



**City of Guelph**

# **Guelph Transportation Master Plan**

**Evaluation of Alternatives Report**

**March 2021 – 18-8919**

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## 1.0 Introduction

This report presents the evaluation of Alternative Solutions for the Guelph Transportation Master Plan (TMP) update. The comparative evaluation of options is summarized in the main report. The detailed rationale for the evaluation criteria can be found in **Appendix A** and the detailed results supporting the evaluation can be found in **Appendix B**.

### 1.1 Background

The Guelph Transportation Master Plan (TMP) update is a long-range strategic plan that will define how Guelph's transportation system will support the community as the city continues up to 2051. The main objectives of the TMP update are:

1. to ensure the new plan is consistent with current policies, including the Official Plan and other master plans that have been approved since 2005;
2. to recommend new policies and guidelines that reflect our community's vision and that balance mobility, environment and efficiency while prioritizing safety and access for all travellers, and
3. to explore how new and evolving technologies and travel services will shape the future of transportation in Guelph.

The analysis summarized in this report builds upon previously completed work as part of the TMP, including:

- Develop the TMP vision, values, and goals;
- Identifying strategic directions for the TMP;
- Summarizing existing conditions;
- Developing the TMP Problem Statements;
- Developing the ideal networks for each mode of travel; and
- Developing and refine the Alternative Solution network concepts.

Refer to previous project documentation for a more detailed overview of each of the aforementioned project tasks.

## 2.0 Alternative Solutions and Evaluation Criteria

This section defines the four Alternative Solutions considered as part of the Guelph TMP and the criteria used to evaluate them.

### 2.1 Alternative Solutions

Alternative Solutions represent the options for what Guelph's future transportation networks could look like. Four Alternative Solutions were considered as part of this TMP update, representing combinations of different proposed priority network concepts for each mode of travel. Since the TMP is a long-term strategic plan with a horizon year of 2051, all of the elements of the ultimately selected option - known as the Preferred Solution - may not be implemented until 2051.

The six proposed priority networks, which were developed in earlier stages of the project, include:

1. Pedestrian Priority Network
2. Cycling Priority Network (i.e the Cycling Spine Network)
3. Transit Priority Network (i.e the Quality Transit Network)
4. Goods Movement Priority Network (i.e. for trucks)
5. Car Priority Network
6. Resilience Priority Network

**Table 1** summarizes the priority networks included in each Alternative Solution, which are further defined under the following headings.

**Table 1: Inclusion of Priority Networks by Alternative Solution**

<b>Networks</b>	<b>Alternative 1 Do Nothing</b>	<b>Alternative 2 Sustainability</b>	<b>Alternative 3 Sustainability and Resilience</b>	<b>Alternative 4 Car Efficiency</b>
<b>Pedestrian Priority Network</b>	Y	Y	Y	Y
<b>Cycling Spine Network</b>	N	Y	Y	Y
<b>Quality Transit Network</b>	N	Y	Y	S
<b>Goods Movement Priority Network</b>	Y	S	S	Y
<b>Car Priority Network</b>	N	N	N	Y
<b>Resilience Priority Network</b>	N	N	Y	Y

*Y = Alternative implements all the elements of the network*

*S = Alternative implements some of the elements of the network*

*N = Alternative does not implement the network*

### 2.1.1

#### **Alternative 1 – Do Nothing**

With this Alternative, the City would make no changes to the existing transportation network for any mode - car, transit, bike or pedestrian – beyond future projects that have already been approved by City Council.

#### **Priority Networks Included**

This Alternative would include the implementation of the Pedestrian Priority Network since the elements of the Pedestrian Priority Network have been approved to through previous policies and strategic plans.

### Justification for Alternative

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Alternative 1 is an option that is required to be included to meet the needs of the Municipal Engineers Association (MEA) Class Environmental Assessment (EA) process for infrastructure Master Plans. It provides a baseline for the analysis of the other Alternative Solutions.

Alternative 1 is most strongly aligned with the affordability value and goal of the TMP as it eliminates new capital costs beyond what has already been committed to. It does not align with other TMP values or goals.

### 2.1.2 Alternative 2 – Sustainability Focus

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Alternative 2 is the best network strategy for shifting the mode share in Guelph towards sustainable modes of travel like walking, cycling and transit while not adding new street capacity for cars. This Alternative rebalances the overall transportation system, shifting the priorities away from improving car efficiency in all situations towards improving the experience for non-car modes. It also improves the safety and experience of more vulnerable users - people walking, cycling using transit.

This Alternative will help manage congestion for people who continue to drive by encouraging more people to travel by non-car modes (this Alternative has the biggest potential for a mode shift away from cars among the four Alternatives). The Alternative also improves the safety and environment of all travelers, particularly the more vulnerable users - people walking, cycling and using transit.

### Priority Networks Included

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Alternative 2 implements the Pedestrian Priority, Cycling Spine and Quality Transit Networks. It also partially implements the Goods Movement Priority Network.

### Justification for Alternative

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Alternative 2 is strongly aligned with the **sustainability, safety, equity, and land use alignment** values and goals of the TMP. It is also aligned with the **affordability** value and goal as it limits additional investment in infrastructure for cars.

### 2.1.3 Alternative 3 – Sustainability and Resilience Focus

Alternative 3 supports the shift in mode share towards sustainable modes of travel. It also adds transportation network resiliency against future challenges and opportunities, such as climate change, emerging mobility technologies, or societal disruptions like the COVID-19 pandemic by extending the four-lane street network to offer flexibility and redundancy. This Alternative improves the safety and experience for all travelers walking, cycling and using transit.

