 4) Repair for Pedestrians
  - 5) Repair for Vehicles
  - 6) Replacement





# Study Area



# Study Objectives

**The Township has initiated a Schedule C Municipal Class Environmental Assessment (EA) study with the following key objectives:**

- Consider a reasonable range of appropriately planned potential solutions;
- Consider impacts to all aspects of the environment (social, cultural, natural environment, technical and economic);
- Select a preferred solution through a transparent decision-making process; and,
- Encourage public participation throughout the process.



# Problem and Opportunity Definition

## A) Problem:

- Structural inspections have identified the need for permanent closure, repairs or replacement of the Middlebrook Truss Bridge and the Middlebrook Concrete Bridge due to their condition.
- Due to age and condition, future repair costs will increase and will become more frequent and require significant capital investment to extend the life span of the structures.

## B) Opportunity:

To determine a strategy to identify the short and long term plan for the Middlebrook Place Bridges, while meeting engineering and public safety standards.



# Middlebrook Truss Bridge





## Middlebrook Concrete Bridge



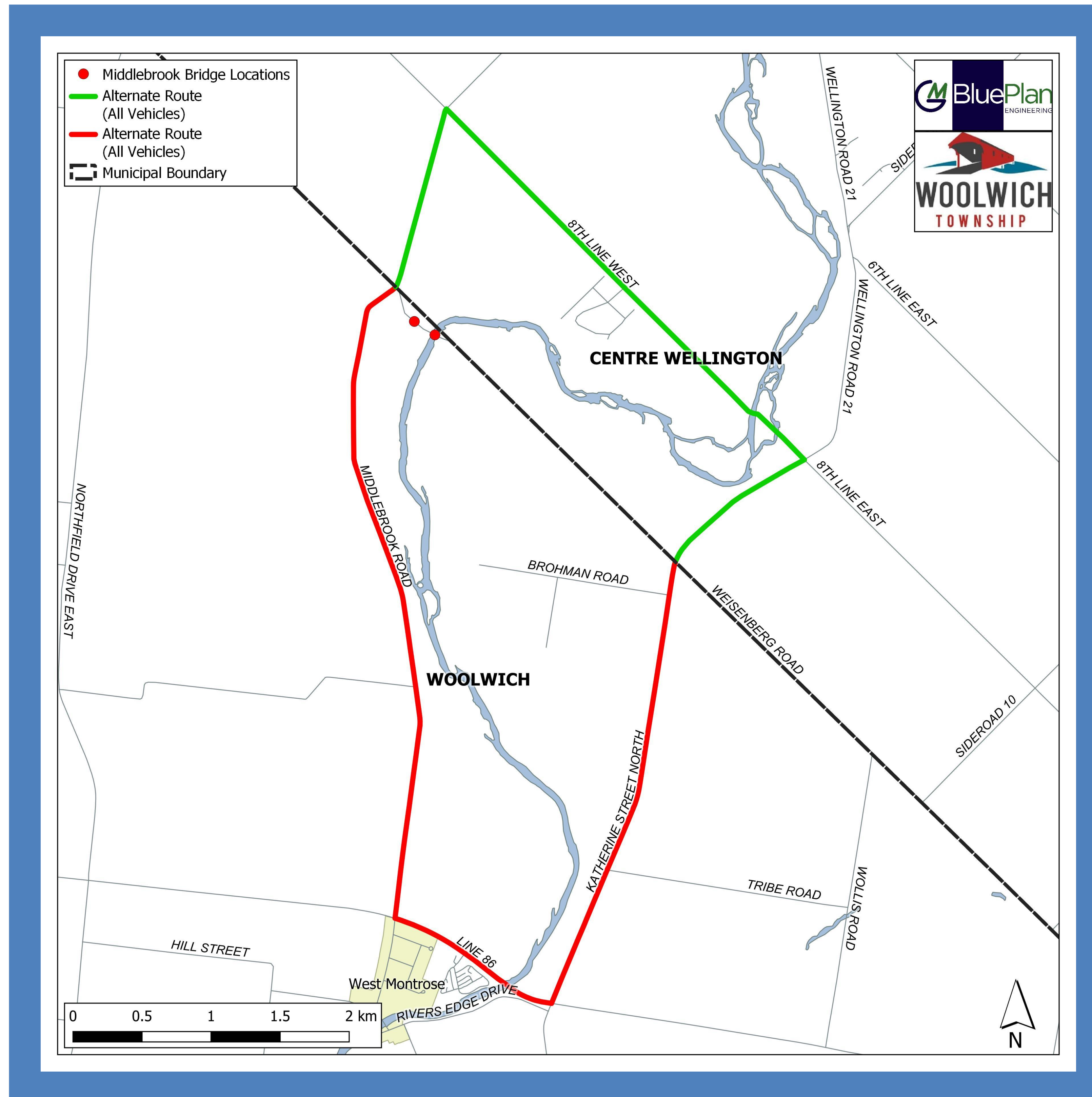


# Transportation and Traffic Study

- Transportation and Traffic analysis completed within and adjacent to the Study Area.
  - Analysis completed using latest available traffic data provided by the Township and Region of Waterloo.
- Analysis of data showed that the Middlebrook Place Bridges likely only serve the immediate local area residents with an insignificant amount of commuter traffic
  - Prior to the Truss Bridge's closure, approximately 50 vehicles per day utilized the Middlebrook Truss Bridge, in comparison to 6,000 and 1,000 for Line 86 and Eighth Line West, respectively.
- The most suitable parallel travel routes would be:
  - Line 86 and/or Eight Line West
