Appendix B

Analysis and Evaluation Report

ANALYSIS AND EVALUATION REPORT

County of Peterborough
Active Transportation Master Plan

FINAL

Presented to:

County of Peterborough
310 Armour Road
Peterborough, ON
K9H 1Y6

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BT ENGINEERING

EXECUTIVE SUMMARY

An Active Transportation Master Plan (ATMP) is being undertaken by the County of Peterborough, as identified in the Transportation Master Plan (TMP) for the promotion of cycling and walking, under the Municipal Class Environmental Assessment (amended 2015). The Master Planning Process, as part of the Municipal Class EA, is a planning process that considers all potential natural, social, cultural and economic environments as well as property and land use effects. The project is being described as the Active Transportation Master Plan (ATMP). Based on the study recommendations and public and agency interest, the study documentation will be an ATMP document.

This report summarizes the process used to systematically analyze, evaluate and rank candidate projects for active transportation improvements in the County. This sequential methodology includes community and stakeholder input at all key stages of the study. This document will become a component of the ATMP document which will address the active transportation improvement alternatives within the County.

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GLOSSARY OF TERMS

AADT	Annual Average Daily Traffic – the average 24-hour, two-way traffic for the period from January 1st to December 31st.
Alignment	The vertical and horizontal position of a road.
Alternative	Well-defined and distinct course of action that fulfills a given set of requirements. The EA Act distinguishes between Alternatives to the Undertaking and Alternative Methods of Carrying out the Undertaking.
Alternative Planning Solutions	Alternative ways of solving problems or meeting demand (Alternatives to the Undertaking).
Alternative Design Concepts	Alternative ways of solving a documented transportation deficiency or taking advantage of an opportunity. (Alternative methods of carrying out the undertaking).
Alternative Project	Alternative Planning Solution, see above.
ANSI	Area of Natural or Scientific Interest
ATMP	Active Transportation Master Plan
Berm	Earth landform used to screen areas.
BMP	Best Management Practice
BRT	Bus Rapid Transit
Bump-up	The act of requesting that an environmental assessment initiated as a class EA be required to follow the individual EA process. The change is a result of a decision by the proponent or by the Minister of Environment to require that an individual environmental assessment be conducted. This is described as a Part II Order. Also see Part II order.
Bypass	A form of realignment in which the route is intended to go around a particular feature or community.
Canadian Environmental Assessment Act (CEAA)	The CEAA applies to projects for which the federal government holds decision-making authority. It is legislation that identifies the responsibilities and procedures for the environmental assessment.
Class Environmental Assessment Document	An individual environmental report documenting a planning process which is formally submitted under the EA Act. Once the Class EA document is approved, projects covered by the class can be implemented without having to seek further approvals under the EA Act provided the Class EA process is followed.
Class Environmental Assessment Process	A planning process established for a group of projects in order to ensure compliance with the Environmental Assessment (EA) Act. The EA Act, in Section 13, makes provision for the establishment of Class Environmental Assessments.
Coarse Screening	Initial screening of a group of alternatives. Also see Screening.
Compensation	The replacement of natural habitat lost through implementation of a project, where implementation techniques and other measures could not alleviate the effects.
Corridor	A band variable width between two locations. In transportation studies a corridor is a defined area where a new or improved transportation facility might be located.
Criterion(a)	Explicit feature or consideration used for comparison of alternatives.
Cumulative Effects Assessment	Cumulative Effects Assessment assesses the interaction and combination of the residual environmental effects of the project during its construction and operational phases on measures to prevent or lessen the predicted impacts with the same environmental effects from other past, present, and reasonably foreseeable future projects and activities.
Decibel (dB)	A logarithmic unit of measure used for expressing level of sound.
dBA	‘A’ weighted sound level; the human ear cannot hear the very high and the very low sound frequencies as well as the mid-frequencies of sounds, and hence the predicted sound levels, measured in dBA, are a reasonable accurate approximation of sound levels heard by the human ear.
Detail Design	The final stage in the design process in which the engineering and environmental components of preliminary design are refined and

	details concerning, for example, property, drainage, utility relocations and quantity estimate requirements are prepared, and contract documents and drawings are produced.
DFO	Department of Fisheries and Oceans.
Dichotomous Utility Function	A utility function that represents a desirable or undesirable response from a criterion (yes/no, present/absent, true/false).
Dimensionless Number	A number that does not have a unit of measurement, such as length (m), time (s), mass (kg) associated with it. Examples include Utility Score and Overall Score.
Do Nothing Alternative	This alternative is a mandatory requirement of the Class EA. This option is the null or no action alternative and it becomes the baseline to which all alternatives are compared.
Double Counting	Unintentional accounting for a particular factor or attribute more than once in the evaluation.
EA	Environmental Assessment
EA Act	Ontario Environmental Assessment Act (as amended by S.O. 1996 C.27), RSO 1980.
Environment	• Air, land or water, • Plant and animal life, including humans, • The social, economic and cultural conditions that influence the life of man or a community, • Any building structure, machine or other device or thing made by man, • Any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities or man, or • Any part or combination of the foregoing and the interrelationships between any two or more of them, in or of Ontario.
Environmental Effect	A change in the existing conditions of the environment which may have either beneficial (positive) or detrimental (negative) effects.
Environmentally Sensitive Areas (ESA's)	Those areas identified by any agency or level of government which contain natural features, ecological functions or cultural, historical or visual amenities which are susceptible to disturbance from human activities and which warrant protection.
Equivalent Sound Level (Leq)	The level of continuous sound having the same energy as a fluctuating sound in a given time period. In this report Leq refers to 24-hour, 16 or 18-hour averages.
ESR	Environmental Study Report.
Evaluation	The outcome of a process that appraises the advantages and disadvantages of alternatives.
Evaluation Process	The process involving the identification of criteria, rating of predicted impacts, assignment of weights to criteria, aggregation of weights, and rating to produce an ordering of preference of alternatives.
External Agencies	Include Federal departments and agencies, Provincial ministries and agencies, conservation authorities, municipalities, Crown corporations or other agencies other than the City of Cambridge.
Factor	See Global Factors.
Flyover	A grade separation with the side road over the freeway. Also described as an underpass.
Freeway	Freeway is defined as an existing completed, partially developed (staged) or proposed divided highway with full control of access and grade separated intersections. This definition may include some highways that are not officially designated as freeways.
Function Form	See Utility Function
Grade Separation	The separation of a cross road with a vertical grade difference from the freeway. Also see overpass, underpass or flyover.
Global Factors	The main categories of factors, (i.e. Transportation, Economic Environment, Natural Environment, Social and Cultural, Land Use and Property and Cost). All sub-factors are components or a subset of global factors.
HADD	Harmful Alteration, Disturbance or Destruction of fish habitat.
Harmonized EA Process	Harmonized planning process for this project that will meet both the Provincial and Federal EA requirements.

Individual Environmental Assessment	An Environmental Assessment for an undertaking to which the EA Act applies and which requires formal review and approval under the Act.
Linear Utility Function	A function that can be defined using a linear equation of the form: y = a + bx, where y is the dependent variable (raw score) x is the independent variable (measurement) b is the slope of the function, and a is the y intercept, normalized in this study to be equal to one or zero
Matrix	A rectangular array of criteria and values.
Mitigating Measure	A measure that is incorporated into a project to reduce, eliminate or ameliorate detrimental environmental effects.
Mitigation	Taking actions that either remove or alleviate to some degree the negative impacts associated with the implementation of alternatives.
MNRF	Ministry of Natural Resources and Forestry
MOECC	Ministry of the Environment and Climate Change
MTO	Ministry of Transportation Ontario
Multi-Use Pathway (MUP)	A multi-use pathway is physically separated from motor vehicle traffic, and can be either within the highway right-of-way or within an independent right-of-way. Multi-use pathways include bicycle paths, rail-trails or other facilities built for bicycle and pedestrian traffic.
Noise Attenuation	A mitigation measure used to lessen the intensity of the noise level (dBA) where the noise level is increased in a noise sensitive area greater than 5 dBA 10 years after completion.
NSA	Noise Sensitive Area is a noise sensitive land use, which has an outdoor living area associated with the residential unit.
OLA	Outdoor Living Area is the part of an outdoor amenity area provided for the quiet enjoyment of the outdoor environment.
OTM Book 15	Ontario Traffic Manual for Pedestrian Crossing Facilities.
OTM Book 18	Ontario Traffic Manual for Cycling Facilities
Overall Score	The final value of an alternative's score derived by summing all of the weighted scores.
Part II Order	The Environmental Assessment Act (EAA) has provisions that allow an interested person, Aboriginal community, or government agency to ask for a higher level of assessment for a class environmental assessment (Class EA) project if they feel that there are outstanding issues that have not been adequately addressed. This is known as a Part II Order.
Planning Alternatives	Planning alternatives are "alternative methods" under the EA Act. Identification of significant transportation engineering opportunities while protecting significant environmental features as much as possible.
Planning Solutions	That part of the planning and design process where alternatives to the undertaking and alternative routes are identified and assessed. Also described as "Alternative Project" under the federal EA Act.
POH	Public Open House
Prime Agricultural Areas	Prime agricultural areas as defined in municipal official plans and other government policy sources.
Project	A specific undertaking planned and implemented in accordance with this Class EA including all those activities necessary to solve a specific transportation problem.
Proponent	A person or agency that carries or proposes to carry out an undertaking, or is the owner or person having change, management, or control of an undertaking.
Public	Includes the general public, interest groups, associates, community groups, and individuals, including property owners.
RA	Responsible Authority from the Federal government who will act as the lead agency in administering the processing of the federal CEAA screening for this project.
Ranking	The ordering of alternatives from first to last for comparison purposes.
Raw Data	The measurement of the impact, or measured data, under each

	criterion.
Realignment	Replacement or upgrading of an existing roadway on a new or revised alignment.
RBCI	Rural Bicycle Compatibility Index. A numerical score reflecting how well-suited a roadway is towards cyclists based on its paved shoulder width and its traffic volume.
Recommended Plan	That part of the planning and design process, during which various alternative solutions are examined and evaluated including consideration of environmental effects and mitigation measures; the recommended design solution is then developed in sufficient detail to ensure that the horizontal and vertical controls are physically compatible with the proposed site, that the requirements of lands and rights-of-way are satisfactorily identified, and that the basic design criteria or features to be contained in the design have been fully recognized and documented in sufficient graphic detail to ensure their feasibility.
Risk	Probability that a given outcome will or will not materialize. Distinct from uncertainty in that the alternative outcomes are known or defined and that the probability of each is measureable.
Route Alternatives	Location alternatives within a corridor.
SADT	Summer Average Daily Traffic – the average 24-hour, two way traffic for the period from July 1st to August 31st including weekends.
Screening	Process of eliminating alternatives from further consideration, which do not meet minimum conditions or categorical requirements.
Step Function	A utility function can be defined by several linear functions within separate ranges that have a slope equal to zero. For this study, two step functions are used: Case A: y = 1, for x = desirable and y = 0, for x = undesirable Case B: y = 1 for x = desirable, y = 0.5 for x = medium performance and y = o for x = undesirable
Study Team	The Study Team will include the City of Cambridge and Consultant Technical management team who will lead all technical elements of the study.
Sub-factor	A single criterion used for the evaluation. Each sub-factor is grouped under one of the factors.
TMP	Transportation Master Plan
TPA	Technically Preferred Alternative
TPP	Technically Preferred Plan
Traceability	Characteristic of an evaluation process which enables its development and implementation to be followed with ease.
Undertaking	In keeping with the definition of the Environmental Assessment act, a project or activity subject to an Environmental Assessment.
Utility Function	A function (linear, step, dichotomous) that represents the Utility Score versus the criterion measurement or desirableness.
Utility Score	The “y” value derived from the Utility Function of the measurement of the impact induced by a particular alternative’s criterion. A measurement of the usefulness or attractiveness of an alternative with respect to an individual evaluation criterion based on its measured effect (a number between 0 and 1). The utility score is dimensionless.
Weight	The importance attributed to a criterion relative to other criterion. The value of the weight is expressed in a percentage and the sum of all criterion weights is equal to 100%.
Weighted Additive Method	The method used in the quantitative evaluation of alternatives, which reduces the project’s numerous criteria into a dimensionless number for each alternative suitable for comparison.
Weighted Score	A raw score that has been multiplied by the criterion weights. The weighted scores reflect the social value or importance of the specific group providing weights.

1 INTRODUCTION

The purpose of this report is to summarize the analysis and evaluation of the candidate projects for the Active Transportation Master Plan (ATMP) in the County of Peterborough. This report is a component of the final ATMP document. Based on the study recommendations and public and agency interest, the study documentation will be an ATMP. Dependent on the Municipal Class EA Schedule of projects carried forward they may be Schedule A, A+, B or C projects. Schedule B and C projects will include 30 day public review periods.

The EA process requires that all alternatives be evaluated in a manner that is systematic, traceable and transparent. This includes a commitment to open and meaningful public consultation. The analysis and evaluation process must recognize public and agency input as well as Municipal and MTO standards and requirements. This report documents the decision-making process used to rank the candidate projects, including the following activities:

- Development of a long list of active transportation improvement alternatives;
- Identification of the candidate long list of assessment factors and sub-factors and screening out those where there were no meaningful and measurable differences among the alternatives as well as those that do not apply to the study area;
- Screening out of alternatives which do not achieve the basic project requirements and/or do not comply with County standards/requirements;
- Identification of the benefits and potential impacts for the short-listed alternatives;
- Evaluation of select groups of alternatives (Active Transportation Programs and Policies) using a qualitative assessment where the number of alternatives was low or where there were a small number of evaluation criteria to distinguish between alternatives;
- Stakeholder meetings to review alternatives and evaluation criteria;
- Prioritization and ranking of short-listed alternatives using a recognized evaluation technique including weighting the relative importance of criteria; and,
- Ranking alternatives.

At the conclusion of the prioritization exercise, the candidate projects will be reviewed by the County, Evaluation Committee and public for input and comment.

2 STUDY PURPOSE

2.1 Scope

This plan will prioritize the candidate projects within the County of Peterborough which have been identified by the consulting team, previous studies or the public at PIC No. 1.

This study is following the Class EA process for a Master Plan project under the Municipal Class Environmental Assessment (EA). At the completion of this study, an ATMP document will be prepared and published for public review.

Several candidate alternatives have been reviewed for active transportation within the County (Study Area). Engineering, environmental, and property requirements will be established, along with the identification of mitigation measures to reduce or negate short term (construction related) and long term residual effects.

3 GENERATION AND ASSESSMENT OF ACTIVE TRANSPORTATION ALTERNATIVES

The analysis and evaluation process is a central requirement of the EA process and has been the subject of review by the Ministry of the Environment and Climate Change (MOECC). MOECC's review of *Evaluation Methods in Environmental Assessment* provided the framework for the detailed evaluation processes to be followed for this study.

Within the Study Area, numerous candidate projects have been generated for consideration. The long list of candidate projects and a description of each candidate project are found in this section of the report.

3.1 Candidate Projects

Active Transportation Candidate Projects

A total of 134 projects were identified through:

- A conceptual active transportation/cycling network for Peterborough County that identified both on-road and off-road (trail) active transportation facilities;
- Discussions with interest groups such as the Peterborough Cycling Club;
- Discussions with the Technical Advisory Committee, which included the County of Peterborough; and
- Discussions with members of the public.

Each candidate project had five potential sub-projects as a means of implementing an active transportation alternative:

- Sub-project A: Paved Shoulder
- Sub-project B: Paved Multi-use Path (MUP);
- Sub-project C: Shared use of the general lane;
- Sub-project D: Bike Lane; and
- Sub-project E: Other project.

The alternatives were coarse screened based on implementation feasibility and need. Municipal roads were coarse screened to carry forward only sub-project C: shared use of the general lane based on demand. County roads were coarse screened to have a paved shoulder, a paved MUP (where feasible) or both. Those candidate projects with both were carried forward for evaluation. No candidate projects were recommended to carry forward bike lanes. Provincial roads were recommended to have a paved shoulder. Finally, a list of "Other Projects" was identified which included pedestrian facilities, parking lots and trails in the County.

The long list of candidate projects can be found in **Table 3.1**. **Figure 3.2** to **Figure 3.6** illustrate the grouping of the candidate projects for: County Roads; Municipal Roads; Multi-use Trails; Other Facilities; and Provincial Roads.

Waterway Candidate Projects

Canoe routes were identified at the first Public Information Centre and are illustrated as dark blue lines in **Figure 3.7**.