This Alternative will help manage congestion for people who continue to drive by encouraging more people to travel by non-car modes and also widening some roads (note that increased capacity due to long-term widening is expected to be a short-term solution; case studies over the decades have shown that congestion tends to rebound to pre-widening levels due to a concept called “induced demand”). The Alternative also improves the safety and environment of all travelers, particularly the more vulnerable users - people walking, cycling and using transit.

#### Priority Networks Included

Alternative 3 implements the Pedestrian Priority, Cycling Spine, Quality Transit and Resilience Networks. It also partially implements the Goods Movement Priority Network.

#### Justification for Alternative

Alternative 3 is strongly aligned with the **safety, equity, land use alignment** and **future resiliency** values and goals of the TMP. It is also aligned with the **sustainability** value and goal.

### 2.1.4 Alternative 4 – Car Efficiency Focus

Alternative 4 improves the convenience of driving while also supporting a mode shift away from cars by implementing the Pedestrian Priority and Cycling Spine Network. The Alternative also improves the safety and environment of all travelers, particularly the more vulnerable users - people walking, cycling and using transit.



Note that reductions to car delays resulting from street widenings are expected to be a short-term benefit. Case studies over the decades have shown that congestion tends to rebound to pre-widening levels due to a concept called “induced demand.”

### Priority Networks Included

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Alternative 4 implements the full versions of all priority networks except the Quality Transit Network. Stage 1 of the Quality Transit Network would be implemented through this Alternative, even if indicators show that other stages are warranted. This is because Stages 2 and 3 of the Quality Transit Network will require physical reconfiguration for streets within constrained rights-of-way, which will be prioritized for increasing car capacity.

Stage 1 of the Quality Transit Network would be completely implemented. Stage 2 and Stage 3 of the Quality Transit Network would be scaled back. All potential transit priority lanes to be implemented through conversion of existing traffic lanes would be eliminated. Some widenings to create transit priority lanes would also be eliminated (e.g. on Victoria Road) where the additional street width was needed to reduce delays for cars.

### Justification for Alternative

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Alternative 4 best represents the traditional approach to TMP projects where infrastructure and street widening decisions are based primarily on the need to provide the necessary car capacity to meet travel demands.

## Evaluation Criteria

The evaluation criteria used to assess the four Alternative Solutions for the Guelph TMP fall into three Criteria Groups, which represent the three types of impacts each network concept could have:

- Natural and Social Environment
- Transportation Environment
- Cost Environment

The evaluation criteria for each category were developed to align with the TMP policy framework, established in earlier stages of the project. The recommended criteria, justification for including each criterion, and the indicator for each criterion (along with indication of whether the indicator was determined qualitatively or quantitatively) are summarized in **Table 2**.

The rationale for the selection of each indicator, along with a scoring rationale for the qualitative indicators, can be found in **Appendix A**.

Table 2: Summary of Evaluation Criteria

Criteria Group	Criteria	Criteria Justification	Indicator	Qualitative	Quantitative
Natural and Social Environment	Reduces potential for footprint (property) impacts on natural and social heritage features	EA requirement	Lane-km of street widenings	-	X
Natural and Social Environment	Creates opportunities for additional streetscaping	Aligned with TMP Goal 5	Lane-km of street widenings	-	X
Natural and Social Environment	Increases transportation options for all travelers	Aligned with TMP Goal 1	Provision of new or improved active transportation and transit network elements	X	-
Natural and Social Environment	Reduces GHG by supporting mode share shift	Aligned with TMP Goal 4	Tonnes of CO2 from passenger vehicles during AM and PM peak hours	-	X

Criteria Group	Criteria	Criteria Justification	Indicator	Qualitative	Quantitative
<b>Natural and Social Environment</b>	Aligns with Guelph's planning objectives	Aligned with TMP Goal 5	Aligns with the City's Official Plan, Strategic Plan, and Growth Management Strategy: <ul style="list-style-type: none"> <li>• Reduces GHG,</li> <li>• Reduces auto mode share;</li> <li>• Reduces collision severity by improving safety for vulnerable travelers;</li> <li>• Supports intensification through sustainable transportation;</li> <li>• Minimizes footprint impacts</li> </ul>	X	-
<b>Transportation Environment</b>	Improves safety of vulnerable users	Aligned with TMP Goal 1	Extent of implementation of recommended All Ages and Abilities (AAA) cycling network	X	-

Criteria Group	Criteria	Criteria Justification	Indicator	Qualitative	Quantitative
<b>Transportation Environment</b>	Improves resiliency of transportation system	Aligned with TMP Goal 7	Extent of implementation of new or improved network elements for multiple modes AND implementation of Core 4-Lane network	-	X
<b>Transportation Environment</b>	Supports increase in use of active transportation modes	Aligned with TMP Goal 2 Aligned with TMP Goal 4	Extent of implementation of AAA cycling network while also limiting increase in car capacity	X	-
<b>Transportation Environment</b>	Supports increase in use of transit	Aligned with TMP Goal 3 Aligned with TMP Goal 4	Extent of implementation of Quality Transit network while also limiting increase in car capacity	X	-
<b>Transportation Environment</b>	Manages congestion on car network	Aligned with TMP Goal 2	Proportion of major road network (i.e. % of lane-km of expressways, arterials and collectors) with V/C >0.9 during peak hours	-	X

Criteria Group	Criteria	Criteria Justification	Indicator	Qualitative	Quantitative
<b>Transportation Environment</b>	Manages congestion on truck routes	Aligned with TMP Goal 2	Proportion of designated truck routes (i.e. % of truck route lane-kms) with V/C >0.9 during peak hours	-	X
<b>Cost Environment</b>	Limits capital costs	Aligned with TMP Goal 6	Lane-km of street widening	-	X
<b>Cost Environment</b>	Limits operations and maintenance (O+M) costs	Aligned with TMP Goal 6	Extent of implementation of the AAA cycling network	X	-
<b>Cost Environment</b>	Limits transit operation costs	Aligned with TMP Goal 6	Extent of implementation of Quality Transit Network	X	-

## 4.0

























## Natural and Social Environment Evaluation

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**Table 3** summarizes the evaluation of the four Alternative Solutions through the lens of impacts to the natural and social environment.