- Vehicular access to property between Middlebrook Place Bridges is restricted to 10 tonnes or less.



# Alternate Routes





# Cultural Heritage and Heritage Impact Study

- Each bridge was identified has having heritage significance in:
  - Spanning the Generations, Study of Old Bridges in Waterloo Region (PHCS 2004a), Waterloo Region.
  - Grand River Watershed Heritage Bridge Inventory (2013).
- Neither bridge is designated under Part IV of the Ontario Heritage Act, nor are they identified as a heritage bridge on the Ontario Heritage Bridge List.
- Study recommends consideration for designating the truss bridge under the Ontario Heritage Act.
- Preference from a heritage perspective is to leave the structures in place, minimizing impacts of repairs.



# Cultural Heritage and Heritage Impact Study

- The **Middlebrook Truss Bridge** was found to have heritage significance due to the following:
  - One of four remaining Pratt camelback through truss bridges located in the Region of Waterloo;
  - Single-lane construction;
  - Truss members connected by pins;
  - Steel double-span truss configuration with nine panels;
  - Location on Middlebrook Place, spanning the Grand River;
  - Views to the bridge from the approaches; and,
  - Views from the bridge of the surrounding rural landscape and the Grand River.



# Cultural Heritage and Heritage Impact Study

- The **Middlebrook Concrete Bridge** was found to have heritage significance due to the following:
  - Single-lane construction;
  - Early example of a cast-in-place concrete rigid frame with a box design in the Region of Waterloo; and,
  - Simple concrete railing system which gives the bridge a distinctive appearance and affords the bridge a degree of aesthetic appeal.



# Archaeology Study

- Parts of the Study Area have been identified as having archaeological potential, and may require a Stage 2 Archaeological Assessment if these areas will be impacted by the preferred alternative.