Table 3.1: Land Based Candidate Projects

Alt	Description of Alternative
1	Hooton Drive (Shared Use of General Lane)
2	Stewart Line (Shared Use of General Lane)
3	CR 15 (North Monaghan Parkway) (Paved Shoulder)
4	Sharpe Line / Brown Line(Shared Use of General Lane)
5	CR 503 (Paved Shoulder)
6	Moore Drive(Shared Use of General Lane)
7	CR 11/Airport Road (Paved Shoulder)
8	CR 2 N-S (Paved Shoulder)
9	CR 31 (Paved Shoulder)
10	CR 2 E-W (Paved Shoulder)
11	Cloverdale Line / Storell Road (Shared Use of General Lane)
12	CR 21 (Wallace Point Road) (Paved Shoulder)
13A	Gifford Causeway (MUP with EA approved platform width)
13B	Gifford Causeway (Additional widening with Paved MUP)
14	CR 34 (Paved Shoulder)
15	CR 4 (Paved Shoulder)
16	Lang Road/Allandale Road/Nelson Road (Shared Use of General Lane)
17	Drummond Line (Shared Use of General Lane)
18	Old Norwood Road/Ashburnham Drive (Shared Use of General Lane)
19	Division Road (Shared Use of General Lane)
20	University Road/Pioneer Road (Shared Use of General Lane)
21	CR 32 (Paved Shoulder)
22	Villiers Line/Indian River Line (Shared Use of General Lane)
23	Asphodal 7th Line (Shared Use of General Lane)
24	Dummer Asphodel Road (CR 8) (Paved Shoulder)

Table 3.1: Land Based Candidate Projects	
Alt	**Description of Alternative**
25	CR 8 (West of South Street) CR4 (Paved Shoulder)
26	CR 38 (South Street North of CR 8 - Warsaw) (Paved Shoulder)
27	CR 29 - CR 6 (Paved Shoulder)
28	3 Line/Lynchs Rock Road (Shared Use of General Lane)
29	CR 6 (West of 4 Line) (Paved Shoulder)
30	Miller Road (Shared Use of General Lane)
31	Preston Road (Shared Use of General Lane)
32	CR 25 (Paved Shoulder)
33	CR 2/Wallace Point Road (Paved Shoulder)
34	Bridgenorth (E Communication Road) / 7 Line (Shared Use of General Lane)
35	Camp Line Road (Shared Use of General Lane)
36	Hilliard Street (Shared Use of General Lane)
37	Northey's Road/Lakefield 14 Line/Lakefield 15 Line/North School Road (Shared Use of General Lane)
38A-I	Highway 28 (Paved Shoulder Section 1)
38A-II	Highway 28 (Paved Shoulder Section 2)
38B-I	Highway 28 (MUP Section 1)
38B-II	Highway 28 (MUP Section 2)
39	Caves Road / Sawmill Road / 3rd Line North (Shared Use of General Lane)
40	Birchview Road (Shared Use of General Lane)
41	CR 6 (Paved Shoulder)
42	CR 40 / CR 45 (Paved Shoulder)
43	CR 42 (Paved Shoulder)
44	Browns Line Road/Concession Road 8 (Shared Use of General Lane)
45	CR 48 (Paved Shoulder)
46	Road Lake Road / 6 Line (Shared Use of General Lane)
47	CR 46 (Paved Shoulder)
48	CR 30/CR 44 (Paved Shoulder)
49	Northeys Bay Road/CR 6 (Paved Shoulder)
50	Pedestrian lookout on the north side of the causeway (Other Project)
51-I	Highway 7 (TransCanada) (Paved Shoulder Section 1)
51-II	Highway 7 (TransCanada) (Paved Shoulder Section 2)

Table 3.1: Land Based Candidate Projects	
Alt	**Description of Alternative**
51-III	Highway 7 (TransCanada) (Paved Shoulder Section 3)
51-IV	Highway 7 (TransCanada) (Paved Shoulder Section 4)
51-V	Highway 7 (TransCanada) (Paved Shoulder Section 5)
52	Ramps on Highway 7 to access the TransCanada pathway (south of Fowlers Corners) (Other Project)
53	Construct parking area/improvements at Millbrook conservation area trails with signage to match the Haroldtown lot (Other Project)
54	Construct parking area/improvements at Havelock conservation area trails with signage to match the Haroldtown lot (Other Project)
55	(Trent Lakes) Add link from new subdivision to Adam and Eve Trail (Other Project)
56A-I	County Road Northern Cycle Route Buckhorn - Burleigh Falls (Paved Shoulder Section 1)
56A-II	County Road Northern Cycle Route Buckhorn - Burleigh Falls(Paved Shoulder Section 2)
56B-I	County Road Northern Cycle Route Buckhorn - Burleigh Falls (Paved MUP Section 1)
56B-II	County Road Northern Cycle Route Buckhorn - Burleigh Falls (Paved MUP Section 2)
57	Millbrook Valley Trail Expansion (Other Project)
58	CR 28 link to Northumberland County (Paved MUP)
59A	Connect Keene to the Trans Canada Trail (Paved Shoulder)
59B	Connect Keene to the Trans Canada Trail (Paved MUP)
60A	Connect Lang to TransCanada Trail (Paved Shoulder)
60B	Connect Lang to TransCanada Trail (Paved MUP)
61	Pave Rotary Greenway Trail (Other Project)
62	Provide a pedestrian link on Alma Street to School/Splash pad/Highschool/ skateboard park (Other Project)
63	Links from Havelock to Matheson Property Conservation Area trails (Other Project)
64A	Ennismore - Bridgenorth connection (Paved Shoulder)
64B	Ennismore - Bridgenorth connection (Paved MUP)
65	Pedestrian crossing on Highway 7 in Norwood (Other Project)
66	East side of Television Road (Sidewalk/MUP)
67	Apsley to Lakefield (Paved Shoulder)
68	North of Lily Lake Road (Paved Shoulder)
69A	CR 10 (Paved Shoulder)
69B	CR 10 (Paved MUP)
70	Robinson Road Loop (Shared Use of General Lane)

Table 3.1: Land Based Candidate Projects	
Alt	**Description of Alternative**
71	Trail Connections (School/ Library/ Arena to residential areas in Apsley) (Other Project)
72	TransCanada Trail Parking Lot on Ackison Road (Other Project)
73	CR 20 -CR 18 Bridgenorth (Paved Shoulder)
74	CR 24 (Paved Shoulder)
75	12th line Smith - Birch Island Road - 11 Line - Centre Line (Shared Use of General Lane)
76	Centre Line - Carnegie Avenue (Shared Use of General Lane)
77	CR 23-CR18-CR29 (Paved Shoulder)
78	West Portion, Route 1A (Shared Use of General Lane)
79	CR 8 (Paved Shoulder)
80	Keene Road (Paved Shoulder)
81	Crowley Line (Shared Use of General Lane)
82	Base Line (Shared Use of General Lane)
83	Tapley Quarter Line - Syer Line (Shared Use of General Lane)
84	CR 10 South of Millbrook (Paved Shoulder)
85	Carmel Line (Shared Use of General Lane)
86	Beardsmore Road Johnston Drive (Shared Use of General Lane)
87	CR 17 (Paved Shoulder)
88	Tara Road (Shared Use of General Lane)
89	Hooton Drive Extension to CR10 (Shared Use of General Lane)
90	CR 23 Buckhorn Road Connection (Paved Shoulder)
91	Cedar Cross Road - Oke Road (Shared Use of General Lane)
92	Centre Road (Paved Shoulder)
93A-I	Hwy 28 South of Young's Point (Paved Shoulder Section 1)
93A-II	Hwy 28 South of Young's Point (Paved Shoulder Section 2)
93B-I	Hwy 28 South of Young's Point (Paved MUP Section 1)
93B-II	Hwy 28 South of Young's Point (Paved MUP Section 2)
94	CR 17 Listowel Line (Paved Shoulder)
95	CR 23 CR 29 (Paved Shoulder)
96	Fifth Line (Shared Use of General Lane)
97	Ennis Road (Shared Use of General Lane)
98	Hiawatha – Baseline (Shared Use of General Lane)
99	Lakeside Road (Shared Use of General Lane)

Table 3.1: Land Based Candidate Projects	
Alt	**Description of Alternative**
100	Birdsall Line (Shared Use of General Lane)
101	River Road (Shared Use of General Lane)
102	Trail Connection to Baseline (Other Project)
103	Pave Bridgenorth Trail (Paved MUP)
104-I	Pave Lang-Hastings Trail (Paved MUP)
104-II	Pave Lang-Hastings Trail (Paved MUP)
105	Pave TransCanada Trail (Paved MUP)
106	Rotary Greenway Pedestrian Crossing in Lakefield (Other Project)
107	Bridgenorth Causeway Link MUP and Bridgenorth Trail Connection (Paved MUP)
108-I	CR 504 CR 46 - North Route to Apsley (Paved Shoulder Section 1)
108-II	CR 504 CR 46 - North Route to Apsley (Paved Shoulder Section 2)
109-I	CR 620 - Apsley to Coe Hill (Paved Shoulder Section 1)
109-II	CR 620 - Apsley to Coe Hill (Paved Shoulder Section 2)
110	CR 504 (Paved Shoulder)
111	Clydesdale Road/Jeff Road (Shared Use of General Lane)
112	CR 18 Chemong Road (Paved Shoulder)
113	CR36 to connect Buckhorn to Bobcaygeon (Paved Shoulder)