Refer to **Appendix B** for detailed results of the qualitative and quantitative analysis supporting the scores in **Table 3**.

**Table 3: Natural and Social Environment Evaluation**

<b>Criteria</b>	<b>Alternative 1 <i>Do Nothing</i></b>	<b>Alternative 2 <i>Sustainability</i></b>	<b>Alternative 3 <i>Sustainability and Resilience</i></b>	<b>Alternative 4 <i>Car Efficiency</i></b>
<b>Reduces potential for footprint (property) impacts on natural and social heritage features</b>				
<b>Creates opportunities for additional streetscaping</b>				
<b>Increases transportation options for all travelers</b>				
<b>Reduces GHG by supporting mode share shift</b>				
<b>Aligns with Guelph's planning objectives</b>				
<b>TOTAL</b>				

\*\* Full circle = most preferred, empty circle = least preferred



5.0

# Transportation Environment Evaluation

**Table 4** summarizes the evaluation of the four Alternative Solutions through the lens of impacts to the transportation environment.

Refer to **Appendix B** for detailed results of the qualitative and quantitative analysis supporting the scores in **Table 4**.

**Table 4: Transportation Environment Evaluation**

Criteria	Alternative 1 <i>Do Nothing</i>	Alternative 2 <i>Sustainability</i>	Alternative 3 <i>Sustainability and Resilience</i>	Alternative 4 <i>Car Efficiency</i>
Improves safety of vulnerable users				
Improves resiliency of transportation system				
Supports increase in use of active transportation modes				
Supports increase in use of transit				
Manages congestion on car network				
Manages congestion on truck routes				
<b>TOTAL</b>				

















\*\* Full circle = most preferred, empty circle = least preferred

## 6.0 Cost Environment Evaluation

**Table 5** summarizes the evaluation of the four Alternative Solutions through the lens of impacts to the City costs.

Refer to **Appendix B** for detailed results of the qualitative and quantitative analysis supporting the scores in **Table 5**.

**Table 5: Cost Environment Evaluation**

Criteria	Alternative 1 <i>Do Nothing</i>	Alternative 2 <i>Sustainability</i>	Alternative 3 <i>Sustainability and Resilience</i>	Alternative 4 <i>Car Efficiency</i>
Limits capital costs				
Limits operations and maintenance (O+M) costs				
Limits transit operation costs				
<b>TOTAL</b>				

\*\* Full circle = most preferred, empty circle = least preferred

















## 7.0

## Evaluation Summary

**Table 6** summarizes the overall evaluation. Based on the technical evaluation only, Alternatives 2 and 3 are tied as the Preferred Alternatives for Guelph's future transportation networks. Both Alternatives show the most significant alignment with the TMP goals, which were supported through the November-December 2020 round of public engagement for the TMP.

Alternatives 2 and 3 tie for the highest score in the Natural and Social Environment criteria group. Alternative 3 also scores highest in the Transportation Environment criteria group but lower in the Cost Environment criteria group. Alternative 2 scores second-highest in both the Transportation Environment and Cost Environment criteria groups.

**Table 6: Summary of Evaluation**

Criteria	Alternative 1 <i>Do Nothing</i>	Alternative 2 <i>Sustainability</i>	Alternative 3 <i>Sustainability and Resilience</i>	Alternative 4 <i>Car Efficiency</i>
Natural and Social Environment				
Transportation Environment				
Cost Environment				
<b>TOTAL</b>				

\*\* Full circle = most preferred, empty circle = least preferred

# Appendix A

## Evaluation Criteria – Detailed Rationale and Qualitative Scoring Guide

Table A1: EA Evaluation Criteria and Rationale

Criteria Group	Criteria	Criteria Justification	Indicator	Rationale for Indicator
<b>Natural and Social Environment</b>	Reduces potential for footprint (property) impacts on natural and social heritage features	EA requirement	Lane-km of street widenings*	<ul style="list-style-type: none"> <li>• This is a requirement of the EA process, and is a proxy for all of the negative impacts from footprint type of analysis that is completed in EA studies</li> <li>• Widenings with potential for impact on sensitive natural or social heritage features were explicitly screened out</li> </ul>
<b>Natural and Social Environment</b>	Creates opportunities for additional streetscaping	Aligned with TMP Goal 5	Lane-km of street widenings*	<ul style="list-style-type: none"> <li>• Reflects alignment with land use objectives</li> <li>• Any capital project provides the opportunity to add enhancements</li> </ul>

Criteria Group	Criteria	Criteria Justification	Indicator	Rationale for Indicator
<b>Natural and Social Environment</b>	Increases transportation options for all travelers	Aligned with TMP Goal 1	Provision of new or improved active transportation and transit network elements beyond those approved by Council	<ul style="list-style-type: none"> <li>To measure the difference in geographic distribution of new network elements for the Alternatives - how well each Alternative supports the implementation of the Priority networks to improve modal balance of the transportation system across the city</li> </ul>
<b>Natural and Social Environment</b>	Reduces GHG by supporting mode share shift	Aligned with TMP Goal 4	Tonnes of CO2 from passenger vehicles during AM and PM peak hours**	<ul style="list-style-type: none"> <li>To measure how GHG will be reduced resulting from the mode share shift</li> <li>Calculated total peak hour vehicle-km using the model</li> </ul>
<b>Natural and Social Environment</b>	Aligns with Guelph's planning objectives	Aligned with TMP Goal 5	Aligns with the City's Official Plan, Strategic Plan, and Growth Management Strategy:	<ul style="list-style-type: none"> <li>To represent alignment of the Alternatives with land use objectives</li> </ul>
<b>Transportation Environment</b>	Improves safety of vulnerable users	Aligned with TMP Goal 1	Extent of implementation of recommended All Ages and Abilities (AAA) cycling network	<ul style="list-style-type: none"> <li>Implementation of AAA cycling network improves safety for vulnerable users</li> </ul>