## Environmental Impact Study

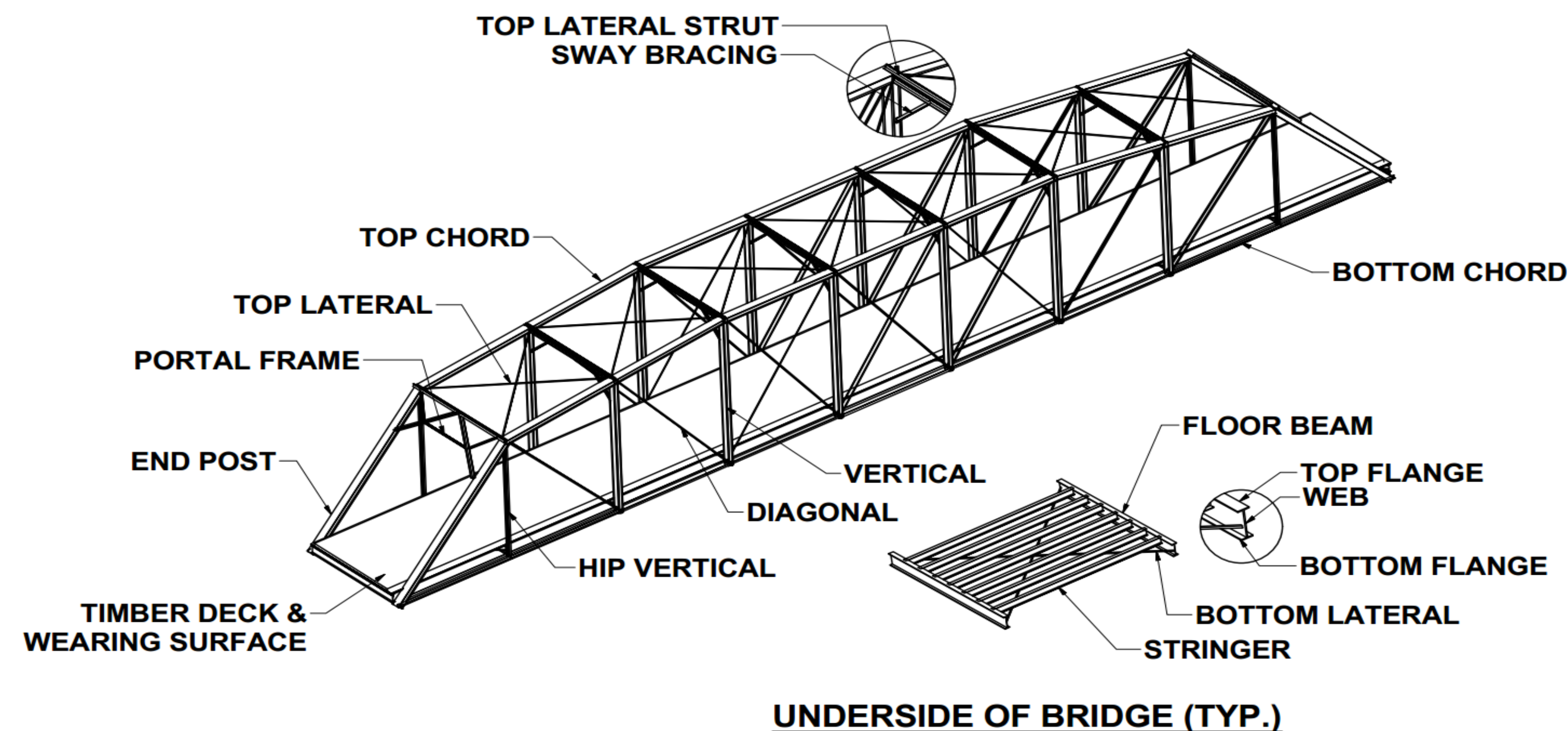
- There are no nationally or provincially rare vegetation communities or flora in the Study Area.
- There are no Provincially Significant Wetlands present in the Study Area.
- Wildlife habitat is considered common and well represented upstream and downstream of both bridges.
- The following Species at Risk or their habitat have the potential to be present in or adjacent to the Study Area:
  - Barn Swallow, Chimney Swift, Eastern Wood-pewee, Bank Swallow, Wood Thrush, Bobolink, Eastern Meadowlark, Snapping turtle, Milksnake, Rainbow, Black Redhorse, Silver Shiner, Wavy-rayed Lampmussel, Little Brown Myotis
- Through implementation of appropriate mitigation measures, none of the proposed alternatives will result in significant long-term impacts to natural features identified within the Study Area.



# Bridge Condition Assessment

## Middlebrook Truss Bridge

- The bridge is in poor condition and remains closed. Key concerns are:
  - Compromised structural integrity of numerous stringers due to corrosion;
  - Sagging / loss of tension in tension members (diagonals, laterals);
  - Severe corrosion of rivet heads; and,
  - Severe corrosion of bearings and disengagement of roller pins.





# Middlebrook Truss Bridge



Severe corrosion, loss of rivet heads on bottom chord



Stringers with severe corrosion and perforations

Severe corrosion of diagonals





# Bridge Condition Assessment

## Middlebrook Concrete Bridge

- The bridge is in poor condition and is currently subject to a 10 tonne load limit. Key concerns are:
  - Concrete in abutments, wingwalls, and soffit is in poor condition;
  - The concrete barrier is in poor condition and does not meet safety standards; and,
  - The concrete footings are exposed, and there is evidence of severe erosion and undermining of the footings.