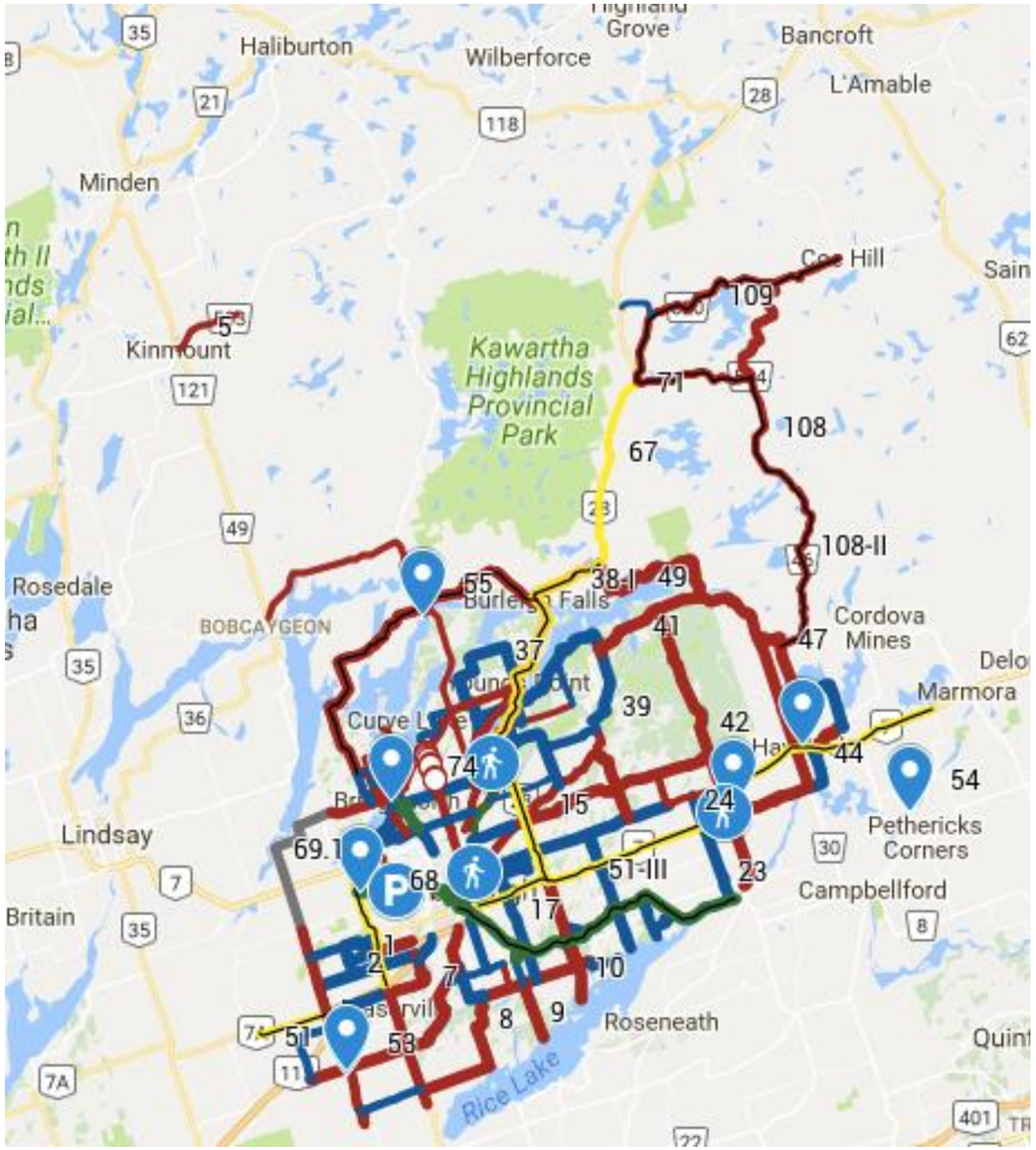

Figure 3.1: All Candidate Projects

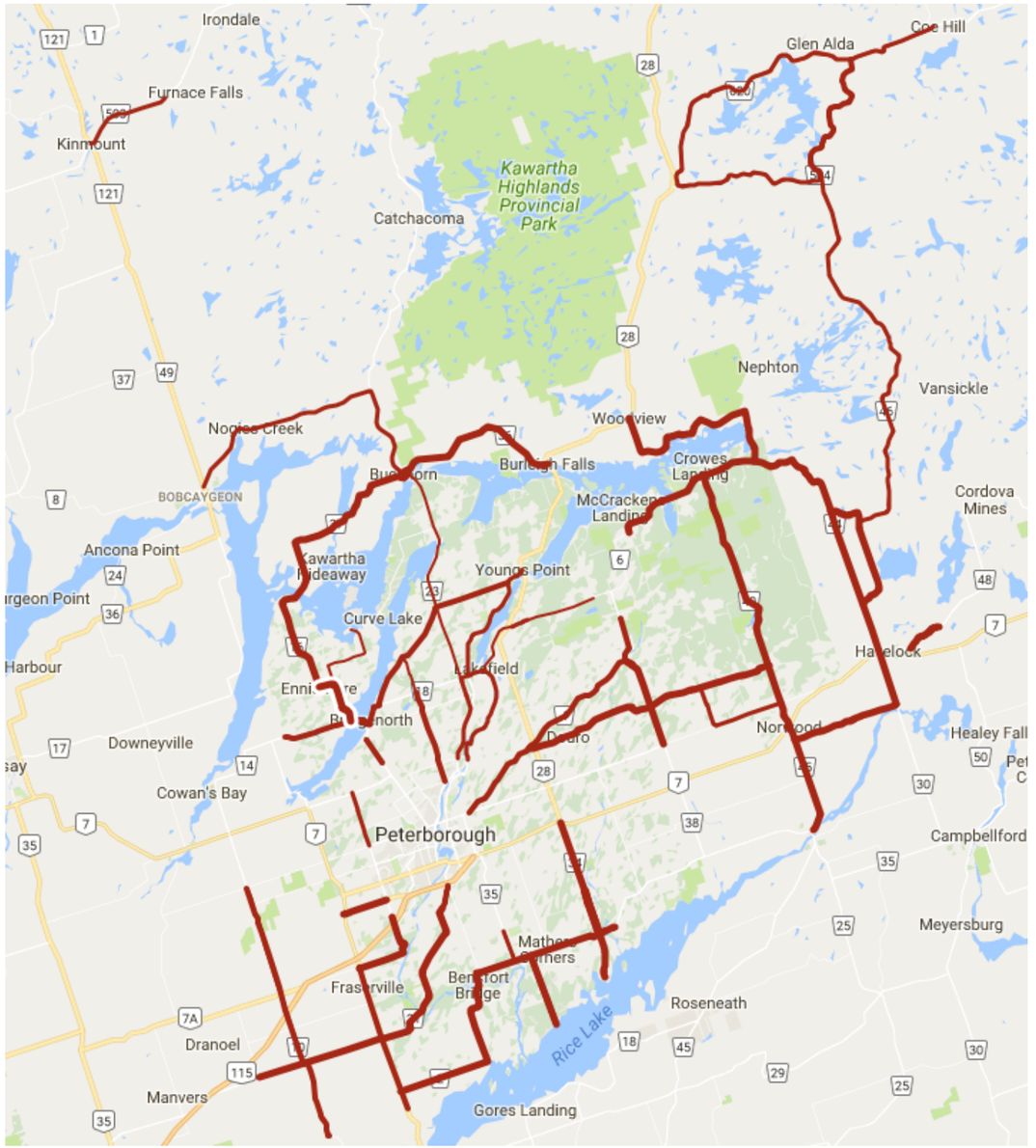

Figure 3.2: County Road Candidate Projects

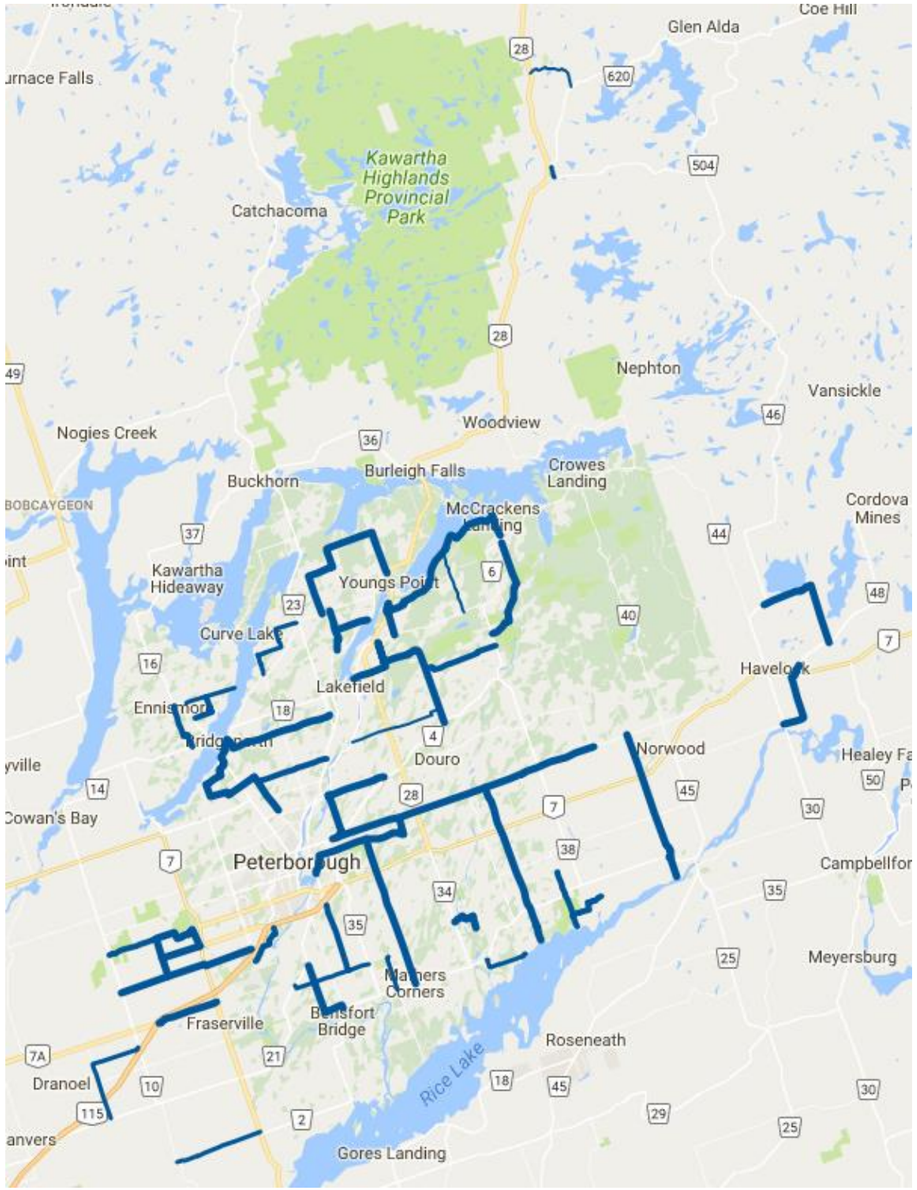

Figure 3.3: Municipal Road Candidate Projects

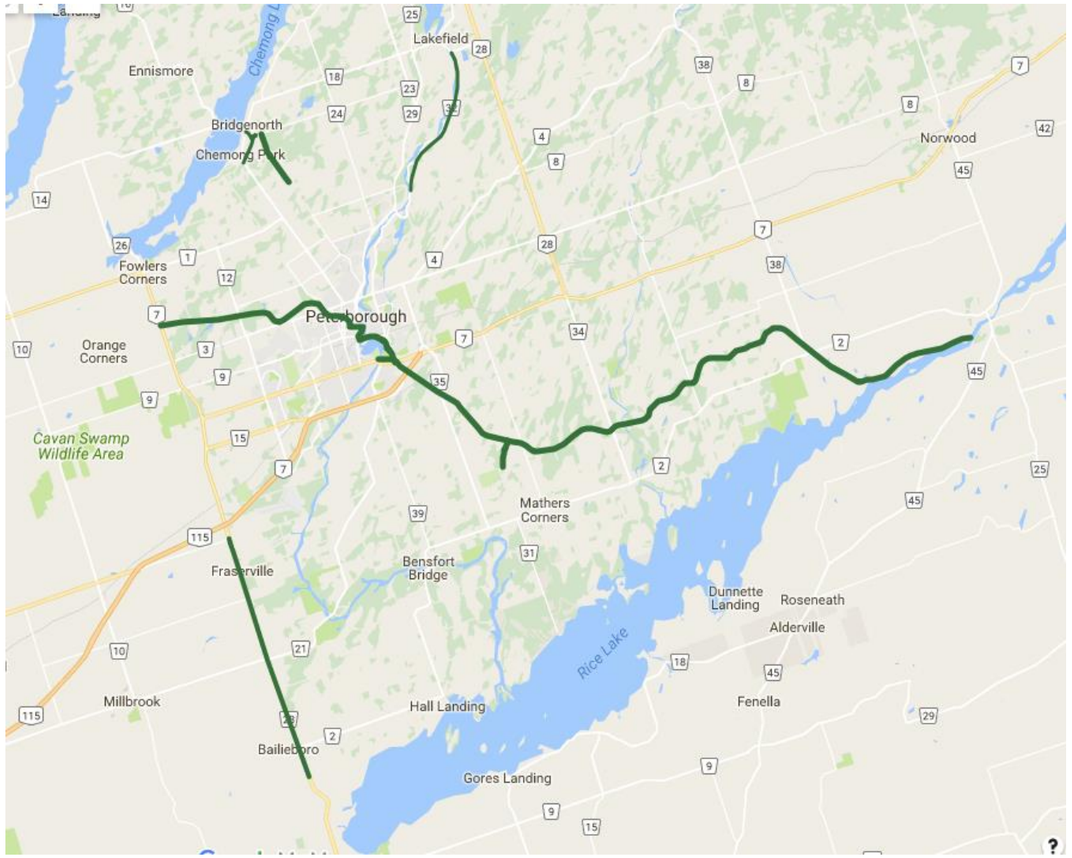

Figure 3.4: Multi-use Paths

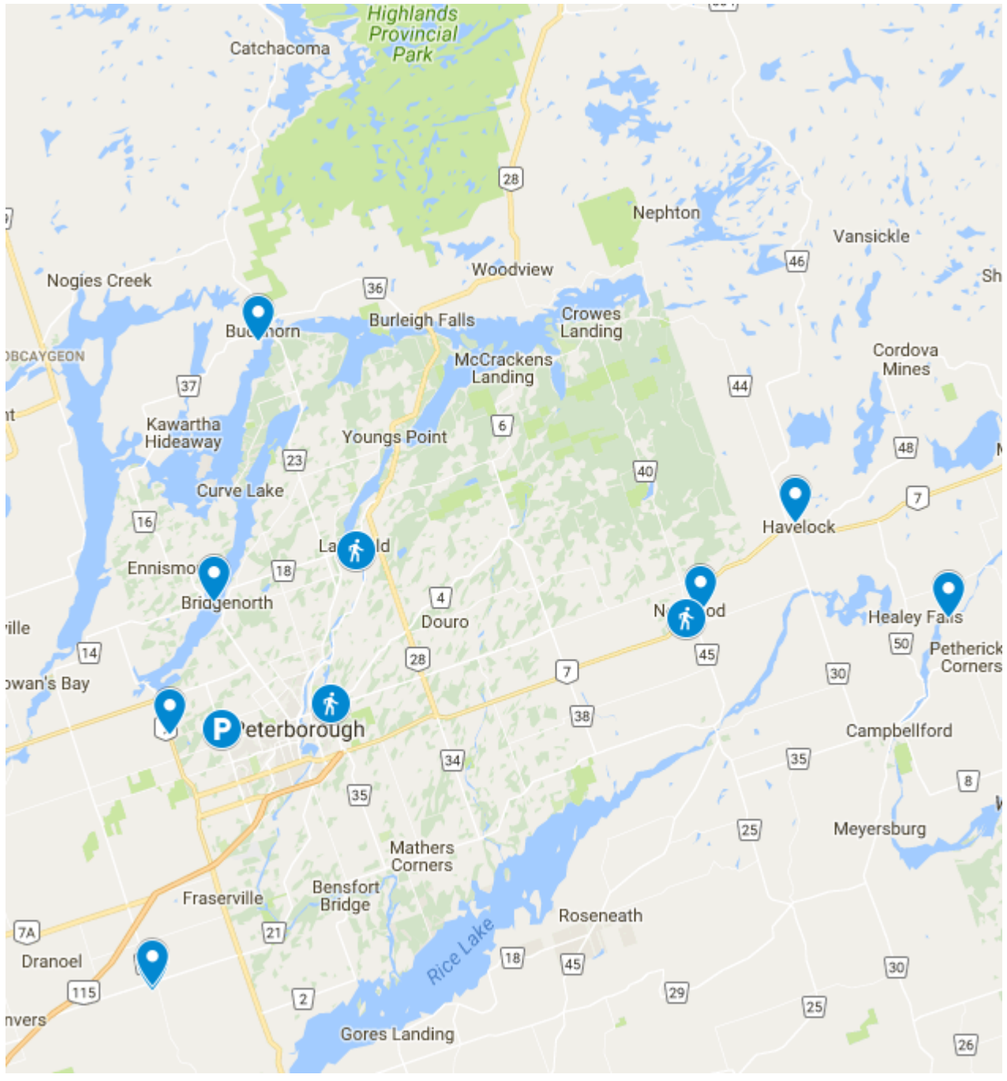

Figure 3.5: Other Facilities

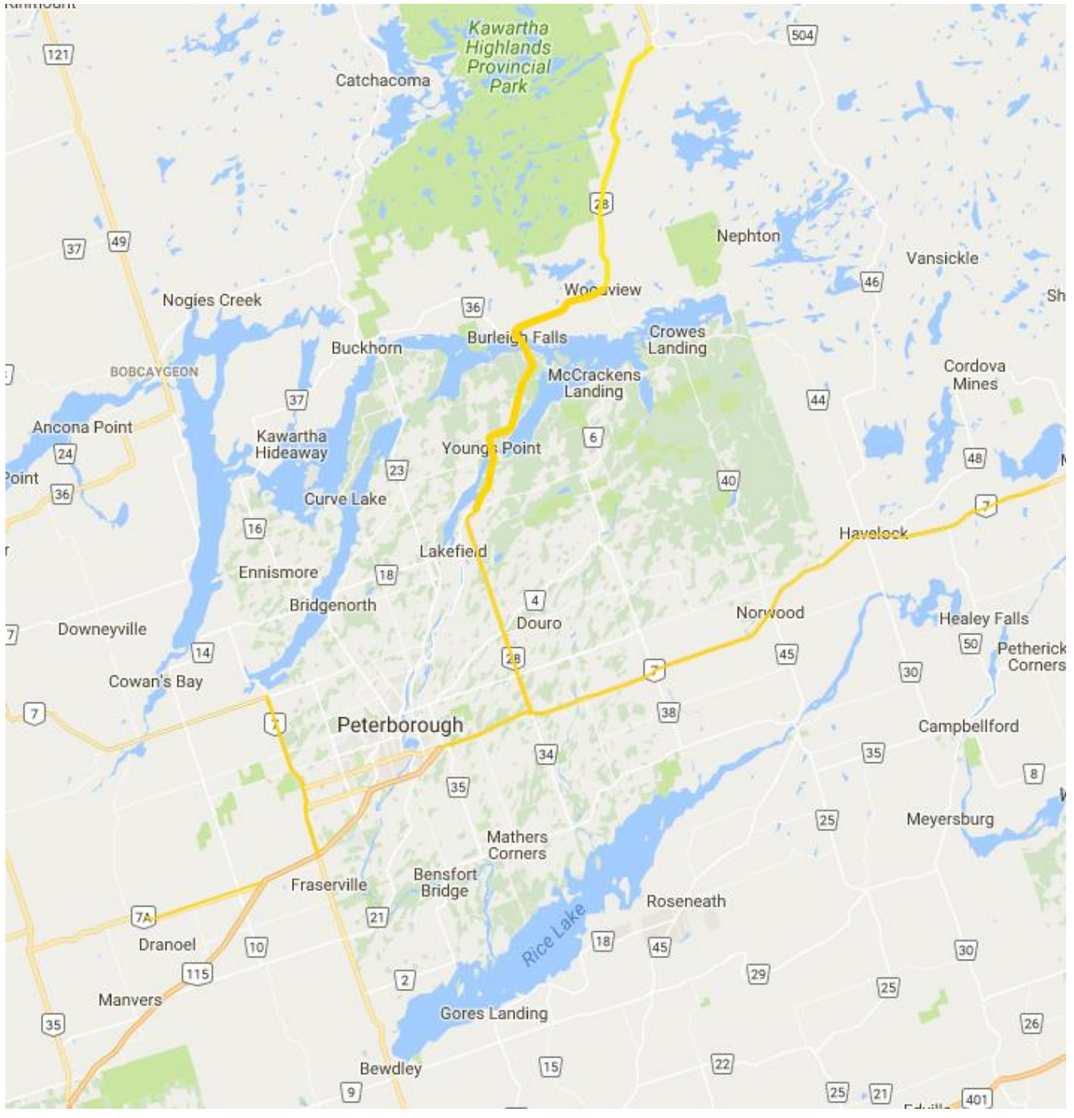

Figure 3.6: Provincial Road Candidate Projects

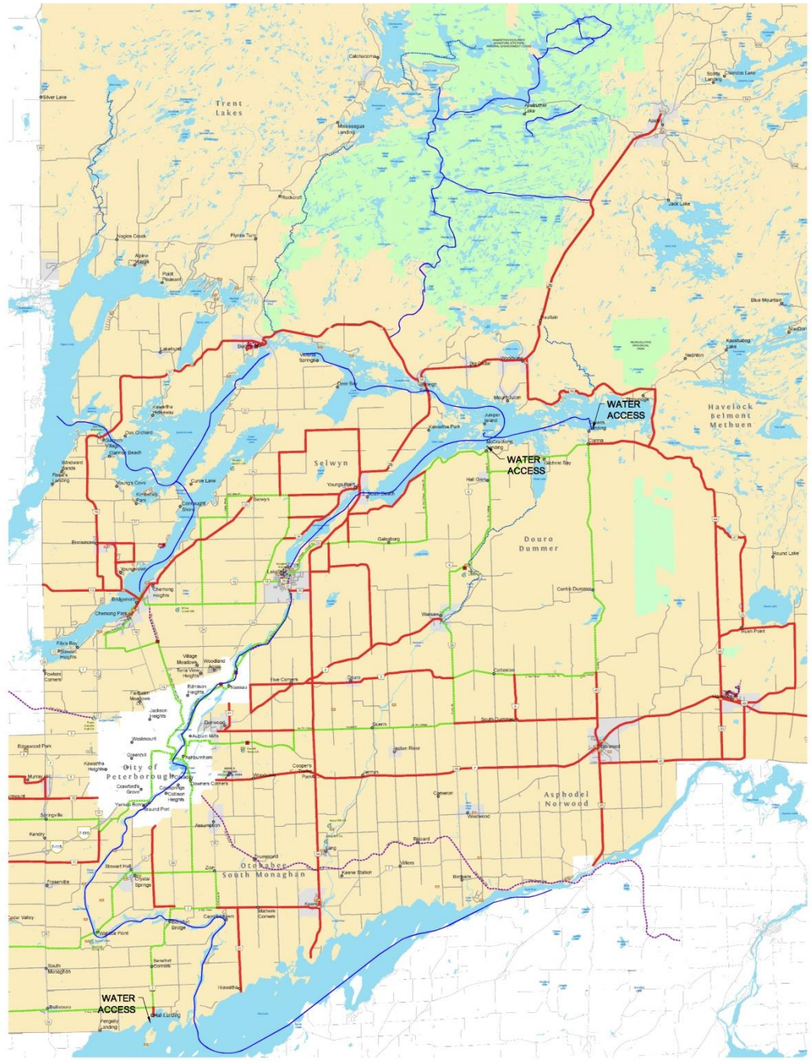

Figure 3.7: Canoe Routes

4 ANALYSIS AND EVALUATION PROCESS

This section describes the formal quantitative methodology approach known as the Multi-Attribute Trade-off System (MATS) process used in this study for evaluating and prioritizing competing candidate projects.

The recommended ATMP is a ranked list of all candidate projects. These will be presented to the public at PIC No. 2 for comment.

4.1 Qualitative Evaluation Methodology

The use of a qualitative analysis and evaluation was utilized to compare and prepare recommendations on ATMP policies and programs that were considered as part of the study. Based on this review, technical memorandum was prepared as draft recommendations for programs and policies that could be implemented by lower and upper tier municipalities. These policies may be considered in future Official Plan updates. See **Appendix D** for the Program and Policy Recommendation Memorandum.

4.2 Quantitative Evaluation Methodology

The long list of candidate projects was evaluated quantitatively. This evaluation approach is based on the "Weighted Additive Method" which focuses on the differences between the alternatives, addresses the complexity of the base data collected, and provides a traceable decision-making process. This approach is consistent with the MOECC practices for the evaluation of numerous and complex alternatives. Using the "Weighted Additive Method", overall scores are assigned to each alternative and the candidate projects are ranked relative to each other to provide a list of alternatives that best suit the County's needs for active transportation.

The steps shown below, as described in the Evaluation Methodology report included in **Appendix A**, are being followed by the Evaluation Committee to arrive at an overall score for each alternative.

- Development of Evaluation Criteria (coarse screening a long list of criteria to develop a short list of criteria to carry forward for evaluation). These factors and sub-factors are used to measure the differences between the alternatives;
- Public review of alternative projects (PIC No. 1);
- Development of definitions and utility functions for each sub-factor carried forward. (Data must be collected for each alternative under each sub-factor. Measurements for each alternative, under each sub-factor, are conducted using topographic plans, field surveys, numerical modelling etc.);
- Weighting of Criteria (assigning weights to each factor and sub-factor based on their importance to each team member's discipline or area of expertise) ;
- Stakeholder meetings on projects and utility scores;
- Rating of Alternatives (based on Average Evaluation Committee Weights);
- Public Review (PIC No. 2);
- Recommendations and presentation of a Recommended Plan.

This systematic approach is consistent with MOECC practices for the evaluation of numerous and complex alternatives. It avoids many of the pitfalls associated with qualitative assessments by using an analytical approach that measures scores based on a mathematical relationship, i.e. the degree of subjectivity by the Evaluation Committee is minimized. This traceable process allows the Evaluation Committee and the public an opportunity to assess trade-offs involved in the evaluation and use of this information in the decision making process. These steps are briefly described in the following sections.

4.3 Evaluation Criteria

The initial task in the evaluation is to develop evaluation criteria from which alternatives will be assessed. This process includes the identification of "global" groups of factors followed by the selection of a number of "local" sub-factors under the global groups.

4.3.1 *Global Evaluation Factors*

As an initial step, the evaluation criteria were grouped into broad categories, or factors, established to describe the study specific engineering and environmental concerns. Four global factors were selected which were used for each evaluation, as follows:

- Pedestrians;
- Cyclists;
- Cost; and
- Other Benefits.

4.3.2 *Evaluation Sub-Factors*

Under each of the four general global factors listed above there were a number of sub-factors selected under which measurements could be made. These sub-factors, under one of the applicable global factors, were the individual descriptors for the evaluation. The selection of the sub-factors is very important to the decision-making process because they must adequately describe the issue or aspect of the environment to be evaluated and the unique features of each alternative. Any information regarding an alternative, where there are differences among alternatives, is incorporated into the decision making process by including it as a sub-factor. Generally, the process begins by establishing a long list of potential sub-factors through discussions with the TAC, Stakeholders and the Public. Then, for each group of alternatives being evaluated the sub-factors are reviewed and screened by eliminating those that were considered equal or not applicable among the alternatives.

Table 4.1 provides the Short List of Factors and Sub-Factors carried forward for analysis of the candidate projects. Sub-factor definition pages can be found in **Appendix B** and illustrate the utility scores for each project. The Pedestrians – Connectivity – Desire Lines, Cyclists – Connectivity – Desire Lines and Other Benefits – Promote Public Health were discussed with stakeholders to determine the characteristics of these sub-factor definition utility scores. These notes are in **Appendix C**.