Criteria Group	Criteria	Criteria Justification	Indicator	Rationale for Indicator
<b>Transportation Environment</b>	Improves resiliency of transportation system	Aligned with TMP Goal 7	Extent of implementation of new or improved network elements for multiple modes AND implementation of Core 4-Lane network	<ul style="list-style-type: none"> <li>All widenings to four lanes improve the resiliency of the network, regardless of designated purpose, because lanes can be repurposed in future as necessary</li> </ul>
<b>Transportation Environment</b>	Supports increase in use of active transportation modes	Aligned with TMP Goal 2	Extent of implementation of AAA cycling network while also limiting increase in car capacity	<ul style="list-style-type: none"> <li>Increases in car capacity run counter to efforts to shift demands to active modes</li> </ul>
<b>Transportation Environment</b>	Supports increase in use of transit	Aligned with TMP Goal 4	Extent of implementation of Quality Transit network while also limiting increase in car capacity	<ul style="list-style-type: none"> <li>Increases in car capacity run counter to efforts to shift demands to active modes</li> </ul>
<b>Transportation Environment</b>	Manages congestion on car network	Aligned with TMP Goal 3	Proportion of major road network (i.e. % of lane-km of expressways, arterials and collectors) with V/C >0.9 during peak hours**	<ul style="list-style-type: none"> <li>V/C is the standard measure of performance for congestion</li> <li>Considers expressways, arterials, and collector roads</li> </ul>

Criteria Group	Criteria	Criteria Justification	Indicator	Rationale for Indicator
<b>Transportation Environment</b>	Manages congestion on truck routes	Aligned with TMP Goal 4	Proportion of designated truck routes (i.e. % of truck route lane-kms) with V/C >0.9 during peak hours**	<ul style="list-style-type: none"> <li>V/C is the standard measure of performance for congestion</li> <li>Considers expressways, arterials, and collector roads</li> </ul>
<b>Cost Environment</b>	Limits capital costs	Aligned with TMP Goal 6	Lane-km of street widening*	<ul style="list-style-type: none"> <li>All Alternatives include the planned new Active Transportation bridges; capital costs for the bridges were not considered as they are common to all options and their costs do not impact the comparative evaluation of Alternatives</li> <li>Street widenings have significant capital costs and vary between Alternatives</li> </ul>



Criteria Group	Criteria	Criteria Justification	Indicator	Rationale for Indicator
<b>Cost Environment</b>	Limits operations and maintenance (O+M) costs	Aligned with TMP Goal 6	Extent of implementation of the AAA cycling network	<ul style="list-style-type: none"> <li>• Streets with unique or specialized treatments have significant operational and maintenance costs</li> <li>• Dedicated transit lanes will not have unique design treatments</li> <li>• Cycle tracks and buffered bike lanes may require increased maintenance costs, depending on individual corridor design</li> </ul>
<b>Cost Environment</b>	Limits transit operation costs	Aligned with TMP Goal 6	Extent of implementation of Quality Transit Network	<ul style="list-style-type: none"> <li>• Transit priority measures create a more efficient transit service, which lead to operational cost savings</li> </ul>

*\* Note that the same widenings for the Cycling Spine Network and portions of the Quality Transit Network appear in Alternatives 2, 3, and 4.*

*\*\* Future conditions in modelling results are representative of 2031 conditions, which is the latest available population and employment data at the time of the TMP development.*

**Table A2: Qualitative Scoring Guide**

The table below provides a scoring guide for the criteria with a qualitative indicator. For criteria that used quantitative indicators, the quantitative results of analysis was used to determine the score – see **Appendix B**.

Criteria Group	Criteria	Indicator	Score: 0 - No change	Score: 1 - Minimal	Score: 2 - Moderate	Score: 3 - Significant
<b>Natural and Social Environment</b>	Increases transportation options for all travelers	Provision of new or improved active transportation and transit network elements beyond those approved by Council	No new elements beyond those already approved	Implements the Core Cycling Network; Quality Transit Network corridor improvements are limited to optimization	-	Implements the Core Cycling and Quality Transit Network
<b>Natural and Social Environment</b>	Aligns with Guelph’s planning objectives	Aligns with the City’s Official Plan, Strategic Plan, and Growth Management Strategy: <ul style="list-style-type: none"> <li>• Reduces GHG,</li> <li>• Reduces auto mode share;</li> <li>• Reduces collision severity by improving safety for vulnerable travelers;</li> <li>• Supports intensification through sustainable transportation;</li> <li>• Minimizes footprint impacts</li> </ul>	Not aligned: <ul style="list-style-type: none"> <li>• Supports 0 or 1 objectives</li> </ul>	Minimal alignment: <ul style="list-style-type: none"> <li>• Supports 2 objectives</li> </ul>	Moderate alignment: <ul style="list-style-type: none"> <li>• Supports 3 or 4 objectives</li> </ul>	Significant alignment: <ul style="list-style-type: none"> <li>• Supports 5 objectives</li> </ul>
<b>Transportation Environment</b>	Improves safety of vulnerable users	Extent of implementation of recommended All Ages and Abilities (AAA) cycling network	Implements none of the elements of the All Ages and Abilities (AAA) cycling network	Implements some of the All Ages and Abilities (AAA) cycling network	Implements most of the All Ages and Abilities (AAA) cycling network	Fully implements the All Ages and Abilities (AAA) cycling network