Concrete barrier at concrete bridge



Spalling with exposed corroded rebar on soffit



## Alternative Solutions - Truss Bridge:

- The Township has elected to assess and evaluate the alternatives associated with the Middlebrook Truss Bridge first.
- After a recommendation for a preferred solution has been determined for the truss bridge, an evaluation of applicable alternatives for the Middlebrook Concrete Bridge will be assessed and evaluated to determine its corresponding recommended preferred solution.



# Alternative Solutions - Truss Bridge:

## 1. Do Nothing

- Does not address the identified problem and leads to one of the other alternatives in the very near future.

## 2. Permanently Close Bridge/Crossing

↔	<b>Social</b>	<ul style="list-style-type: none"> <li>• Would potentially require property acquisition to construct turnarounds.</li> </ul>
↔	<b>Cultural</b>	<ul style="list-style-type: none"> <li>• Maintains heritage look of crossing, but prevents views from the bridge to surrounding area;</li> <li>• Areas with archaeological potential need to be assessed for turnarounds.</li> </ul>
↔	<b>Technical</b>	<ul style="list-style-type: none"> <li>• Permanently closed to traffic, but detour routes capable of accommodating additional traffic.</li> </ul>
↔	<b>Economic</b>	<ul style="list-style-type: none"> <li>• Costs to construct turnarounds and barriers, remove deck;</li> <li>• Future capital investments and maintenance required to maintain closure devices and eventually remove the structure;</li> <li>• Lowest initial costs and moderate 30 year projected costs.</li> </ul>



# Alternative Solutions - Truss Bridge:

## 3. Remove Bridge without Replacement

↔	<b>Social</b>	<ul style="list-style-type: none"> <li>• Would potentially require property acquisition to construct turnarounds.</li> </ul>
↓	<b>Cultural</b>	<ul style="list-style-type: none"> <li>• One of least preferred option with respect to heritage significance;</li> <li>• Areas with archaeological potential need to be assessed for turnarounds.</li> </ul>
↑	<b>Technical</b>	<ul style="list-style-type: none"> <li>• Bridge is removed eliminating load capacity issues;</li> <li>• Permanently closed to traffic, but near by detour routes capable of accommodating additional traffic;</li> <li>• Utility relocation required.</li> </ul>
↑	<b>Economic</b>	<ul style="list-style-type: none"> <li>• Costs to construct turnarounds and barriers and remove bridge;</li> <li>• Significantly reduces future capital and maintenance costs;</li> <li>• No structure life span concerns;</li> <li>• Moderate initial costs and lowest 30 year projected costs.</li> </ul>



# Alternative Solutions - Truss Bridge:

## 4. Rehabilitate Bridge for Pedestrian Use

↑	<b>Social</b>	<ul style="list-style-type: none"> <li>• Would potentially require property acquisition to construct turnarounds;</li> <li>• Maintains views of structure and landscape;</li> <li>• Public safety improved.</li> </ul>
↔	<b>Cultural</b>	<ul style="list-style-type: none"> <li>• Maintains pedestrian heritage of crossing with slight change to railing;</li> <li>• Areas with archaeological potential need to be assessed for turnarounds.</li> </ul>
↔	<b>Technical</b>	<ul style="list-style-type: none"> <li>• Reduced deck width or member reinforcement may be required to support full pedestrian loading;</li> <li>• No vehicular access.</li> </ul>
↓	<b>Economic</b>	<ul style="list-style-type: none"> <li>• Costs to construct turnarounds, pedestrian barriers, and repair/replace bridge elements to accommodate pedestrian traffic;</li> <li>• Regular substantial capital investments (every 10 to 20 years) leading up to eventually closure or /replacement of the structure;</li> <li>• Repair costs are highly unpredictable based on type and age of structure;</li> <li>• Moderate initial costs and high 30 year projected costs.</li> </ul>