Table 4.1:Short List of Factors and Sub-factors for Combined Interchange Alternatives	
Factors and Sub-Factors	**Unit of Measurement**
Pedestrians	
Performance – Level of Service	High/Medium/Low
Performance – Surface Type	Yes/No
Performance – Safety	AADT
Connectivity – Desire Lines	Pedestrian Desire (1-10)
Cyclists	
Performance – Surface Type	Surface Type (ST/P/G)
Safety – Bicycle Compatibility Index	RBCI
Connectivity – Desire Lines	Cycle Desire (1-10)
Performance – Shared Use of Space	Type of Facility
Performance – Parallel Facility	Yes/No
Cost	
Environmental Effects	Yes/No
Capital Costs	$
Maintenance	Yes/No
Other Benefits	
Tourism/Economic Environment	High/Medium/Low
Promote Public Health	Health (0-10)
Performance for Vehicle Safety	Yes/No

4.4 Social Utility Function

The evaluation method (Weighted Additive Method) used to evaluate alternatives related the performance or attractiveness of alternatives using a mathematical relationship. This included two variables. The first was the raw, measured or modelled data, and the second was the utility score. The utility score is the measure of the attractiveness of the alternative under the particular sub-factor. For this study, the relationship between these two variables was described by either a linear, stepped or a dichotomous social utility function. These utility functions assigned a dimensionless score between 0 and 1 to an alternative for each sub-factor.

Examples of dichotomous, stepped and linear functions used in this study are explained in the following sections.

4.4.1 *Dichotomous Utility Function*

The dichotomous utility function, shown in **Figure 4.1**, permits the decision-makers to establish criteria that present an “either-or” situation (desirable or undesirable, negative or positive, present or absent, etc.). If a “no” answer is desirable then a utility score of ‘one’ would be assigned to this criterion, otherwise a value of ‘zero’ would be assigned; no other utility score being available.

4.4.2 *Stepped Utility Function*

The stepped utility function, shown in **Figure 4.1**, permits the decision-makers to assess criteria when the sub-factor presents more than one level of impact. An example of this situation is where the sub-factor can be categorized into “high, medium or low” degrees of impact. If a “high” answer is undesirable then a utility score or zero is assigned to this criterion, a “medium” answer would be 0.5 and “low” would have a value of 1.0 assigned to it. The stepped function may have more than three categories, with each category assigned a value between one and zero.

The value for each step is determined by the subject area specialist (expert). The maximum value found within the group is either the highest or lowest step. If the maximum value is undesirable it is given a value of zero and conversely the lowest value is desirable and is assigned a value of one.

4.4.3 *Linear Utility Function*

The linear function, shown in **Figure 4.1**, was used to convert scores for sub-factors that had varying measurements. Given a measurement, a unique score between zero and one could be assigned to a sub-factor.

The slope of the linear utility function is either negative or positive depending on the desirability of the impact. In the example below, the slope of the function is negative.

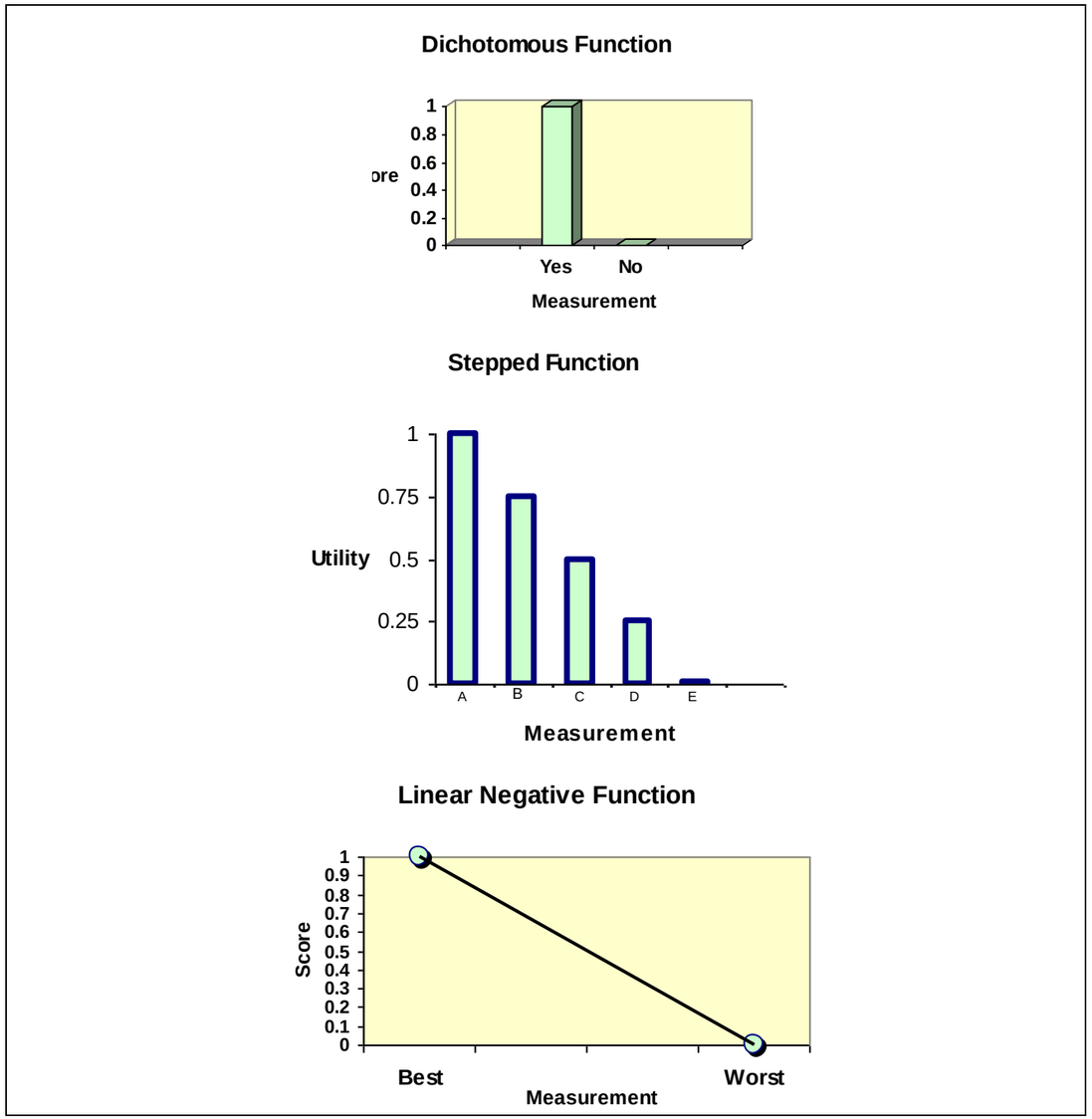

Figure 4.1: Sample Utility Functions

4.5 Weighted Global Factors and Sub-Factors

Factors were eliminated where they were not applicable (because there was no difference between alternatives or they were considered equal). The selection of weights for the factors and sub-factors was based on assessments by the Evaluation Committee. Within a group of factors, inevitably there was an ordering with some sub-factors having more importance than others. This is accounted for by each individual assigning weights to each factor and sub-factor, which is reflected in the "Global Factor Weight" and "Sub-factor Weight" columns in **Table 4.2**.

Table 4.2: Sample Global Factor / Sub-Factor Weights (Sample)

Global Factors/Sub-factors	Evaluation Committee	
	Global Factor Weight	Sub-factor Weight
Transportation	41.7%	
• Accessibility for Pedestrians		75%
• Pedestrian Safety		10.5%
• Bicycle Safety		7.8%
• Disruption of Area Traffic		6.7%
TOTAL		100%

The percentage weight for all global factors totalled (considered as global weights) is 100%. As well, the percentage weight for the sub-factors under each global factor, described as local weights, must total 100%. There is a degree of subjectivity in deciding which is the most important global factor and which is the least important factor. Every person assigning weights has a personal bias and understanding of the scope of the project and life experience. Hence, there is an advantage to having a diversified team of professionals with varied backgrounds performing the evaluation.

Each member assigns percentage weights to each global factor and sub-factor based on their opinion of the relative importance of each after a presentation by each specialist to the Evaluation Committee members. Their individual weights were then averaged to determine the Evaluation Committee weight for each global factor and sub-factor.

The results of the weighting exercise for each alternative are provided in the following sections.

4.5.1 *Weighting Results*

The weighting exercises were carried out by the Evaluation Committee. The results of the weighting exercises have been included in the following sections.

The Multi Attribute Trade-off System (MATS) evaluation method is a numerical quantitative evaluation methodology based on the weighted additive method. For the purpose of this report, they can be treated as identical terms.

Candidate Projects

The results of the weights of the MATS evaluation for the candidate projects are illustrated on **Figure 4.2.** Those projects with two options for improvements (a paved shoulder or paved MUP) only carried forward the higher ranked alternative and in general the paved shoulder was ranked higher than the paved MUP. The results of the evaluation are illustrated in **Table 4.3**. Forty-nine (49) candidate projects were identified in the County of Peterborough's original TMP and are identified as such in this table.

Table 4.3: MATS Evaluation Results

Alt	Rank	Score	Original TMP?	Project Description/Location
Alt 50	1	86.79	X	Pedestrian lookout on the north side of the causeway
Alt 84	2	80.70	X	CR 10 South of Millbrook
Alt 77	3	78.50	X	CR 23-CR 18-CR29
Alt 21	4	78.34	✓	CR 32
Alt 61	5	77.77	X	Pave Rotary Greenway Trail
Alt 9	6	77.53	✓	CR 31
Alt 55	7	77.44	X	(Trent Lakes) Add link from new subdivision to Adam and Eve Trail
Alt 72	8	77.23	X	TransCanada Trail Parking Lot on Ackison Road
Alt 53	9	77.01	X	Construct parking area/improvements at Millbrook conservation area trails with signage to match the Haroldtown lot
Alt 54	9	77.01	X	Construct parking area/improvements at Havelock conservation area trails with signage to match the Haroldtown lot
Alt 59A	11	76.99	X	Connect Keene to the TransCanada Trail
Alt 13A	12	76.94	✓	Gifford Causeway MUP with EA approved platform width
Alt 33	13	76.28	✓	CR 2/Wallace Point Road
Alt 87	14	75.26	X	CR 14 west from Gifford Causeway
Alt 60A	15	74.67	X	Connect Lang to TransCanada Trail
Alt 62	16	73.62	X	In Norwood, provide a pedestrian link on Alma Street to School/splash pad/High School/ skateboard park
Alt	17	73.50	X	Pave Bridgenorth Trail

Table 4.3: MATS Evaluation Results

Alt	Rank	Score	Original TMP?	Project Description/Location
103				
Alt 106	18	73.21	X	Rotary Greenway Pedestrian Crossing in Lakefield
Alt 38A-I	19	73.16	✓	PS on Highway 28; Burleigh Falls to Woodview
Alt 7	20	73.11	✓	CR 11/Airport Road
Alt 102	21	73.06	X	Trail Connection to Baseline
Alt 109-I	22	72.64	X	CR 620 - Apsley to Coe Hill
Alt 12	23	72.40	✓	CR 21 (Wallace Point Road)
Alt 69A	24	72.38	X	CR 10
Alt 14	25	72.29	✓	CR 34
Alt 109-II	26	72.00	X	CR 620 - Apsley to Coe Hill
Alt 32	27	71.94	✓	CR 25
Alt 74	28	71.89	X	CR 24
Alt 49	29	71.23	✓	Northeys Bay Road/CR 6
Alt 108-I	30	70.80	X	CR 504 CR 46 - North Route to Apsley
Alt 57	31	70.51	X	Millbrook Valley Trail Expansion
Alt 24	32	70.45	✓	Dummer Asphodel Road (CR 8)
Alt 41	33	70.27	✓	CR 6
Alt 38A-II	34	69.74	✓	PS on Highway 28; Burleigh Falls to Woodview
Alt 8	35	69.64	✓	CR 2 N-S across Bensfort Bridge
Alt 5	36	69.04	✓	CR 503 east of Kinmount
Alt 65	37	68.96	X	Pedestrian crossing on Highway 7 in Norwood
Alt 68	38	68.83	X	CR 27/CR 12 North of Lily Lake Road
Alt 90	39	68.79	X	CR 23 Buckhorn Road Connection to Lakefield
Alt 104-I	40	68.37	X	Pave Lang-Hastings Trail; City limits to Lang
Alt 56A-I	41	68.11	X	County Road Northern Cycle Route Buckhorn - Burleigh Falls
Alt 64A	42	67.75	X	Ennismore - Bridgenorth connection
Alt 105	43	67.73	X	Pave TransCanada Trail – Peterborough City Limits to Highway 7 (Fowler's Corners)

Table 4.3: MATS Evaluation Results

Alt	Rank	Score	Original TMP?	Project Description/Location
Alt 67	44	67.57	X	Highway 28: Apsley to Woodview
Alt 73	45	67.55	X	CR 20 -CR 18 Bridgenorth – Young's Point
Alt 113	46	67.44	X	CR 36 – Buckhorn to Bobcaygeon
Alt 29	47	67.42	✓	CR 6 – 5 Line to Douro 4th Line
Alt 59B	48	67.26	X	Connect Keene to the TransCanada Trail
Alt 39	49	67.17	✓	North of Warsaw: Caves Road / Sawmill Road / 3rd Line North
Alt 110	50	66.77	X	East of Apsley: CR 504 between CR 46 and CR 620
Alt 47	51	66.56	✓	CR 46 near Round Lake
Alt 63	52	66.35	X	Links from Havelock to Matheson Property Conservation Area trails
Alt 10	53	66.06	✓	CR 2 E-W CR 39 - Keene
Alt 13B	54	66.04	✓	Gifford Causeway – Additional platform widening with MUP
Alt 45	55	66.01	✓	CR 48, NE of Havelock
Alt 15	56	65.55	✓	CR 4, Peterborough City Limit to Warsaw Caves
Alt 60B	57	65.36	X	Connect Lang to TransCanada Trail
Alt 95	58	65.35	X	CR 23 CR 29 (Lakefield Road), Peterborough City Limit – 7 Line
Alt 112	59	65.30	X	CR 18 Chemong Road – Fifth Line to Bridgenorth
Alt 80	60	64.93	X	CR 35 (Keene Road) from Baseline to CR 2
Alt 104-II	61	64.73	X	Pave Lang-Hastings Trail – Lang to Hastings
Alt 3	62	64.64	✓	CR 15 (North Monaghan Parkway)
Alt 36	63	63.68	✓	Hilliard Street – Peterborough City Limit to Bridgenorth Trail
Alt 38B-I	64	63.41	✓	Highway 28 MUP – Burleigh Falls to Woodview
Alt 26	65	63.34	✓	CR 38 (South Street) North of CR 8 - Warsaw
Alt 56A-II	66	62.76	X	FPS on County Road Northern Cycle Route, Ennismore - Buckhorn
Alt 66	67	62.58	X	Sidewalk on east side of Television Road
Alt 94	68	62.50	X	CR 17 Listowel Line, Ennis Road to Emerald Isle
Alt 107	69	62.24	X	Bridgenorth Causeway Link MUP and Bridgenorth Trail Connection
Alt 43	70	62.07	✓	CR 42 – Norwood to CR 30

Table 4.3: MATS Evaluation Results

Alt	Rank	Score	Original TMP?	Project Description/Location
Alt 22	71	61.71	✓	Villiers Line/Indian River Line, Rice Lake to Division Rd.
Alt 100	71	61.71	X	Birdsall Line: Rice Lake to TC Trail
Alt 18	73	60.83	✓	Old Norwood Road/Ashburnham Drive
Alt 108-II	74	60.75	X	CR 46 CR 47 – CR 504, East N/S Route to Apsley
Alt 42	75	60.68	✓	CR 40 / CR 45, Norwood to Upper Stony Lake
Alt 27	76	60.33	✓	CR 29 - CR 6, Lakefield to Camp Line Road
Alt 64B	77	60.09	X	MUP on CR-16, Ennismore - Bridgenorth connection
Alt 34	78	58.55	✓	Bridgenorth (E Communication Road) / 7 Line
Alt 97	78	58.55	X	Ennis Road: Chemong Lake to Ennismore.
Alt 51-I	80	58.52	X	Highway 7 (TransCanada) – Kawartha Lakes – Highway 115
Alt 92	81	58.44	X	Centre Road, Water Street – 3 Line
Alt 51-IV	82	58.30	X	Highway 7 (TransCanada), Norwood to Havelock
Alt 19	83	57.65	✓	Division Road – Peterborough City Limit east to CR 8
Alt 38B-II	84	57.42	✓	MUP on Highway28, Lakefield – Burleigh Falls
Alt 48	85	57.35	✓	CR 30/CR 44 – Havelock to Upper Stony Lake
Alt 56B-I	86	57.16	X	MUP on CR 36 Northern Cycle Route Buckhorn - Burleigh Falls
Alt 52	87	57.01	X	Ramps on Highway 7 to access the TransCanada pathway (south of Fowlers Corners)
Alt 51-II	88	56.81	X	Highway 7 (TransCanada), Highway 115 to Fowlers Corners
Alt 71	89	56.78	X	Trail Connections (School/ Library/ Arena to residential areas in Apsley)
Alt 79	90	56.21	X	CR 8, Ashpodal Dummer Line – CR 8
Alt 101	91	55.77	X	River Road connecting TC Trail to Birdsall Resort
Alt 51-V	92	55.74	X	Highway 7 (TransCanada), Havelock to Northumberland County
Alt 88	93	55.45	X	Tara Road – Ennismore to CR 14.
Alt 69B	94	55.03	X	MUP on CR 10, Millbrook north to Kawartha Lakes Line
Alt 75	95	55.00	X	12th line Smith - Birch Island Road - 11 Line - Centre Line, roughly following south shore of Chemong Lake

Table 4.3: MATS Evaluation Results

Alt	Rank	Score	Original TMP?	Project Description/Location
Alt 83	95	55.00	X	Tapley Quarter Line - Syer Line NW of Millbrook
Alt 85	95	55.00	X	Carmel Line, CR 10 – CR 28
Alt 86	98	54.77	X	Beardsmore Road Johnston Drive, Peterborough City Limit to Airport Road
Alt 4	99	54.13	✓	Sharpe Line / Brown Line – Airport Road to CR 10
Alt 20	100	53.90	✓	University Road/Pioneer Road, east of Peterborough City Limits to CR 4.
Alt 81	101	53.67	X	Crowley Line, Peterborough City Limits south to Base Line
Alt 82	101	53.67	X	Base Line, Wallace Point Road – Keene Road
Alt 93B-II	103	53.64	X	MUP on Highway 28, Highway 7 north to CR 4
Alt 78	104	53.61	X	Fifth Line/Pinehill Rd, Hilliard Street to Bridgenorth
Alt 46	105	53.48	✓	Roundd Lake Road / 6 Line, CR 48 – CR 46. NE of Havelock
Alt 76	106	53.35	X	CR 24 (Centre Line), Peterborough City Limits north to CR 18 (8th Line Smith)
Alt 70	107	52.95	X	Brick Road/Skyline Road, part of “Robinson Road Loop” outside Ennismore
Alt 99	108	52.67	X	Lakeside Road (north shore of Rice Lake) – CR 2 – Settler’s Line
Alt 25	109	52.65	✓	CR 8 (through Douro) West of South Street to CR 4
Alt 16	110	52.25	✓	Lang Road/Allandale Road/Nelson Road, CR 34 (Heritage Line) to TC Trail
Alt 93A-II	111	52.18	X	FPS on Highway 28 between Highway 7 and CR 4
Alt 98	112	52.16	X	Hiawatha – Baseline; connects TC Trail to CR 31 (and eventually Rice Lake)
Alt 35	113	52.14	✓	Camp Line Road – CR 6 – Clear Lake.
Alt 6	114	51.76	✓	Moore Drive; CR 28 – Highway 115
Alt 96	115	51.26	X	Fifth Line, Hilliard Street to Lakefield Road.