Criteria Group	Criteria	Indicator	Score: 0 - No change	Score: 1 - Minimal	Score: 2 - Moderate	Score: 3 - Significant
<b>Transportation Environment</b>	Supports increase in use of active transportation modes	Extent of implementation of AAA cycling network WHILE ALSO limiting increase in car capacity	No AAA cycling network implementation Unlimited car capacity	Complete AAA cycling network implementation Unlimited car capacity Or No AAA cycling network implementation No car capacity increases	-	Complete AAA cycling network implementation No car capacity increases
<b>Transportation Environment</b>	Supports increase in use of transit	Extent of implementation of the Quality Transit Network WHILE ALSO limiting increase in car capacity	No Quality Transit Network implementation Unlimited car capacity	Quality Transit Network through optimization only Unlimited car capacity Or No Quality Transit Network No car capacity	-	Complete Quality Transit Network No car capacity increases
<b>Cost Environment</b>	Limits operations and maintenance costs	Extent of implementation of the AAA cycling network	-	Full implementation of AAA cycling network	-	No implementation of AAA cycling network
<b>Cost Environment</b>	Limits transit operation costs	Extent of implementation of Quality Transit Network	No implementation of the Quality Transit Network	Quality Transit Network corridor improvements are limited to optimization	-	Fully implements the Quality Transit Network

## **Appendix B**

### **Detailed Evaluation Results**

**Table B1: Evaluation Summary for All Alternatives**

Criteria Group	Criteria	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<b>Natural and Social Environment</b>	Reduces potential for footprint (property) impacts on natural and social heritage features	Lane-km of street widenings	0	40.6	67.6	67.6
<b>Natural and Social Environment</b>	Creates opportunities for additional streetscaping	Lane-km of street widenings	0	40.6	67.6	67.6
<b>Natural and Social Environment</b>	Increases transportation options for all travelers	Provision of new or improved active transportation and transit network elements beyond those approved by Council	0	3	3	1
<b>Natural and Social Environment</b>	Reduces GHG by supporting mode share shift	Transportation-related GHG emissions (tonnes of CO2)	140.2	132.1	131.9	140.3

Criteria Group	Criteria	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<b>Natural and Social Environment</b>	Aligns with Guelph’s planning objectives	Aligns with the City’s Official Plan, Strategic Plan, and Growth Management Strategy: <ul style="list-style-type: none"> <li>• Reduces GHG,</li> <li>• Reduces auto mode share;</li> <li>• Reduces collision severity by improving safety for vulnerable travelers;</li> <li>• Supports intensification through sustainable transportation;</li> <li>• Minimizes footprint impacts</li> </ul>	0	3	2	0
<b>Transportation Environment</b>	Improves safety of vulnerable users	Extent of implementation of recommended All Ages and Abilities (AAA) cycling network	0	3	3	3

Criteria Group	Criteria	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<b>Transportation Environment</b>	Improves resiliency of transportation system	Extent of implementation of new or improved network elements for multiple modes AND implementation of Core 4-Lane network	0	40.6	67.6	67.6
<b>Transportation Environment</b>	Supports increase in use of active transportation modes	Extent of implementation of AAA cycling network while also limiting increase in car capacity	0	3	3	1
<b>Transportation Environment</b>	Supports increase in use of transit	Extent of implementation of Quality Transit network while also limiting increase in car capacity	1	3	3	1
<b>Transportation Environment</b>	Manages congestion on car network	Proportion of major road network (i.e. % of lane-km of expressways, arterials and collectors) with V/C >0.9 during peak hours	8%	10%	9%	8%

Criteria Group	Criteria	Indicator	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<b>Transportation Environment</b>	Manages congestion on truck routes	Proportion of designated truck routes (i.e. % of truck route lane-kms) with V/C >0.9 during peak hours	19%	25%	23%	18%
<b>Cost Environment</b>	Limits capital costs	Lane-km of street widening	0	40.6	67.6	67.6
<b>Cost Environment</b>	Limits operations and maintenance (O+M) costs	Extent of implementation of the AAA cycling network	3	1	1	1
<b>Cost Environment</b>	Limits transit operation costs	Extent of implementation of Quality Transit Network	0	3	3	1



Table B2: Evaluation Summary of Alternative 1 - Do Nothing

Criteria Group	Criteria	Score	Rationale for Score and Data
Natural and Social Environment	Reduces potential for footprint (property) impacts on natural and social heritage features	0	<ul style="list-style-type: none"> <li>0 km of lane widening</li> </ul>
Natural and Social Environment	Creates opportunities for additional streetscaping	0	<ul style="list-style-type: none"> <li>Alternative 1 does not widen any streets. Therefore, it creates no opportunities for adding streetscaping</li> </ul>
Natural and Social Environment	Increases transportation options for all travelers	0	<ul style="list-style-type: none"> <li>Alternative 1 does not add or improve active transportation and transit network elements</li> </ul>
Natural and Social Environment	Reduces GHG by supporting mode share shift	140.2	<ul style="list-style-type: none"> <li>AM GHG emissions peak is 65.6 and PM peak is 74.6 tonnes of CO<sub>2</sub></li> </ul>
Natural and Social Environment	Aligns with Guelph's planning objectives	0	<ul style="list-style-type: none"> <li>Least aligned with Official Plan because it least promotes transit, cycling and walking to offer a balance of transportation choice or use of transit infrastructure to shape growth for high and density areas</li> <li>Does not enhance or further the implementation of the Downtown Secondary Plan</li> <li>Does not support Climate Change objectives because it does not support shift in mode choice</li> <li>Does not support objectives in the Guelph Strategic Plan</li> </ul>