# Alternative Solutions - Truss Bridge:

## 5. Rehabilitate Bridge for Vehicular Use

↔	<b>Social</b>	<ul style="list-style-type: none"> <li>• Maintains views of structure and landscape;</li> <li>• Single lane and load limit still present;</li> <li>• Public safety improved.</li> </ul>
↑	<b>Cultural</b>	<ul style="list-style-type: none"> <li>• Maintains heritage significance of crossing with changes to railing to meet current standards;</li> <li>• No impacts to areas with archaeological potential</li> </ul>
↔	<b>Technical</b>	<ul style="list-style-type: none"> <li>• Load posting and limit of one vehicle on structure at a time still required;</li> <li>• In-depth repairs may be necessary that involve unique and difficult construction practices.</li> </ul>
↓	<b>Economic</b>	<ul style="list-style-type: none"> <li>• Costs to repair/replace bridge elements to accommodate vehicular traffic;</li> <li>• Regular substantial capital investments (every 10 to 20 years) leading up to eventually closing/replacing the structure;</li> <li>• Repair costs are highly unpredictable based on type and age of structure;</li> <li>• Moderate initial costs and high 30 year projected costs.</li> </ul>



# Alternative Solutions - Truss Bridge:

## 6. Replace Bridge/Crossing for Vehicular Use

↔	<b>Social</b>	<ul style="list-style-type: none"> <li>• Impacts views of existing structure;</li> <li>• Potentially require property acquisition;</li> <li>• Public safety greatly improved.</li> </ul>
↓	<b>Cultural</b>	<ul style="list-style-type: none"> <li>• One of least preferred option with respect to heritage significance;</li> <li>• Replacement will impact areas that may have archaeological potential – Stage 2 Archaeological Assessment would need to be completed.</li> </ul>
↑	<b>Technical</b>	<ul style="list-style-type: none"> <li>• Provides opportunity for improvements to geometry (2 lanes/wider deck);</li> <li>• Can incorporate pedestrian and cycling facilities;</li> <li>• Provides a long-term solution to structural issues.</li> </ul>
↓	<b>Economic</b>	<ul style="list-style-type: none"> <li>• Highest initial capital costs and highest 30 year projected costs.</li> <li>• Reduced maintenance and operating costs;</li> <li>• Estimated 75 year service life with first major rehabilitation in approximately 50 years.</li> </ul>



# Alternative Solutions - Truss Bridge:

## 7. Replace Bridge/Crossing for Pedestrian Use

↑	Social	<ul style="list-style-type: none"> <li>• Would potentially require property acquisition to construct turnarounds;</li> <li>• Impacts views of existing structure;</li> <li>• Public safety greatly improved.</li> </ul>
↓	Cultural	<ul style="list-style-type: none"> <li>• One of least preferred option with respect to heritage significance;</li> <li>• Replacement will impact areas that may have archaeological potential – Stage 2 Archaeological Assessment would need to be completed.</li> </ul>
↑	Technical	<ul style="list-style-type: none"> <li>• Provides proper pedestrian and cycling facilities;</li> <li>• Provides a long-term solution to structural issues;</li> <li>• No vehicular access.</li> </ul>
↔	Economic	<ul style="list-style-type: none"> <li>• High initial capital costs and moderate 30 year projected costs;</li> <li>• Reduced maintenance and operating costs;</li> <li>• Estimated 60 to 75 year service life with first major rehabilitation in approximately 40 years.</li> </ul>



# Financial Projections - Truss Bridge:

Year	Alternative 2: Closure		Alternative 3: Removal		Alternative 4: Rehabilitate (Pedestrian)		Alternative 5: Rehabilitate (Vehicular)		Alternative 6: Replace (Vehicular)		Alternative 7: Replace (Pedestrian)	
	2018 Dollars	Invest. Req'd	2018 Dollars	Invest. Req'd	2018 Dollars	Invest. Req'd	2018 Dollars	Invest. Req'd	2018 Dollars	Invest. Req'd	2018 Dollars	Invest. Req'd
2020	\$450k	\$450k	\$700k	\$700k	\$900k	\$900k	\$650k	\$650k	\$3.5M	\$3.5M	\$1.2M	\$1.2M
2025	-	-	-	-	\$75k	\$65k	\$75k	\$65k	-	-	-	-
2030	-	-	-	-	-	-	-	-	-	-	-	-
2035	-	-	-	-	-	-	-	-	-	-	-	-
2040	\$175k	\$100k	-	-	\$600k	\$330k	\$600k	\$330k	\$30k	\$15k	\$10k	\$5k
2045	-	-	-	-	-	-	-	-	-	-	-	-
2050	\$500k	\$200k	-	-	\$500k	\$200k	\$750k	\$310k	-	-	-	-
<b>Total (2018 Dollars)</b>	<b>\$1.1M</b>		<b>\$700k</b>		<b>\$2.1M</b>		<b>\$2.0M</b>		<b>\$3.5M</b>		<b>\$1.2M</b>	
<b>Investment Required</b>	<b>\$750k</b>		<b>\$700k</b>		<b>\$1.5M</b>		<b>\$1.3M</b>		<b>\$3.5M</b>		<b>\$1.2M</b>	