Table 4.3: MATS Evaluation Results

Alt	Rank	Score	Original TMP?	Project Description/Location
Alt 93B-I	116	51.07	X	MUP on Highway 28 CR 4 to CR 29 (East of Lakefield)
Alt 17	117	51.04	✓	Drummond Line, CR 2 to Old Norwood Road.
Alt 2	118	50.96	✓	Stewart Line, Howden Quarter Line to Preston Road.
Alt 40	119	50.49	✓	Birchview Road, CR 6 to CR 6 along Clear Lake.
Alt 93A-I	120	50.47	X	FPS on Highway 28 CR 4 to CR 29 (East of Lakefield)
Alt 111	121	49.88	X	Clydesdale Road/Jeff Road, connects Highway 28 to CR 620 north of Apsley
Alt 51-III	122	49.32	X	Highway 7, Peterborough City Limit to Norwood
Alt 1	123	48.33	✓	Hooton Drive, Howden Quarter Line to Preston Road
Alt 23	124	48.06	✓	Asphodal 7th Line, TC Trail to CR 8
Alt 56B-II	125	47.75	X	MUP on CR 16/CR 37 between Ennismore and Buckhorn
Alt 31	126	47.14	✓	Preston Road (Selwyn), 12th Line Smith to CR 25
Alt 11	127	47.08	✓	Cloverdale Line / Storell Road, CR 21 – CR 2 (just north of Bensfort Bridge)
Alt 30	128	45.90	✓	Miller Road, Preston Road (Selwyn) to CR 25
Alt 37	128	45.90	✓	Northey’s Road/Lakefield 14 Line/Lakefield 15 Line/North School Road. Finishes just north of Young’s Point
Alt 58	130	45.18	X	CR 28 south link to Northumberland County
Alt 89	131	42.17	X	Hooton Drive Extension from Howden Quarter Line to CR 10
Alt 28	132	41.71	✓	3 Line/Lynchs Rock Road, CR 4 – CR 29
Alt 44	133	40.84	✓	Browns Line Road/Concession Road 8, CR 30 – CR 48 (SE of Havelock)
Alt 91	134	38.86	X	Cedar Cross Road - Oke Road; Lynchs Rock Road to CR 4

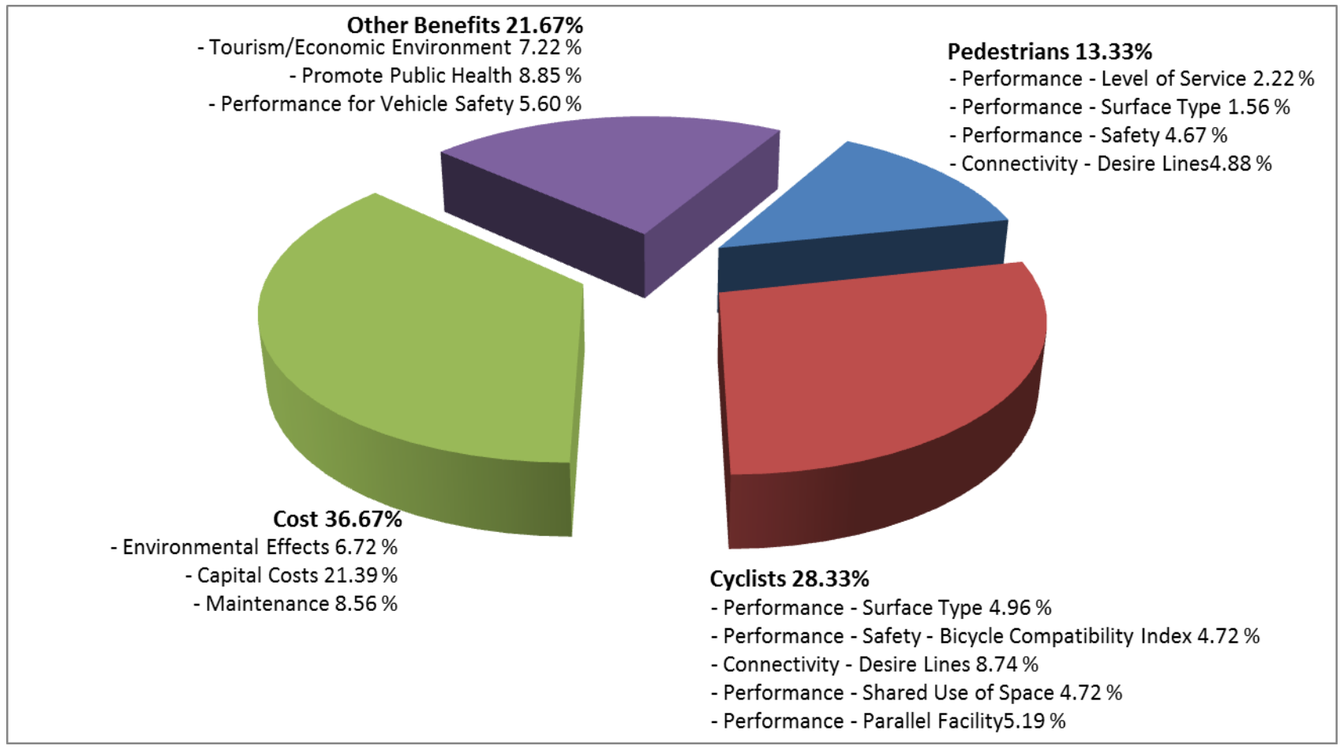

Figure 4.2: MATS Weighting Results for Alternatives

5 RECOMMENDED PLAN

The Recommended Plan is a list ranking the candidate projects. **Table 5.1** illustrates the final list of candidate projects carried forward and the type of project and road. Since a few of the candidate projects had two options for improvements, only the top ranked candidate project was carried forward, which reduces the number of projects from 134 to 123.

The projects carried forward were split into three categories: County projects requiring paved shoulders (see **Table 5.2**); local and provincial roads (see **Table 5.3**); and, other projects not falling within the first two categories (see **Table 5.4**).

Table 5.1: Final List of Candidate Projects Carried Forward

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 50	1	86.79	x	Pedestrian lookout on the north side of the causeway	Other Project	"Other"
Alt 84	2	80.70	x	CR 10 South of Millbrook	Paved Shoulder	County
Alt 77	3	78.50	x	Lakefield, CR 23-CR18-CR29	Paved Shoulder	County
Alt 21	4	78.34	✓	Water Street CR 32	Paved Shoulder	County
Alt 9	6	77.53	✓	CR 31, North of Rice Like.	Paved Shoulder	County
Alt 55	7	77.44	x	(Trent Lakes) Add link from new subdivision to Adam and Eve Trail	Other Project	"Other"
Alt 72	8	77.23	x	TransCanada Trail Parking Lot on Ackison Road	Other Project	"Other"
Alt 53	9	77.01	x	Construct parking area/improvements at Millbrook conservation area trails with signage to match the Haroldtown lot	Other Project	"Other"
Alt 54	9	77.01	x	Construct parking area/improvements at Havelock conservation area trails with signage to match the Haroldtown lot	Other Project	"Other"
Alt 59A	11	76.99	x	Connect Keene to the Trans Canada Trail	Paved Shoulder	County
Alt 13A	12	76.94	✓	Gifford Causeway EA Approved platform width	Paved Shoulder	County
Alt 33	13	76.28	✓	CR 2/Wallace Point Road	Paved Shoulder	County
Alt 87	14	75.26	x	CR 17 West from Gifford Causeway	Paved Shoulder	County
Alt 60A	15	74.67	x	Connect Lang to TransCanada Trail	Paved Shoulder	County
Alt 62	16	73.62	x	In Norwood, provide a pedestrian link on Alma Street to School/splash pad/High School/ skateboard park	Other Project	"Other"
Alt 103	17	73.50	x	Pave Bridgenorth Trail	Paved MUP	"Other"
Alt 106	18	73.21	x	Rotary Greenway Pedestrian Crossing in Lakefield	Other Project	"Other"
Alt 38A-I	19	73.16	✓	Highway 28	Paved Shoulder	Provincial
Alt 7	20	73.11	✓	CR 11/Airport Road	Paved Shoulder	County
Alt 102	21	73.06	x	Trail Connection to Baseline	Other Project	"Other"
Alt 109-I	22	72.64	x	CR 620 - Apsley to Coe Hill	Paved Shoulder	County
Alt 12	23	72.40	✓	CR 21 (Wallace Point Road)	Paved Shoulder	County
Alt 69A	24	72.38	x	CR 10	Paved Shoulder	County
Alt 14	25	72.29	✓	CR 34	Paved Shoulder	County
Alt 109-II	26	72.00	x	CR 620 - Apsley to Coe Hill	Paved Shoulder	County
Alt 32	27	71.94	✓	CR 25	Paved Shoulder	County
Alt 74	28	71.89	x	CR 24	Paved Shoulder	County
Alt 49	29	71.23	✓	Northeys Bay Road/CR 6	Paved Shoulder	County
Alt 108-I	30	70.80	x	CR 504 CR 46 - North Route to Apsley	Paved Shoulder	County
Alt 57	31	70.51	x	Millbrook Valley Trail Expansion	Other Project	"Other"
Alt 24	32	70.45	✓	Dummer Asphodel Road (CR 8)	Paved Shoulder	County
Alt 41	33	70.27	✓	CR 6	Paved Shoulder	County
Alt 38A-	34	69.74	✓	FPS on Highway 28, Burleigh	Paved	Provincial

Table 5.1: Final List of Candidate Projects Carried Forward

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
II				Falls to Woodview	Shoulder	
Alt 8	35	69.64	✓	CR 2 N-S across Bensfort Bridge	Paved Shoulder	County
Alt 5	36	69.04	✓	CR 503 east of Kinmount	Paved Shoulder	County
Alt 65	37	68.96	x	Pedestrian crossing on Highway 7 in Norwood	Other Project	"Other"
Alt 68	38	68.83	x	CR27/12 North of Lily Lake Road	Paved Shoulder	County
Alt 90	39	68.79	x	CR 23 Buckhorn Road Connection to Lakefield	Paved Shoulder	County
Alt 104-I	40	68.37	x	Pave Lang-Hastings Trai, City limits to Lang	Paved MUP	"Other"
Alt 56A-I	41	68.11	x	County Road Northern Cycle Route Buckhorn - Burleigh Falls	Paved Shoulder	County
Alt 64A	42	67.75	x	Ennismore - Bridgenorth connection	Paved Shoulder	County
Alt 105	43	67.73	x	Pave TransCanada Trail – Peterborough City Limits to Highway 7 (Fowler's Corners)	Paved MUP	"Other"
Alt 67	44	67.57	x	Highway 28, Apsley to Woodview	Paved Shoulder	Provincial
Alt 73	45	67.55	x	CR 20 -CR 18 Bridgenorth – Young's Point	Paved Shoulder	County
Alt 113	46	67.44	x	CR36 – Buckhorn to Bobcaygeon	Paved Shoulder	County
Alt 29	47	67.42	✓	CR6 – 5 Line to Douro 4th Line	Paved Shoulder	County
Alt 39	49	67.17	✓	North of Warsaw: Caves Road / Sawmill Road / 3rd Line North	Shared Use	Municipal
Alt 110	50	66.77	x	East of Apsley, CR 504 between CR45 and CR620	Paved Shoulder	County
Alt 47	51	66.56	✓	CR 46 near Round Lake	Paved Shoulder	County
Alt 63	52	66.35	x	Links from Havelock to Matheson Property Conservation Area trails	Other Project	"Other"
Alt 10	53	66.06	✓	CR 2 E-W CR39 - Keene	Paved Shoulder	County
Alt 45	55	66.01	✓	CR 48 NE of Havelock	Paved MUP	County
Alt 15	56	65.55	✓	CR 4, Peterborough City Limit to Warsaw Caves	Paved Shoulder	County

Table 5.1: Final List of Candidate Projects Carried Forward

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 95	58	65.35	x	CR 23 CR 29 (Lakefield Road), Peterborough City Limit – 7 Line	Paved Shoulder	County
Alt 112	59	65.30	x	CR 18 Chemong Road – Fifith Line to Bridgenorth.	Paved Shoulder	County
Alt 80	60	64.93	x	CR35 Keene Road from Baseline to CR2	Paved Shoulder	County
Alt 104-II	61	64.73	x	Pave Lang-Hastings Trail – Lang to Hastings	Paved MUP	"Other"
Alt 3	62	64.64	✓	CR 15 (North Monaghan Parkway)	Paved Shoulder	County
Alt 36	63	63.68	✓	Hilliard Street – Peterborough City Limit to Bridgenorth Trail	Shared Use	Municipal
Alt 26	65	63.34	✓	CR 38 (South Street North of CR 8 - Warsaw)	Paved Shoulder	County
Alt 56A-II	66	62.76	x	FPS on County Road Northern Cycle Route, Ennismore - Buckhorn	Paved Shoulder	County
Alt 66	67	62.58	x	Sidewalk on east side of Television Road	Paved Shoulder	"Other"
Alt 94	68	62.50	x	CR 17 Listowel Line, Ennis Road to Emerald Isle	Paved Shoulder	County
Alt 107	69	62.24	x	Bridgenorth Causeway Link MUP and Bridgenorth Trail Connection	Paved MUP	"Other"
Alt 43	70	62.07	✓	CR 42 – Norwood to CR 30.	Paved Shoulder	County
Alt 22	71	61.71	✓	Villiers Line/Indian River Line, Rice Lake to Division Road	Shared Use	Municipal
Alt 100	71	61.71	x	Birdsall Line, Rice Lake to TC Trail	Shared Use	Municipal
Alt 18	73	60.83	✓	Old Norwood Road/Ashburnham Drive	Shared Use	Municipal
Alt 108-II	74	60.75	x	CR 46 CR 47 – CR 504, East N/S Route to Apsley	Paved Shoulder	County
Alt 42	75	60.68	✓	CR 40 / CR 45, Norwood to Upper Stony Lake	Paved Shoulder	County
Alt 27	76	60.33	✓	CR 29 - CR 6; Lakefield to Camp Line Road	Paved Shoulder	County
Alt 34	78	58.55	✓	Bridgenorth (E Communication Road) / 7 Line	Shared Use	Municipal
Alt 97	78	58.55	x	Ennis Road, Chemong Lake to Ennismore.	Shared Use	Municipal

Table 5.1: Final List of Candidate Projects Carried Forward

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 51-I	80	58.52	X	Highway 7 (TransCanada) – Kawartha Lakes – Highway 115	Paved Shoulder	Provincial
Alt 92	81	58.44	X	Centre Road, Water Street – 3 Line	Paved Shoulder	Municipal
Alt 51-IV	82	58.30	X	Highway 7 (TransCanada), Norwood to Havelock	Paved Shoulder	Provincial
Alt 19	83	57.65	✓	Division Road – Peterborough City Limit east to CR8	Shared Use	Municipal
Alt 48	85	57.35	✓	CR 30/CR 44 – Havelock to Upper Stony Lake	Paved Shoulder	County
Alt 52	87	57.01	X	Ramps on Highway 7 to access the TransCanada pathway (south of Fowlers Corners)	Other Project	"Other"
Alt 51-II	88	56.81	X	Highway 7 (TransCanada); Highway 115 to Fowlers Corners	Paved Shoulder	Provincial
Alt 71	89	56.78	X	Trail Connections (School/ Library/ Arena to residential areas in Apsley)	Other Project	Municipal
Alt 79	90	56.21	X	CR 8, Ashpodal Dummer Line – CR8	Paved Shoulder	County
Alt 101	91	55.77	X	River Road connecting TC Trail to Birdsall Resort	Shared Use	Municipal
Alt 51-V	92	55.74	X	Highway 7 (TransCanada), Havelock to Northumberland County	Paved Shoulder	Provincial
Alt 88	93	55.45	X	Tara Road – Ennismore to CR14	Shared Use	Municipal
Alt 75	95	55.00	X	12th line Smith - Birch Island Road - 11 Line - Centre Line, roughly following south shore of Chemong Lake	Shared Use	Municipal
Alt 83	95	55.00	X	Tapley Quarter Line - Syer Line NW of Millbank	Shared Use	Municipal
Alt 85	95	55.00	X	Carmel Line, CR10 – CR28	Shared Use	Municipal
Alt 86	98	54.77	X	Beardsmore Road Johnston Drive, Peterborough City Limit to Airport Road.	Shared Use	Municipal
Alt 4	99	54.13	✓	Sharpe Line / Brown Line – Airport Road to CR10	Shared Use	Municipal
Alt 20	100	53.90	✓	University Road/Pioneer Road, East of Peterborough City Limits to CR4	Shared Use	Municipal