Criteria Group	Criteria	Score	Rationale for Score and Data
Transportation Environment	Improves safety of vulnerable users	0	<ul style="list-style-type: none"> <li>Alternative 1 does not include cycling network modifications beyond what is included in the approved 2013 Cycling Master Plan and does not implement the AAA cycling network</li> </ul>
Transportation Environment	Improves resiliency of transportation system	0	<ul style="list-style-type: none"> <li>Alternative 1 does not add or improve any network elements for any modes and does not implement the Core 4-Lane network</li> </ul>
Transportation Environment	Supports increase in use of active transportation modes	0	<ul style="list-style-type: none"> <li>Alternative 1 does not implement Cycling Spine network</li> <li>Alternative 1 continues the existing trend for car capacity and does not include measures to limit car capacity</li> </ul>
Transportation Environment	Supports increase in use of transit	1	<ul style="list-style-type: none"> <li>Alternative 1 only implements optimization elements of the Quality Transit Network</li> </ul>
Transportation Environment	Manages congestion on car network	8%	<ul style="list-style-type: none"> <li>Average of AM and PM</li> <li>In the AM there will be 7% of all links in the networks that exceed a v/c of 0.9</li> <li>In the PM there will be 9% of all links in the networks that exceed a v/c of 0.9</li> </ul>
Transportation Environment	Manages congestion on truck routes	19%	<ul style="list-style-type: none"> <li>Average of AM and PM</li> <li>In the AM there will be 17% of all links in the networks that exceed a v/c of 0.9</li> <li>In the PM there will be 20% of all links in the networks that exceed a v/c of 0.9</li> </ul>

Criteria Group	Criteria	Score	Rationale for Score and Data
Cost Environment	Limits capital costs	0	<ul style="list-style-type: none"> <li>Alternative 1 includes no network modifications that require additional cost commitments not already accounted for in Development Charges background studies supporting the current Guelph Official Plan</li> </ul>
Cost Environment	Limits operations and maintenance (O+M) costs	3	<ul style="list-style-type: none"> <li>Alternative 1 does not implement the AAA cycling network</li> </ul>
Cost Environment	Limits transit operation costs	0	<ul style="list-style-type: none"> <li>Alternative 1 does not implement the Quality Transit Network</li> </ul>

### Summary

- Alternative 1 has no network modifications, which results in no improvements for sustainable transportation options, and does not improve the safety of vulnerable road users, or work to lower GHG emissions
- Alternative 1 does not align with Guelph’s Planning Policies because it doesn’t support intensification or promote active transportation or transit
- Alternative 1 has the lowest impact on capital and operating and maintenance costs because it contains no network modifications, though it is expected to have the highest delays for transit, resulting in the highest transit operating costs.
- It also makes no improvements to the streetscape, or network performance

**Table B3: Evaluation Summary of Alternative 2 – Sustainability Focus**

Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Natural and Social Environment</b>	Reduces potential for footprint (property) impacts on natural and social heritage features	40.6	<ul style="list-style-type: none"> <li>40.6 km of widening, resulting in potential impacts to natural and social heritage features</li> </ul>
<b>Natural and Social Environment</b>	Creates opportunities for additional streetscaping	40.6	<ul style="list-style-type: none"> <li>40.6 km of widening, which creates additional opportunities for streetscaping</li> </ul>
<b>Natural and Social Environment</b>	Increases transportation options for all travelers	3	<ul style="list-style-type: none"> <li>Alternative 2 fully implements the Pedestrian, Cycling Spine, and Quality Transit Networks, which would provide new or improved walking, cycling, and transit network elements</li> </ul>
<b>Natural and Social Environment</b>	Reduces GHG by supporting mode share shift	132.1	<ul style="list-style-type: none"> <li>The AM GHG emissions peak is 61.4 and PM peak is 70.7 tonnes of CO<sub>2</sub></li> </ul>

Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Natural and Social Environment</b>	Aligns with Guelph's planning objectives	3	<ul style="list-style-type: none"> <li>• Aligned with Official Plan directions of enabling walkability and supporting transit</li> <li>• Supports: <ul style="list-style-type: none"> <li>○ Use of transit and active modes</li> <li>○ Easy access to a range of transportation options,</li> <li>○ Growth in the intensification corridors, mixed-use nodes, and Downtown,</li> <li>○ Development strategies and Secondary Plans for Downtown, GID, and Clair-Maltby, and</li> <li>○ Minimum impact natural environment</li> </ul> </li> </ul>
<b>Transportation Environment</b>	Improves safety of vulnerable users	3	<ul style="list-style-type: none"> <li>• Fully implements the Cycling Spine network, improving the core network of cycling facilities to meet the needs of cyclists of All Ages and Abilities</li> </ul>
<b>Transportation Environment</b>	Improves resiliency of transportation system	40.6	<ul style="list-style-type: none"> <li>• Adds approximately 40.6 km of four-lane street to the network</li> <li>• Fully implements the Pedestrian, Cycling Spine, and Quality Transit Networks supporting multiple modes</li> </ul>
<b>Transportation Environment</b>	Supports increase in use of active transportation modes	3	<ul style="list-style-type: none"> <li>• Alternative 2 fully implements the Cycling Spine Network, improving the core network of cycling facilities to meet the needs of cyclists of All Ages and Abilities without any increases for car capacity</li> </ul>
<b>Transportation Environment</b>	Supports increase in use of transit	3	<ul style="list-style-type: none"> <li>• Alternative 2 fully implements the Quality Transit Network without any increases for car capacity</li> </ul>