Note:  
 - Costs do not include HST, but include 15% Contingency and 15% Engineering Fees  
 - Current investment required ("Invest. Req'd") based on present value determined using a Level 1 Financial Analysis in accordance with the Ministry of Transportation Ontario's Structural Financial Analysis Manual (SO-11, 1993), assuming a 3% discount rate



# Middlebrook Truss Bridge Alternative Solutions:

<b>Middlebrook Truss Alternative Solutions</b>						
<b>Criteria</b>	Alternative 2: Closure	Alternative 3: Removal	Alternative 4: Rehabilitate (Pedestrian)	Alternative 5: Rehabilitate (Vehicular)	Alternative 6: Replace (Vehicular)	Alternative 7: Replace (Pedestrian)
Social	↔	↔	↑	↔	↔	↑
Natural	↔	↔	↔	↔	↔	↔
Cultural	↔	↓	↔	↑	↓	↓
Technical	↔	↑	↔	↔	↑	↑
Economic	↔	↑	↓	↓	↓	↔
<b>Overall Ranking</b>	<b>2</b>	<b>1</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>



## Recommended Truss Solution:

### REMOVAL WITHOUT REPLACEMENT is the Recommended Solution:

- Addresses structural problems;
- Most economically feasible short and long term solution;
- Public safety improved.

### Rehabilitation alternatives (nos. 4 & 5) are not recommended due to lifecycle costs considerations:

- Rehabilitation for pedestrian use has approximately the same lifecycle cost as replacement for pedestrian use. A rehabilitated structure may last for approximately 30 years, whereas a replacement structure would last for approximately 75 years.
- Rehabilitation for vehicular use (to a 6 tonne load limit) has approximately 40% of the present value cost of a full replacement (no load limit). A rehabilitated structure may last for 30 years, whereas a replacement structure would last for approximately 75 years.



# Middlebrook Place Bridges Alternative Solutions:

**Truss Bridge Alternative 2:**  
Permanently Close Bridge

**Truss Bridge Alternative 3:**  
Removal Without Replacement

**Truss Bridge Alternative 4:**  
Rehabilitate for Pedestrian Use

**Truss Bridge Alternative 5:**  
Rehabilitate for Vehicular Use

**Truss Bridge Alternative 6:**  
Replace for Vehicular Use

**Truss Bridge Alternative 7:**  
Replace for Pedestrian Use

**Removal Without Replacement is Recommended Solution for Truss Bridge**

Note: The combination of preferred solutions for the Middlebrook Truss Bridge and the Middlebrook Concrete Bridge must allow for normal traffic access to property between the structures (over either the truss bridge, the concrete bridge, or both)

~~**Concrete Bridge Alternative A:**  
Do Nothing~~

~~**Concrete Bridge Alternative B:**  
Closure~~

~~**Concrete Bridge Alternative C:**  
Removal Without Replacement~~

**Concrete Bridge Alternative D:**  
Rehabilitate Bridge

**Concrete Bridge Alternative E:**  
Replace Bridge



## Next Steps:

### Environmental Assessment – Process and Timeline

#### Phases 1 and 2

- |   |                    |
|---|--------------------|
| <input checked="" type="checkbox"/> a) Publish Notice of Project Initiation                     | March 2018         |
| <input checked="" type="checkbox"/> b) Hold Public Information Centre (PIC No.1)                | November 27, 2018  |
| c) Determine Recommended Preferred Solution for Concrete Bridge (rehabilitation or replacement) | Winter/Spring 2019 |
| d) Township Council decision on Staff selection of Preferred Solution                           | Winter/Spring 2019 |
| e) Review and confirm choice of Schedule (Completes Phase 2)                                    | Spring/Summer 2019 |



**- YOUR INPUT IS IMPORTANT -**

**Comment Sheets are Available at this Public  
Information Session**

**Please Submit by December 18<sup>th</sup>, 2018**

**THANK YOU**