Table 5.1: Final List of Candidate Projects Carried Forward

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 81	101	53.67	X	Crowley Line, Peterborough City Limits south to Base Line	Shared Use	Municipal
Alt 82	101	53.67	X	Base Line, Wallace Point Road – Keene Road	Shared Use	Municipal
Alt 93B-II	103	53.64	X	MUP on Highway 28, Highway 7 north to CR4	Paved MUP	Provincial
Alt 78	104	53.61	X	Fifth Line/Pinehill Road, Hilliard Street to Bridgenorth	Shared Use	Municipal
Alt 46	105	53.48	✓	Round Lake Road / 6 Line, CR48 – CR46. NE of Havelock	Shared Use	Municipal
Alt 76	106	53.35	X	CR24Centre Line, Peterborough City Limits north to CR18 (8th Line Smith)	Shared Use	Municipal
Alt 70	107	52.95	X	Brick Road/Skyline Road, part of "Robinson Road Loop" outside Ennismore	Shared Use	Municipal
Alt 99	108	52.67	X	Lakeside Road (north shore of Rice Lake)– CR2 – Settler's Line	Shared Use	Municipal
Alt 25	109	52.65	✓	CR 8 (through Douro) West of South Street to CR4	Paved Shoulder	County
Alt 16	110	52.25	✓	Lang Road/Allandale Road/Nelson Road, CR34 (Heritage Line) to TC Trail	Shared Use	Municipal
Alt 98	112	52.16	X	Hiawatha – Baseline; connects TC Trail to CR31 (and eventually Rice Lake)	Shared Use	Municipal
Alt 35	113	52.14	✓	Camp Line Road – CR6 – Clear Lake	Shared Use	Municipal
Alt 6	114	51.76	✓	Moore Drive, CR28 – Highway 115	Shared Use	Municipal
Alt 96	115	51.26	X	Fifth Line, Hilliard Street to Lakefield Road	Shared Use	Municipal
Alt 93B-I	116	51.07	X	MUP on Highway 28 CR4 to CR29 (East of Lakefield)	Paved MUP	Provincial
Alt 17	117	51.04	✓	Drummond Line, CR2 to Old Norwood Road	Shared Use	Municipal
Alt 2	118	50.96	✓	Stewart Line, Howden Quarter Line to Preston Road	Shared Use	Municipal
Alt 40	119	50.49	✓	Birchview Road, CR6 to CR6 along Clear Lake	Shared Use	Municipal
Alt 111	121	49.88	X	Clydesdale Road/Jeff Road, connects Highway 28 to CR 620	Shared Use	Municipal

Table 5.1: Final List of Candidate Projects Carried Forward

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
				north of Apsley		
Alt 51-III	122	49.32	x	Highway 7, Peterborough City Limit to Norwood	Paved Shoulder	Provincial
Alt 1	123	48.33	✓	Hooton Drive, Howden Quarter Line to Preston Road	Shared Use	Municipal
Alt 23	124	48.06	✓	Asphodal 7th Line, TC Trail to CR8	Shared Use	Municipal
Alt 56B-II	125	47.75	x	MUP on CR16/CR37 between Ennismore and Buckhorn	Paved MUP	County
Alt 31	126	47.14	✓	Preston Road (Selwyn), 12th Line Smith to CR25	Shared Use	Municipal
Alt 11	127	47.08	✓	Cloverdale Line / Storell Road, CR21 – CR2 (just north of Bensfort Bridge)	Shared Use	Municipal
Alt 30	128	45.90	✓	Miller Road, Preston Road (Selwyn) to CR25.	Shared Use	Municipal
Alt 37	128	45.90	✓	Northey's Road/Lakefield 14 Line/Lakefield 15 Line/North School Road. Finishes just north of Young's Point	Shared Use	Municipal
Alt 58	130	45.18	x	CR 28 south link to Northumberland County	Paved MUP	County
Alt 89	131	42.17	x	Hooton Drive Extension from Howden Quarter Line to CR10	Shared Use	Municipal
Alt 28	132	41.71	✓	3 Line/Lynchs Rock Road, CR4 – CR29	Shared Use	Municipal
Alt 44	133	40.84	✓	Browns Line Road/Concession Road 8, CR30 – CR48 (SE of Havelock)	Shared Use	Municipal
Alt 91	134	38.86	x	Cedar Cross Road - Oke Road, Lynchs Rock Road to CR4.	Shared Use	Municipal

Table 5.2: Candidate Projects for Paved Shoulder County Roads

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 84	2	80.70	x	CR 10 South of Millbrook	Paved Shoulder	County
Alt 77	3	78.50	x	Lakefield, CR 23-CR18-CR29	Paved Shoulder	County
Alt 21	4	78.34	✓	Water Street. CR 32	Paved Shoulder	County
Alt 9	6	77.53	✓	CR 31, North of Rice Lake	Paved Shoulder	County
Alt 59A	11	76.99	x	Connect Keene to the TransCanada Trail	Paved Shoulder	County
Alt 13A	12	76.94	✓	Gifford Causeway EA Approved platform width	Paved Shoulder	County
Alt 33	13	76.28	✓	CR 2/Wallace Point Road	Paved Shoulder	County
Alt 87	14	75.26	x	CR 17 west from Gifford Causeway.	Paved Shoulder	County
Alt 60A	15	74.67	x	Connect Lang to TransCanada Trail	Paved Shoulder	County
Alt 38A-I	19	73.16	✓	Highway 28	Paved Shoulder	Provincial
Alt 7	20	73.11	✓	CR 11/Airport Road	Paved Shoulder	County
Alt 109-I	22	72.64	x	CR 620 - Apsley to Coe Hill	Paved Shoulder	County
Alt 12	23	72.40	✓	CR 21 (Wallace Point Road)	Paved Shoulder	County
Alt 69A	24	72.38	x	CR 10	Paved Shoulder	County
Alt 14	25	72.29	✓	CR 34	Paved Shoulder	County
Alt 109-II	26	72.00	x	CR 620 - Apsley to Coe Hill	Paved Shoulder	County
Alt 32	27	71.94	✓	CR 25	Paved Shoulder	County
Alt 74	28	71.89	x	CR 24	Paved Shoulder	County
Alt 49	29	71.23	✓	Northeys Bay Road/CR 6	Paved Shoulder	County
Alt 108-I	30	70.80	x	CR 504 CR 46 - North Route to Apsley	Paved Shoulder	County

Table 5.2: Candidate Projects for Paved Shoulder County Roads

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 24	32	70.45	✓	Dummer Asphodel Road (CR 8)	Paved Shoulder	County
Alt 41	33	70.27	✓	CR 6	Paved Shoulder	County
Alt 38A-II	34	69.74	✓	FPS on Highway 28, Burleigh Falls to Woodview	Paved Shoulder	Provincial
Alt 8	35	69.64	✓	CR 2 N-S across Bensfort Bridge	Paved Shoulder	County
Alt 5	36	69.04	✓	CR 503 east of Kinmount	Paved Shoulder	County
Alt 68	38	68.83	X	CR27/12 North of Lily Lake Road	Paved Shoulder	County
Alt 90	39	68.79	X	CR 23 Buckhorn Road Connection to Lakefield	Paved Shoulder	County
Alt 56A-I	41	68.11	X	County Road Northern Cycle Route Buckhorn - Burleigh Falls	Paved Shoulder	County
Alt 64A	42	67.75	X	Ennismore - Bridgenorth connection	Paved Shoulder	County
Alt 67	44	67.57	X	Highway 28, Apsley to Woodview	Paved Shoulder	Provincial
Alt 73	45	67.55	X	CR 20 -CR 18 Bridgenorth – Young's Point	Paved Shoulder	County
Alt 113	46	67.44	X	CR36 – Buckhorn to Bobcaygeon	Paved Shoulder	County
Alt 29	47	67.42	✓	CR6 – 5 Line to Douro 4th Line	Paved Shoulder	County
Alt 110	50	66.77	X	East of Apsley, CR 504 between CR45 and CR620	Paved Shoulder	County
Alt 47	51	66.56	✓	CR 46 near Round Lake	Paved Shoulder	County
Alt 10	53	66.06	✓	CR 2 E-W CR39 - Keene	Paved Shoulder	County
Alt 15	56	65.55	✓	CR 4, Peterborough City Limit to Warsaw Caves	Paved Shoulder	County
Alt 95	58	65.35	X	CR 23 CR 29 (Lakefield Road), Peterborough City Limit – 7 Line	Paved Shoulder	County
Alt 112	59	65.30	X	CR 18 Chemong Road – Fifth Line to Bridgenorth	Paved Shoulder	County
Alt 80	60	64.93	X	CR35 Keene Road from Baseline to CR2	Paved Shoulder	County
Alt 3	62	64.64	✓	CR 15 (North Monaghan Parkway)	Paved	County

Table 5.2: Candidate Projects for Paved Shoulder County Roads

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
					Shoulder	
Alt 26	65	63.34	✓	CR 38 (South Street North of CR 8 - Warsaw)	Paved Shoulder	County
Alt 56A-II	66	62.76	X	FPS on County Road Northern Cycle Route, Ennismore - Buckhorn	Paved Shoulder	County
Alt 66	67	62.58	X	Sidewalk on east side of Television Road	Paved Shoulder	"Other"
Alt 94	68	62.50	X	CR 17 Listowel Line, Ennis Road to Emerald Isle.	Paved Shoulder	County
Alt 43	70	62.07	✓	CR 42 – Norwood to CR 30.	Paved Shoulder	County
Alt 108-II	74	60.75	X	CR 46 CR 47 – CR 504, East N/S Route to Apsley	Paved Shoulder	County
Alt 42	75	60.68	✓	CR 40 / CR 45, Norwood to Upper Stony Lake	Paved Shoulder	County
Alt 27	76	60.33	✓	CR 29 - CR 6, Lakefield to Camp Line Road	Paved Shoulder	County
Alt 48	85	57.35	✓	CR 30/CR 44 – Havelock to Upper Stony Lake	Paved Shoulder	County
Alt 79	90	56.21	X	CR 8, Ashpodal Dummer Line – CR8	Paved Shoulder	County
Alt 25	109	52.65	✓	CR 8 (through Douro) west of South Street to CR4	Paved Shoulder	County

Table 5.3: Candidate Projects for Municipal Roads and Provincial Roads

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 39	49	67.17	✓	North of Warsaw: Caves Road / Sawmill Road / 3rd Line North	Shared Use	Municipal
Alt 36	63	63.68	✓	Hilliard Street – Peterborough City Limit to Bridgenorth Trail	Shared Use	Municipal
Alt 22	71	61.71	✓	Villiers Line/Indian River Line, Rice Lake to Division Road	Shared Use	Municipal
Alt 100	71	61.71	X	Birdsall Line, Rice Lake to TC Trail	Shared Use	Municipal
Alt 18	73	60.83	✓	Old Norwood Road/Ashburnham Drive	Shared Use	Municipal
Alt 34	78	58.55	✓	Bridgenorth (E Communication Road) / 7 Line	Shared Use	Municipal
Alt 97	78	58.55	X	Ennis Road, Chemong Lake to Ennismore	Shared Use	Municipal
Alt 51-I	80	58.52	X	Highway 7 (TransCanada) – Kawartha Lakes – Highway 115	Paved Shoulder	Provincial
Alt 92	81	58.44	X	Centre Road, Water Street – 3 Line	Paved Shoulder	Municipal
Alt 51-IV	82	58.30	X	Highway 7 (TransCanada), Norwood to Havelock	Paved Shoulder	Provincial
Alt 19	83	57.65	✓	Division Road – Peterborough City Limit east to CR8.	Shared Use	Municipal
Alt 51-II	88	56.81	X	Highway 7 (TransCanada); Highway 115 to Fowlers Corners	Paved Shoulder	Provincial
Alt 71	89	56.78	X	Trail Connections (School/ Library/ Arena to residential areas in Apsley)	Other Project	Municipal
Alt 101	91	55.77	X	River Road connecting TC Trail to Birdsall Resort	Shared Use	Municipal
Alt 51-V	92	55.74	X	Highway 7 (TransCanada); Havelock to Northumberland County	Paved Shoulder	Provincial
Alt 88	93	55.45	X	Tara Road – Ennismore to CR14	Shared Use	Municipal
Alt 75	95	55.00	X	12th line Smith - Birch Island Road - 11 Line - Centre Line, roughly following south shore of Chemong Lake	Shared Use	Municipal
Alt 83	95	55.00	X	Tapley Quarter Line - Syer Line NW of Millbank	Shared Use	Municipal

Table 5.3: Candidate Projects for Municipal Roads and Provincial Roads

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 85	95	55.00	X	Carmel Line; CR10 – CR28	Shared Use	Municipal
Alt 86	98	54.77	X	Beardsmore Road Johnston Drive: Peterborough City Limit to Airport Road	Shared Use	Municipal
Alt 4	99	54.13	✓	Sharpe Line / Brown Line – Airport Road to CR10	Shared Use	Municipal
Alt 20	100	53.90	✓	University Road/Pioneer Road, east of Peterborough City Limits to CR4.	Shared Use	Municipal
Alt 81	101	53.67	X	Crowley Line, Peterborough City Limits south to Base Line	Shared Use	Municipal
Alt 82	101	53.67	X	Base Line, Wallace Point Road – Keene Road	Shared Use	Municipal
Alt 93B-II	103	53.64	X	MUP on Highway 28, Highway 7 north to CR4	Paved MUP	Provincial
Alt 78	104	53.61	X	Fifth Line/Pinehill Road, Hilliard Street to Bridgenorth	Shared Use	Municipal
Alt 46	105	53.48	✓	Round Lake Road / 6 Line, CR48 – CR46 NE of Havelock	Shared Use	Municipal
Alt 76	106	53.35	X	CR24 Centre Line, Peterborough City Limits north to CR18 (8th Line Smith)	Shared Use	Municipal
Alt 70	107	52.95	X	Brick Road/Skyline Road; part of "Robinson Road Loop" outside Ennismore	Shared Use	Municipal
Alt 99	108	52.67	X	Lakeside Road (north shore of Rice Lake) – CR2 – Settler's Line	Shared Use	Municipal
Alt 16	110	52.25	✓	Lang Road/Allandale Road/Nelson Road, CR34 (Heritage Line) to TC Trail	Shared Use	Municipal
Alt 98	112	52.16	X	Hiawatha – Baseline, connects TC Trail to CR31 (and eventually Rice Lake)	Shared Use	Municipal
Alt 35	113	52.14	✓	Camp Line Road – CR6 – Clear Lake.	Shared Use	Municipal
Alt 6	114	51.76	✓	Moore Drive, CR28 – Highway 115	Shared Use	Municipal
Alt 96	115	51.26	X	Fifth Line, Hilliard Street to Lakefield Road	Shared Use	Municipal
Alt 93B-I	116	51.07	X	MUP on Highway 28 CR4 to	Paved MUP	Provincial

Table 5.3: Candidate Projects for Municipal Roads and Provincial Roads

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
				CR29 (East of Lakefield)		
Alt 17	117	51.04	✓	Drummond Line, CR2 to Old Norwood Road	Shared Use	Municipal
Alt 2	118	50.96	✓	Stewart Line, Howden Quarter Line to Preston Road	Shared Use	Municipal
Alt 40	119	50.49	✓	Birchview Road; CR6 to CR6 along Clear Lake	Shared Use	Municipal
Alt 111	121	49.88	X	Clydesdale Road/Jeff Road, connects Highway 28 to CR 620 north of Apsley	Shared Use	Municipal
Alt 51-III	122	49.32	X	Highway 7, Peterborough City Limit to Norwood.	Paved Shoulder	Provincial
Alt 1	123	48.33	✓	Hooton Drive, Howden Quarter Line to Preston Road	Shared Use	Municipal
Alt 23	124	48.06	✓	Asphodal 7th Line, TC Trail to CR8	Shared Use	Municipal
Alt 31	126	47.14	✓	Preston Road (Selwyn), 12th Line Smith to CR25	Shared Use	Municipal
Alt 11	127	47.08	✓	Cloverdale Line / Storell Road, CR21 – CR2 (just north of Bensfort Bridge)	Shared Use	Municipal
Alt 30	128	45.90	✓	Miller Road, Preston Road (Selwyn) to CR25.	Shared Use	Municipal
Alt 37	128	45.90	✓	Northey's Road/Lakefield 14 Line/Lakefield 15 Line/North School Road. Finishes just north of Young's Point	Shared Use	Municipal
Alt 89	131	42.17	X	Hooton Drive Extension from Howden Quarter Line to CR10	Shared Use	Municipal
Alt 28	132	41.71	✓	3 Line/Lynchs Rock Road, CR4 – CR29	Shared Use	Municipal
Alt 44	133	40.84	✓	Browns Line Road/Concession Road 8, CR30 – CR48 (SE of Havelock)	Shared Use	Municipal
Alt 91	134	38.86	X	Cedar Cross Road - Oke Road, Lynchs Rock Road to CR4	Shared Use	Municipal

Table 5.4: Remaining Projects

Alt	Rank	Score	Original TMP?	Description	Type of Project	Road Type
Alt 50	1	86.79	X	Pedestrian lookout on the north side of the causeway	Other Project	"Other"
Alt 55	7	77.44	X	(Trent Lakes) Add link from new subdivision to Adam and Eve Trail	Other Project	"Other"
Alt 72	8	77.23	X	TransCanada Trail Parking Lot on Ackison Road	Other Project	"Other"
Alt 53	9	77.01	X	Construct parking area/improvements at Millbrook conservation area trails with signage to match the Haroldtown lot	Other Project	"Other"
Alt 54	9	77.01	X	Construct parking area/improvements at Havelock conservation area trails with signage to match the Haroldtown lot	Other Project	"Other"
Alt 62	16	73.62	X	In Norwood, provide a pedestrian link on Alma Street to School/splash pad/High School/ skateboard park	Other Project	"Other"
Alt 103	17	73.50	X	Pave Bridgenorth Trail	Paved MUP	"Other"
Alt 106	18	73.21	X	Rotary Greenway Pedestrian Crossing in Lakefield	Other Project	"Other"
Alt 102	21	73.06	X	Trail Connection to Baseline	Other Project	"Other"
Alt 57	31	70.51	X	Millbrook Valley Trail Expansion	Other Project	"Other"
Alt 65	37	68.96	X	Pedestrian crossing on Highway 7 in Norwood	Other Project	"Other"
Alt 104-I	40	68.37	X	Pave Lang-Hastings Trail, City limits to Lang.	Paved MUP	"Other"
Alt 105	43	67.73	X	Pave TransCanada Trail – Peterborough City Limits to Highway 7 (Fowler's Corners)	Paved MUP	"Other"
Alt 63	52	66.35	X	Links from Havelock to Matheson Property Conservation Area trails	Other Project	"Other"
Alt 45	55	66.01	✓	CR 48 NE of Havelock.	Paved MUP	County
Alt 104-II	61	64.73	X	Pave Lang-Hastings Trail –	Paved MUP	"Other"

Table 5.4: Remaining Projects						
Alt	**Rank**	**Score**	**Original TMP?**	**Description**	**Type of Project**	**Road Type**
				Lang to Hastings		
Alt 107	69	62.24	X	Bridgenorth Causeway Link MUP and Bridgenorth Trail Connection	Paved MUP	"Other"
Alt 52	87	57.01	X	Ramps on Highway 7 to access the TransCanada pathway (south of Fowlers Corners)	Other Project	"Other"
Alt 56B-II	125	47.75	X	MUP on CR16/CR37 between Ennismore and Buckhorn	Paved MUP	County
Alt 58	130	45.18	X	CR 28 south link to Northumberland County	Paved MUP	County

6 NEXT STEPS

Following the prioritization of the candidate projects, the following will be completed:

- Review by the Technical Advisory Committee (TAC);
- Review by the public; and
- County/Municipal discussions on Stage 1 Affordability Priorities.