Criteria Group	Criteria	Score	Rationale for Score and Data
Transportation Environment	Manages congestion on car network	10%	<ul style="list-style-type: none"> <li>• Average of AM and PM</li> <li>• In the AM there will be 9% of all links in the networks that exceed a v/c of 0.9</li> <li>• In the PM there will be 11% of all links in the networks that exceed a v/c of 0.9</li> </ul>
Transportation Environment	Manages congestion on truck routes	25%	<ul style="list-style-type: none"> <li>• Average of AM and PM</li> <li>• In the AM there will be 23% of all links in the networks that exceed a v/c of 0.9</li> <li>• In the PM there will be 26% of all links in the networks that exceed a v/c of 0.9</li> </ul>
Cost Environment	Limits capital costs	40.6	<ul style="list-style-type: none"> <li>• 40.6 km lane widening</li> </ul>
Cost Environment	Limits operations and maintenance (O+M) costs	1	<ul style="list-style-type: none"> <li>• Alternative 2 implements the AAA cycling network</li> </ul>
Cost Environment	Limits transit operation costs	3	<ul style="list-style-type: none"> <li>• Alternative 2 fully implements the Quality Transit Network</li> </ul>

### Summary

- Alternative 2 implements the Pedestrian, Cycling Spine and Quality Transit networks, which results in improvements to transportation options, and safety for vulnerable road users; there are capital and operations and maintenance associated with implementing these improvements

- Alternative 2 has some footprint impacts due to lane-km widening, which results in opportunities to add streetscaping
- Alternative 2 would result in improvements to lower the levels of GHG and has the lowest projected levels of GHG of the Alternatives
- Alternative 2 aligns with Guelph planning objectives as it promotes active transportation and supports intensification in key areas with transit

**Table B4: Evaluation Summary of Alternative 3 – Sustainability and Resilience Focus**

Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Natural and Social Environment</b>	Reduces potential for footprint (property) impacts on natural and social heritage features	67.6	<ul style="list-style-type: none"> <li>67.6 km of widening, resulting in potential impacts to natural and social heritage features</li> </ul>
<b>Natural and Social Environment</b>	Creates opportunities for additional streetscaping	67.6	<ul style="list-style-type: none"> <li>67.6 km of widening which creates opportunities for additional streetscaping</li> </ul>
<b>Natural and Social Environment</b>	Increases transportation options for all travelers	3	<ul style="list-style-type: none"> <li>Alternative 3 fully implements the Pedestrian, Cycling Spine, and Quality Transit Networks, which would provide new and improved walking, cycling, and transit network elements</li> </ul>
<b>Natural and Social Environment</b>	Reduces GHG by supporting mode share shift	131.9	<ul style="list-style-type: none"> <li>AM GHG emissions peak is 61.5 and PM peak is 70.4 tonnes of CO<sub>2</sub></li> </ul>



Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Natural and Social Environment</b>	Aligns with Guelph's planning objectives	2	<ul style="list-style-type: none"> <li>Aligns with the City's existing planning directions on enabling walkability and supporting transit</li> <li>Supports: <ul style="list-style-type: none"> <li>Use of transit and active modes,</li> <li>Easy access to a range of transportation options,</li> <li>Growth in the intensification corridors, mixed-use nodes, and Downtown,</li> <li>Development strategies and Secondary Plans for Downtown, GID, and Clair-Maltby, and</li> <li>Minimum impact natural environment</li> </ul> </li> <li>Increases car capacity which may encourage some car travel</li> </ul>
<b>Transportation Environment</b>	Improves safety of vulnerable users	3	<ul style="list-style-type: none"> <li>Fully implements the Cycling Spine network, improving the core network of cycling facilities to meet the needs of cyclists of All Ages and Abilities</li> </ul>
<b>Transportation Environment</b>	Improves resiliency of transportation system	67.6	<ul style="list-style-type: none"> <li>Adds 67.6 km of four lane street to the network</li> <li>Fully implements the Pedestrian, Cycling Spine, Quality Transit, and Resilience Networks supporting multiple modes</li> </ul>
<b>Transportation Environment</b>	Supports increase in use of active transportation modes	3	<ul style="list-style-type: none"> <li>Alternative 3 fully implements the Cycling Spine Network, improving the core network of cycling facilities to meet the needs of cyclists of All Ages and Abilities</li> <li>Alternative 3 also adds 13.5 km of widening for the resiliency network, but widenings would have a small benefit to car capacity and a negligible impact on mode choice.</li> </ul>

Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Transportation Environment</b>	Supports increase in use of transit	3	<ul style="list-style-type: none"> <li>Alternative 3 fully implements the Quality Transit Network</li> <li>Alternative 3 also adds 13.5km of widening for the resiliency network, but widenings would have a small benefit to car capacity and a negligible impact on mode choice.</li> </ul>
<b>Transportation Environment</b>	Manages congestion on car network	9%	<ul style="list-style-type: none"> <li>Average of AM and PM</li> <li>In the AM there will be 8% of links in the networks that exceed a v/c of 0.9</li> <li>In the PM there will be 10% of networks that exceed a v/c of 0.9</li> </ul>
<b>Transportation Environment</b>	Manages congestion on truck routes	23%	<ul style="list-style-type: none"> <li>Average of AM and PM</li> <li>In the AM there will be 21% of links in the networks that exceed a v/c of 0.9</li> <li>In the PM there will be 24% of networks that exceed a v/c of 0.9</li> </ul>
<b>Cost Environment</b>	Limits capital costs	67.6	<ul style="list-style-type: none"> <li>67.6 km widening</li> </ul>
<b>Cost Environment</b>	Limits operations and maintenance (O+M) costs	1	<ul style="list-style-type: none"> <li>Alternative 3 implements the AAA cycling network</li> </ul>
<b>Cost Environment</b>	Limits transit operation costs	3	<ul style="list-style-type: none"> <li>Alternative 3 fully implements the Quality Transit Network</li> </ul>