APPENDIX A: Evaluation Methodology Report

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EVALUATION METHODOLOGY REPORT

County of Peterborough
Active Transportation Master Plan

Presented to:

County of Peterborough
310 Armour Road
Peterborough, ON
K9H 1Y6

BTE Project No. 2015-041 July 2016

BT ENGINEERING
BTE

EXECUTIVE SUMMARY

An Active Transportation Master Plan (ATMP) is being undertaken by the County of Peterborough, as identified in the Transportation Master Plan (TMP) for the promotion of cycling and walking, under the Municipal Class Environmental Assessment (amended 2015).

The analysis and evaluation process is a requirement of the EA process; the framework is provided by the Ministry of the Environment and Climate Change (MOECC) Evaluation Methods in Environmental Assessment.

This document describes the qualitative and the quantitative methods of evaluation and which approaches will be utilized for different groups of alternatives. An evaluation method may be defined as a formal procedure for establishing an order of preference among alternatives.

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GLOSSARY OF TERMS

AASHTO	American Association of State and Highway Transportation Officials
Adjacent	Adjacent indicates lying near MTO or Municipal roadway rights-of-way, although not necessarily contiguous to them.
Aesthetics	Methods of providing visual relief and appealing characteristics to planned noise barriers thorough the application of landscaping designs.
Alternative	Well-defined and distinct course of action that fulfils a given set of requirements. The EA Act distinguishes between Alternatives to the Undertaking and Alternative Methods of Carrying out the Undertaking.
ATMP	Active Transportation Master Plan
Coarse Screening	Initial screening of a group of alternatives. Also see Screening.
Criterion(a)	Explicit feature or consideration used for comparison of alternatives.
Dichotomous Utility Function	A utility function that represents a desirable or undesirable response from a criterion (yes/no, present/absent, true/false).
Dimensionless Number	A number that does not have a unit of measurement, such as length (m), time (s), mass (kg) associated with it. Examples include Utility Score and Overall Score.
Do Nothing Alternative	This alternative is a mandatory requirement of the Class EA. This option is the null or no action alternative and it becomes the baseline to which all alternatives are compared.
Double Counting	Unintentional accounting for a particular factor or attribute more than once in the evaluation.
EA	Environmental Assessment
Evaluation	The outcome of a process that appraises the advantages and disadvantages of alternatives.

Evaluation Criteria	See Criteria.
Evaluation Process	The process involving the identification of criteria, rating of predicted impacts, assignment of weights to criteria, aggregation of weights, and rating to produce an ordering of preference of alternatives.
Factor	See Global Factors.
Freeway	Freeway is defined as an existing completed, partially developed (staged) or proposed divided highway with full control of access and grade separated intersections. This definition may include some highways that are not officially designated as freeways.
Function Form	See Utility Function
Global Factors	The main categories of factors, (i.e. Transportation, Economic Environment, Natural Environment, Social and Cultural, Land Use and Property and Cost). All sub-factors are components or a subset of global factors.
Linear Utility Function	A function that can be defined using a linear equation of the form: y = a + bx, where y is the dependent variable (raw score) x is the independent variable (measurement) b is the slope of the function, and a is the y intercept, normalized in this study to be equal to one or zero
Matrix	A rectangular array of criteria and values.
Mitigation	Taking actions that either remove or alleviate to some degree the negative impacts associated with the implementation of alternatives.
Overall Score	The final value of an alternative's score derived by summing all of the weighted scores.
Performance Factor	See Utility Function
POH	Public Open House
Ranking	The ordering of alternatives from first to last for comparison purposes.
Raw Data	The measurement of the impact, or measured data, under each criterion.
Risk	Probability that a given outcome will or will not materialize. Distinct from uncertainty in that the alternative outcomes are known or defined and that the probability of each is measureable.
Screening	Process of eliminating alternatives from further consideration, which do not meet minimum conditions or categorical requirements.
Step Function	A utility function can be defined by several linear functions within separate ranges that have a slope equal to zero. For this study, two step functions are used: Case A: y = 1, for x = desirable and y = 0, for x = undesirable Case B: y = 1 for x = desirable, y = 0.5 for x = medium performance and y = o for x = undesirable
Sub-factor	A single criterion used for the evaluation. Each sub-factor is grouped under one of the factors.
TMP	Transportation Master Plan
TPA	Technically Preferred Alternative
Traceability	Characteristic of an evaluation process which enables its development and implementation to be followed with ease.
Environmental Study Report (ESR)	This report is prepared in compliance with the EA Act requirements and the Ministry of the Environment for acceptance, approval, informational or monitoring purposes and the public record.
Utility Function	A function (linear, step, dichotomous) that represents the Utility Score versus the criterion measurement or desirableness.
Utility Score	The "y" value derived from the Utility Function of the measurement of the impact induced by a particular alternative's criterion. A measurement of the usefulness or attractiveness of an alternative with respect to an individual evaluation criterion based on its measured

	effect (a number between 0 and 1). The utility score is dimensionless.
Weight	The importance attributed to a criterion relative to other criterion. The value of the weight is expressed in a percentage and the sum of all criterion weights is equal to 100%.
Weighted Additive Method	The method used in the quantitative evaluation of alternatives, which reduces the project's numerous criteria into a dimensionless number for each alternative suitable for comparison.
Weighted Score	A raw score that has been multiplied by the criterion weights. The weighted scores reflect the social value or importance of the specific group providing weights.

1 INTRODUCTION

The analysis and evaluation process is a requirement of the Environmental Assessment (EA) Process; the framework is provided by the Ministry of the Environment and Climate Change (MOECC) Evaluation Methods in Environmental Assessment.

This document describes the qualitative and quantitative methods of evaluation and which approaches will be utilized for different groups of alternatives for this study. An evaluation method may be defined as a formal procedure for establishing an order of preference among alternatives[1]. The use of a formal evaluation method has two main advantages: it provides a better basis for decision-making than would otherwise exist and it results in reasons for decisions that, on examination, can be traced.

The selection of an evaluation methodology should consider:

- Various methods have different capabilities which make possible different planning processes that may be better suited to a particular project or stage of the EA.
- With any particular planning process, all the steps (such as identifying alternatives, selecting criteria, consulting and involving interested parties, as well as evaluating) must be reasonable and provide a systematic assessment of the net effects of the project.

The selection of the appropriate evaluation methodology depends upon:

- Complexity of the decision-making;
- The number of alternatives;
- The number of criteria; and,
- The sensitivity of the decision.

These issues are described in the following sections and explain the rationale for utilizing the most appropriate evaluation methodology in each stage of the EA study.

[1] Evaluation Methods in Environmental Assessment, Ministry of Environment, 1990.

2 STUDY AREA

The County of Peterborough has retained BT Engineering Inc. (BTE) to undertake a Master Plan for active transportation within the County. This study will determine a list of candidate projects to improve active transportation.

Several candidate projects will be reviewed based on discussion with the County, public and interested stakeholders for improvements in the County. In addition, engineering, environmental, and property requirements will be established.

3 PUBLIC PARTICIPATION

Public participation is a key component to the success of this project. Early public involvement is encouraged to establish a sound understanding of the public's concerns and views, to identify areas of concern and major study issues, and to promote a cooperative working relationship with the public.

3.1 Public, Property Owner, and Stakeholder Consultation

The public will be engaged through the use of Public Information Centre (PIC) meetings, and group meetings with interested stakeholders. This includes meetings and consultation with utilities, businesses and stakeholders who have an interest in providing comments on the design.

3.2 Public Information Centre (PIC)

The purpose of the PIC is to engage the public and receive feedback on desires for pedestrians, cyclists and other active members of the public to create a long list of desired candidate projects in the County.

4 QUALITATIVE EVALUATION METHODOLOGY

A qualitative evaluation method involves describing impacts in narrative terms, or through qualitative measures, without the explicit specification of criteria, ratings or weights. This method, often termed "professional judgment" is widely used in EA's to assess 'alternative planning solutions'. For example, an EA involving the selection of a corridor might evaluate alternative routes in considerable detail using a formal quantitative evaluation, but the evaluation of 'alternatives to' might be done using a qualitative approach. See **Table 4.1** for an example of the qualitative evaluation approach.

A disadvantage of the qualitative approach is the difficulty in recognizing when a comparison will have intuitive choice or universal support (public), i.e. a simple decision easily accepted. A qualitative approach may also be less defensible or subject to criticism. Risk management is an important issue and should the public or stakeholders question these early decisions, additional information may be required to substantiate or detail the rationale for the early decisions. When alternatives are not systematically compared against a specified set of criteria, it may be difficult to follow how the decision was made and what evidence supports it.

Some advantages of using a qualitative approach over a quantitative approach include: reduced cost, reduced time, and ease of presentation to the public. A qualitative approach is predominantly used to evaluate alternatives where there is a clear conclusion and low complexity. The use of a qualitative approach is best suited where there are few alternatives and few criteria where there are measureable and meaningful differences between alternatives being considered.

Table 4.1: Sample Qualitative Evaluation

Factor Group	Alternatives		
	Alt 1 Two Leg Stop Control	Alt 2 Three Leg Stop Control	Alt 3 Roundabout
Transportation			
Traffic Operations	-	-	✓
Safety	-	-	✓
Property/Land Use			
Property Impacts	✓	✓	×
Natural Environment			
Impacts to Natural Environment	-	-	-
Social/Cultural			
Social Environment	-	-	✓
Cost			
Cost	✓	✓	-
Evaluation Results	×	×	✓

			Carried forward

✓ Good in Comparison | - Fair in Comparison | × Poor in Comparison | Preferred Alternative

Where there are few criteria, such as in **Table 4.1**, it is generally acceptable to use a qualitative analysis because the trade-offs are clear and understandable. A more rigorous definition of the attributes of each alternative, as would be possible using a quantitative approach, is not required because there are too few variables. In this study, the qualitative approach will be used to assess Alternatives to the Undertaking and for the Coarse Screening of the initial long list of preliminary design alternatives.

The use of a more comprehensive evaluation technique becomes necessary as the complexity increases (i.e. number of alternatives and number of criteria). In these situations, as described in **Section 5**, this study will utilize a quantitative approach.

5 QUANTITATIVE EVALUATION METHOD

Key principles of the EA Act and MOECC's Guidelines on Environmental Assessment Planning and Approval are that there be accountability and traceability. A quantitative evaluation method allows both of these key principles to be maintained. A quantitative method based on the simple "Weighted Additive Method" will be used for this study and is referred to as the "Multi-Attribute Trade-off System" (MATS).

The Weighted Additive Method has proven to be invaluable for the evaluation of complex groups of alternatives. The methodology allows for sensitivity testing and the ability to answer "what if" questions. This method is used on projects where alternatives are to be evaluated and the decision making process is faced with either a large number of alternatives or a large number of competing criteria among the alternatives being evaluated.

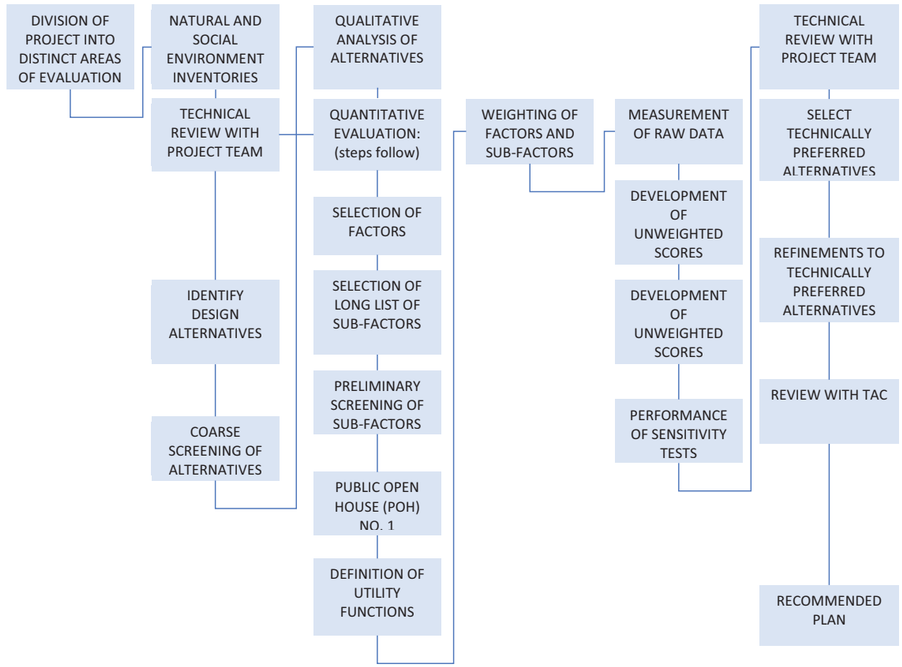
This systematic approach is consistent with MOECC practices for the evaluation of alternatives. It avoids many of the pitfalls associated with qualitative assessments by using an analytical approach that measures scores based on a mathematical relationship, i.e. the degree of subjectivity by the Study Team is minimized. A traceable process allows the Study Team and public an opportunity to assess trade-offs involved in the evaluation and use this information in the decision-making process. In addition, this quantitative method allows sensitivity tests to be performed to determine if the highest ranked alternative is affected by changing the weights (perspective of importance) of the assessment factors.

For this study, preliminary design alternatives will be compared and scores assigned to each of the various assessment factors and a sensitivity-testing program will be completed in consultation with the public and external agency interaction.

When using the Weighted Additive Method, each member of the Study Team assigns a weight to the Global Factors and sub-factors. The Average Study Team Weight is assigned

to each of the alternatives. The alternative with the highest score is selected as the TPA. The steps followed to arrive at an overall score for each alternative are shown in **Figure 5.1**.

Figure 5.1: Quantitative Evaluation Process



This systematic approach includes the following steps:

- Collection of data/environmental inventories
- Development of a long list of reasonable alternatives (including alternatives screened out as unfeasible or unreasonable in comparison to those being carried forward)
- Development of a long list of evaluation criteria/performance factors
- Short listing of sub-factors to those where there are meaningful differences among the alternatives to be compared
- Establish Social Utility Functions (Performance Factors or Function Forms) for the short listed sub-factors
- Weighting of Evaluation Criteria (assigning importance based on the specific set of alternatives)
- Rating of Alternatives
- Sensitivity Testing
- Selection of TPAs
- Public Review
- Refinements to the Technically Preferred Plan
- Recommended Plan

These steps, as they relate to this study, are briefly described in the following sections.

5.1 Evaluation Criteria – Factors

The initial test in the evaluation is to develop evaluation criteria from which alternatives will be assessed. This is broken down into a two-step process that involves the selection of a "global" group of factors and a number of "local" sub-factors under the global groups.

The global factors groups will be presented to the public, and following this consultation will be accepted as describing the broad definition of the environment to be evaluated. Factors considered for this study may include:

- Traffic and Transportation;
- Natural Environment;
- Hydraulics;
- Structures;
- Heritage;
- Social and Cultural Environment;
- Land Use and Property;
- Economic Environment; and
- Cost.

While these factor groups are the starting point for the evaluation, one or more factors could be removed if it was determined that there was no sub-factor in this category i.e. there is not a meaningful and measureable difference among the alternatives being assessed in this category. When a particular factor is carried forward, then one or more sub-factors are considered under this group. These sub-factors are the individual descriptors for the evaluation. The selection of the sub-factors is very important to the decision making process because they must adequately describe the issue to be evaluated and the alternatives being compared. See **Table 5.1** for a sample preliminary listing of sub-factors. Any information regarding an alternative, where there are differences among alternatives, is incorporated into the decision-making process by including it as a sub-factor. The benefit to incorporating two levels of evaluation criteria (global factors and local sub-factors) is the prevention of the unbalancing of the evaluation (that could occur by adding more criteria under one group). Weights are assigned to the global factors to eliminate any possibility of skewing the results by selecting a large number of sub-factors in one particular factor group.