## Summary

- Alternative 3 implements the Pedestrian, Cycling Spine and Quality Transit Network which results in improvements to transportation options and safety for vulnerable road users, although there are capital and operations and maintenance associated with implementing these improvements
- Alternative 3 has footprint impacts due to lane-km widening, which results in opportunities to add streetscaping
- Alternative 3 would result in lower levels of GHG by shifting toward sustainable modes
- Alternative 3 Aligns with Guelph planning objectives by supporting intensification in key areas with transit and promoting active transportation
- Alternative 3 does not widen streets to increase car capacity, though streets could be widened in the future to meet a range of transportation needs

**Table B5: Evaluation Summary of Alternative 4 - Car Efficiency Focus**

Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Natural and Social Environment</b>	Reduces potential for footprint (property) impacts on natural and social heritage features	67.6	<ul style="list-style-type: none"> <li>67.6 km of widening resulting in potential impacts to natural and social heritage features</li> </ul>
<b>Natural and Social Environment</b>	Creates opportunities for additional streetscaping	67.6	<ul style="list-style-type: none"> <li>67.6 km widening which creates additional opportunities for streetscaping</li> </ul>
<b>Natural and Social Environment</b>	Increases transportation options for all travelers	1	<ul style="list-style-type: none"> <li>Alternative 4 fully implements the Pedestrian and Cycling Spine Networks, improving the options to walk and cycle</li> <li>Alternative 4 partially implements the Quality Transit Network</li> </ul>
<b>Natural and Social Environment</b>	Reduces GHG by supporting mode share shift	140.3	<ul style="list-style-type: none"> <li>AM GHG emissions peak is 65.7 and PM peak is 74.6 tonnes of CO<sub>2</sub></li> </ul>

Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Natural and Social Environment</b>	Aligns with Guelph's planning objectives	0	<ul style="list-style-type: none"> <li>Aligns with the City's existing planning directions on enabling walkability and supporting transit</li> <li>Supports: <ul style="list-style-type: none"> <li>Use of transit and active modes,</li> <li>Easy access to a range of transportation options,</li> <li>Growth in the intensification corridors, mixed-use nodes, and Downtown,</li> <li>Development strategies and Secondary Plans for Downtown, GID, and Clair-Maltby, and</li> <li>Minimum impact natural environment</li> </ul> </li> <li>Increases car capacity which may encourage car travel, and does not work toward reducing GHG</li> </ul>
<b>Transportation Environment</b>	Improves safety of vulnerable users	3	<ul style="list-style-type: none"> <li>Fully implements the Cycling Spine network, improving the core network of cycling facilities to meet the needs of cyclists of All Ages and Abilities</li> </ul>
<b>Transportation Environment</b>	Improves resiliency of transportation system	67.6	<ul style="list-style-type: none"> <li>Adds about 67.6 km of four lane street to the network</li> <li>Fully implements the the Pedestrian, Cycling Spine, Quality Transit, and Resilience Networks supporting multiple modes</li> </ul>
<b>Transportation Environment</b>	Supports increase in use of active transportation modes	1	<ul style="list-style-type: none"> <li>Alternative 4 fully implements the Cycling Spine Network, improving the core network of cycling facilities to meet the needs of cyclists of All Ages and Abilities</li> <li>Alternative 4 also adds 19.9 km of widening for the resiliency network and 10.9 km of widening for car capacity, which increases car capacity</li> </ul>

Criteria Group	Criteria	Score	Rationale for Score and Data
<b>Transportation Environment</b>	Supports increase in use of transit	1	<ul style="list-style-type: none"> <li>Alternative 4 implements the Quality Transit Network, but reduces the infrastructure dedicated to transit from 56km (conversion and widening) to 14km (widening), which may not result in an increased use in transit</li> </ul>
<b>Transportation Environment</b>	Manages congestion on car network	8%	<ul style="list-style-type: none"> <li>Average of AM and PM</li> <li>In the AM there will be 7% of all link in the networks that exceed a v/c of 0.9</li> <li>In the PM there will be 9% of links in the networks that exceed a v/c of 0.9</li> </ul>
<b>Transportation Environment</b>	Manages congestion on truck routes	18%	<ul style="list-style-type: none"> <li>Average of AM and PM</li> <li>In the AM there will be 17% of all link in the networks that exceed a v/c of 0.9</li> <li>In the PM there will be 20% of links in the networks that exceed a v/c of 0.9</li> </ul>
<b>Cost Environment</b>	Limits capital costs	67.6	<ul style="list-style-type: none"> <li>67.6 km widening</li> </ul>
<b>Cost Environment</b>	Limits operations and maintenance (O+M) costs	1	<ul style="list-style-type: none"> <li>Alternative 4 implements the AAA cycling network</li> </ul>
<b>Cost Environment</b>	Limits transit operation costs	1	<ul style="list-style-type: none"> <li>In Alternative 4 the Quality Transit Network corridor improvements are limited to optimization and only select widenings</li> </ul>

## Summary

- Alternative 4 implements the Pedestrian and Cycling Spine which results in improvements to active transportation options, and safety for vulnerable road users, although there are capital and operations and maintenance associated with implementing these improvements
- Alternative 4 does not implement the full Quality Transit Network which may not result in significant mode shift toward transit
- Alternative 4 has footprint impacts due to lane-km widening, which may impact natural and social heritage features, although this would create opportunities to improve the streetscape
- Alternative 4 does not lower the GHG emissions as much as the other alternatives
- Alternative 4 aligns with Guelph planning objectives by supporting active transportation modes, but does not support transit prioritization to the same level as Alternatives 2 and 3, and adds capacity for cars which may encourage car use
- Alternative 4 reduces delay for vehicles and trucks