Table 5.1: Sample Long List of Evaluation Criteria (Global Factors and Sub-factors)

Traffic and Transportation	
1. Highway 401 Safety	✗
2. Highway 401 Detour Duration	✓
3. Cornwall Centre Road Detour Duration	✓
4. Out-of-Way Travel	✓
5. Traffic Delay, Highway 401	✗
6. Risk of Queuing	✓
7. Disruption to Bicycles and Pedestrians	✓
8. Design Standard	✓
9. Design Speed	✗
10. Radius of Horizontal Curves	✗
11. Radius of Vertical Curves	✗
12. Consistency with Adjacent Highway Design Elements	✗
13. Safety of Residential Entrances	✗
14. Sight Distances	✗
15. Level of Service on Cross Streets	✗
16. Ability to be implemented for 2011 construction contract	✗
17. Consistency with Southern Ontario Highways Plan	✗
18. Ease of driver task	✗
Natural Environment	
1. Area of Wetland Impacted	✗
2. Fish Habitat Impacted	✓

3. Impact to Natural Woodland Habitat	✗
4. Wildlife Corridors Impacted	✗
5. Number of Watercourse Crossings	✗
6. Number of Groundwater Wells Impacted	✗
7. Stormwater Impact	✓
Cultural Environment	
1. Areas of Archaeological Potential Impacted	✓
2. Loss of Visual Screening along the north side of Hwy 401	✓
3. Cultural Landscape Features Impacted	✗
4. Built Heritage Features Impacted	✗
5. Community Cohesion	✗
6. Impact to Existing Bicycle Path	✗
7. Snowmobile Trails Impacted	✗
8. Vibration Impacts	✗
9. Bridge Aesthetics	✓
Socio-Economic Environment	
1. Out-of-way travel to businesses	✓
2. Impact to Cornwall Motor Speedway	✓
3. Impact to McGregor Grain Impact to McGregor Grain	✗
4. Impact to Cornwall Landfill	✗
5. Impact to Aggregate Resources	✗
6. Impact to Farming Activities	✓
7. Impact to Existing Utilities	✓
8. Number of Noise-Sensitive Areas Impacted	✓
9. Out-of-Way Travel, Emergency Services	✗
10. Out-of-Way Travel, School Buses	✗
11. Potential to Support Regional Development	✗
12. Loss of Surface and Mineral Rights	✗
Land Use and Property	
1. Temporary Limited Interest Required	✓
2. Number of Properties Impacted (Total)	✓
3. Number of Buyouts (Total)	✗
4. Area of Residential Property Required	✗
5. Number of Residential Buyouts	✗
6. Area of Industrial Property Required	✗
7. Number of Industrial Buyouts	✗
8. Area of Institutional Land Required	✗
9. Number of Institutional Buyouts	✗
10. Area of Public Service Facility Land Required	✗

BT ENGINEERING BTE
County of Peterborough
Active Transportation Master Plan
Evaluation Methodology Report

11. Number of Public Service Facility Buyouts	✗
12. Area of Prime Agricultural Land Required	✗
13. Number of Agricultural Buyouts	✗
14. Area of Commercial Land Required	✗
15. Number of Commercial Buyouts	✗
16. Parks/Open Space Area Required	✗
17. Utility Corridors Impacted	✗
18. Potentially Contaminated Sites Impacted	✗
Cost	
1. Life Cycle Cost	✓
2. Durability	✓
3. Maintenance	✓
4. Constructability	✓
5. Long Term Lighting	✓
6. Potential for Settlement	✗

Legend: ✓ Carried Forward ✗ Not Carried Forward

Generally, the process begins by establishing a long list of potential or candidate sub-factors through discussions with community associations, the Study Team and interest groups or from previous studies of the same nature. Then, for each group of alternatives being evaluated, the sub-factors are reviewed and screened by eliminating those that are considered equal among alternatives being considered as well as those that do not apply to the study area, based on the site inventories carried out.

Table 5.2 provides a sample of a typical Factor, Sub-Factor, Unit and Utility Function Type from a similar Transportation Study. Similar Factor, Sub-factor and Utility functions will be developed for this study.

Table 5.2: Typical Evaluation Factors and Sub-Factors

Factor	Sub-Factor	Unit	Utility Function Type
Traffic and Transportation	• Level of Service (LOS)	Letter (A, B, C, D, E or F)	Stepped Function
	• Number of conflicts	Number	Linear
	• Number of intersections	Number	Linear
	• Number of entrances	Number	Linear
	• Out-of-way travel	Minutes	Linear
	• Flexibility for staged construction	Yes/No	Dichotomous
	• Ease to implement detour for new structure	Yes/No	Dichotomous
	• Design consistency	Yes/No	Dichotomous
	• Ability to stage construction	Yes/No	Dichotomous

5.2 Factor and Sub-factor Weights

The selection of weights for the factors and the sub-factors is based on assessments by the Study Team of their relative importance. Within a group of factors, inevitably there is an ordering, with some factors having more importance than others. This is accounted for by each individual assigning a weight to each factor, which is reflected in the "Factor Weight" and "Sub-Factor Weight" columns. An example of typical weights is shown in **Table 5.3**.

Table 5.3: Sample Study Team Average Weights for a Factor Group and Sub-Factors in that Group

Factors	TAC	
	Factor Weight	Sub-Factor Weight
Traffic and Transportation	40.9%	
• Level of Service (LOS)		27.6%
• Number of conflicts		13.5%
• Number of intersections		7.3%
• Number of entrances		6.1%
• Out-of-way travel		2.6%
• Flexibility for staged construction		9.6%
• Ease to implement detour for new structure		13.9%
• Design consistency		9.2%
• Ability to stage construction		10.2%
	Total	**100%**

As shown in **Table 5.3**, in this example, the group of evaluators judged the Traffic and Transportation Factor Group to be valued at 40.9% of the overall importance of the decision between the alternatives being considered.

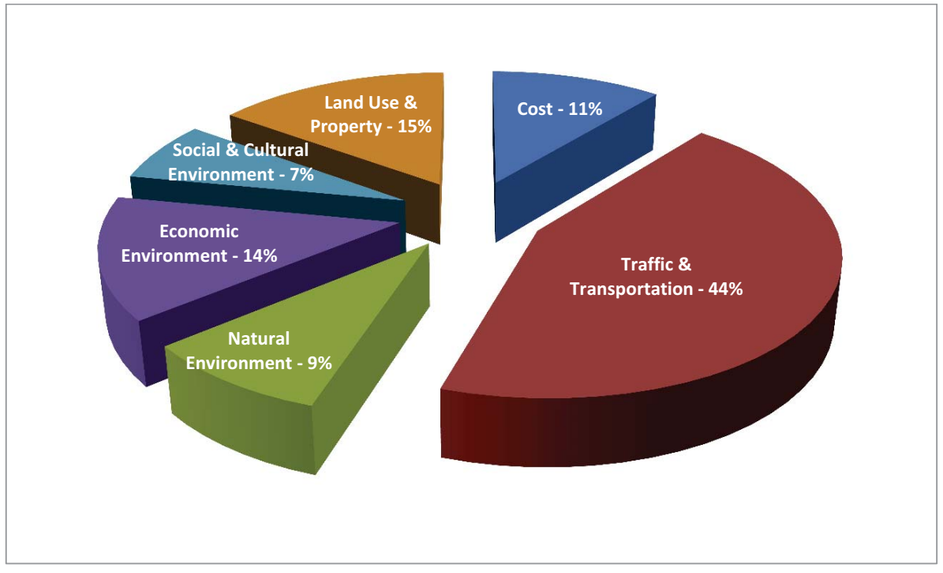
Within each Factor Group the sum of the percentage weights of all sub-factors listed under each factor totals 100%. As shown in Table 5.3 several of the sub-factors were judged to be more important /less important when compared to each other for this specific evaluation of alternatives being considered.

The weights for each factor and sub-factor are determined by averaging the weights assigned by the Study Team (Evaluation Committee). Each member gives a judgement of the importance of each global factor and local sub-factor (a percentage value) based on his or her personal assessment and professional judgement, considering the net effects and input of stakeholders and the public.

There is usually a range of perspectives in deciding the weights (importance) of factors and sub-factors. Every person assigning weights has a personal perspective and understanding of the scope of the project. Hence, there is an advantage to having a diversified team of professionals with varied backgrounds performing the evaluation.

An example of the weighting of each of the global factors is shown in **Figure 5.2**. The weighting of sub-factors within each factor group would be distributed among the available sub-factors.

Figure 5.2: Sample Weighting of Global Factors



5.3 Social Utility Functions

The Weighted Additive Method used to evaluate alternatives relates the performance or attractiveness of alternatives using a mathematical relationship. This includes two variables: the first is the raw data or measured or modelled data and the second is the utility or utility score, which is the measure of attractiveness of the alternative.

For this project, the relationship between these two variables is described, as shown in **Figure 5.3**, by either a dichotomous, stepped, or linear social utility function. A dimensionless utility score between zero (0) and 1 is assigned to an alternative for each sub-factor. The shape of this function can vary from linear to stepped or exponential, and is defined by a subject area specialist.

The use of utility curves or functions is a step that transforms each of the measured effects to a dimensionless number and measure of utility. This step is required because the effects of each sub-factor are measured in different units (length, area, time, volume, dollars etc). To produce a mathematical measure of the performance, each effect is transformed to a measure of utility. The combined effect or performance of each alternative is a measure of utility (attractiveness) which is a dimensionless measure. The utility function (also commonly described as performance factor or function form) defines the relationship of effect to the attractiveness (utility). These utility functions are defined by subject area specialists in the field of study.

Examples of Social Utility Functions for the ‘Ease of Maintenance’ sub-factor definition are shown below in **Figure 5.4**.

Figure 5.3: Sample Utility Functions

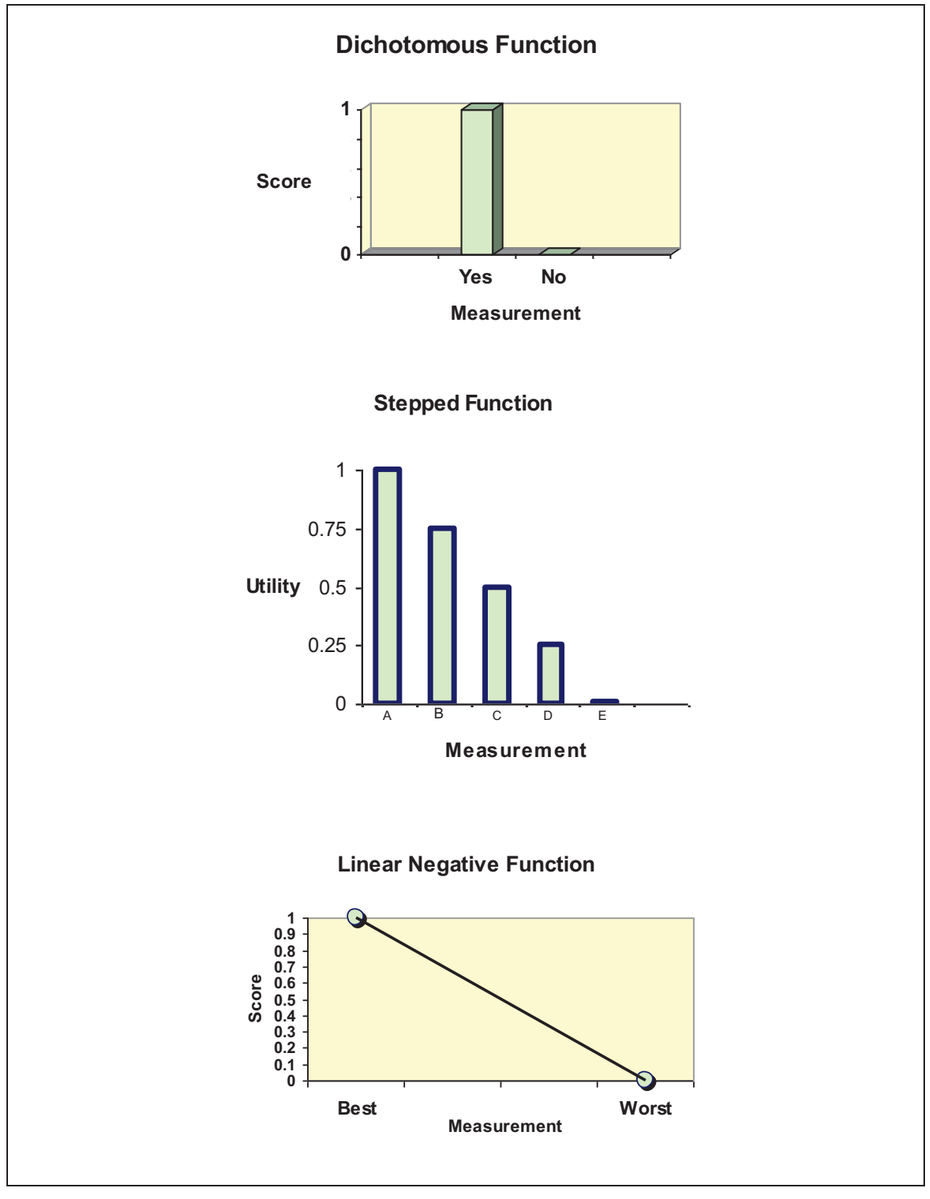
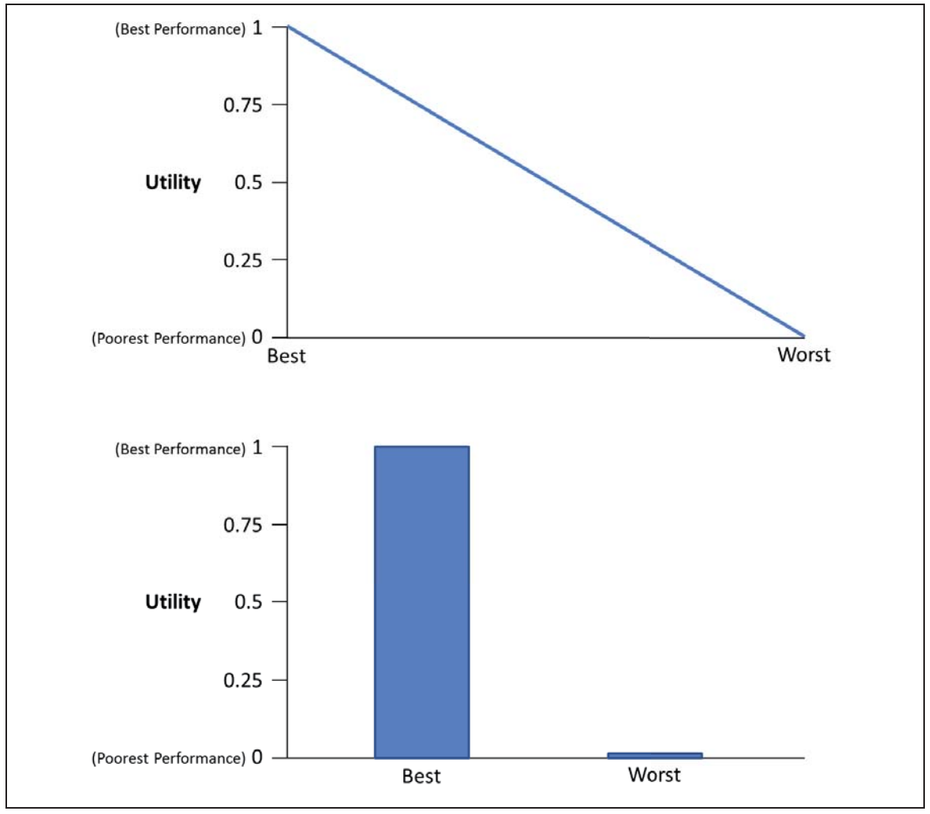


Figure 5.4: Social Utility Function



A dichotomous utility function enables the decision-maker to establish criteria that presents an “either–or” situation (desirable or undesirable, negative or positive, present or absent). If it were decided beforehand that a “yes” answer is desirable, then a utility score of one would be assigned to this criterion, otherwise zero would be assigned. One or zero are the available options; no other utility score is available.

A linear function is used to convert scores for sub-factors that have varying measurements. Given a measurement, a unique utility score between zero and one can be assigned to a sub-factor. The slope of the linear utility function can be negative or positive depending on desirability of the impact.

5.4 Weighted Score

The total un-weighted utility score of a given alternative can be expressed as:

U (Alternative A) = $\varnothing_1 X_1 + \varnothing_2 X_2 \ldots + \varnothing_n X_n$, where

U (A) = Total un-weighted utility score for Alternative A

$\varnothing_1$ = attractiveness with respect to parameters

X_1 = measurement of parameter X

Weighted scores are computed using the weights selected by the TAC. The weighted score for each alternative under a specific sub-factor is calculated as follows:

(weighted score) = (utility score x [(factor weight) x (sub-factor weight)])

Using this approach, a generic weighted attractiveness function can be expressed as:

U_w (Alternative A) = $U_1 W_1 + U_2 W_2 + \ldots + U_n W_n$

OR

U_w (Alternative A) = $W_1 \varnothing_1 X_1 + W_2 \varnothing_2 X_2 \ldots + W_n \varnothing_n X_n$

Where: U = Total un-weighted utility score for Alternative A

U_w (A) = Total weighted utility score for Alternative A

W_1= Weighted parameter (factor weight x sub-factor weight)

$\varnothing_1$ = Attractiveness with respect to parameter 1

X_1 = Measurement of parameter

The weighted scores of all the sub-factors are then added to give total score for each alternative.

$$U_w(A) = \sum_{X=1}^{n} W_n \varnothing_n X_n$$

5.5 Rating Alternatives

Following the selection of evaluation factors and sub-factors, measurements of the impacts are made using topographic plans, field surveys, and numerical modelling. These measurements result in data being available under each of the evaluation criteria from which ratings are made for each alternative.

The Weighted Additive Method focuses on the differences of the alternative, addresses the complexity of the base data collected and provides a traceable and defensible decision-making process. This process is a numerical calculation where alternative scores are determined through the use of a mathematical relationship to equate impacts to scores. It eliminates any possible subjective opinions of scores for alternatives because the team does not estimate the score for an alternative.

The scores for each alternative under each of the respective sub-factors are normalized based on measured impacts. Social utility functions are defined to relate impacts to the attractiveness of an alternative. This means that under each sub-factor, the alternative receives an un-weighted rating of between zero and one based on these measurements. The mathematical relationships for calculating scores are developed in consultation with the Study Team.

5.6 Sensitivity Testing Program

It should be recognized that the scope of the evaluation and determination of weights for the evaluation criteria are a matter of personal and professional judgement. Accordingly, it is considered essential to conduct sensitivity testing to determine the effect of changing weights assigned to each criterion.

To test how sensitive the outcome of the evaluation is with respect to the assigned weights (i.e. would the result have changed if different weights were used), a sensitivity testing program is undertaken. This results in greater confidence in the selection process and reduces the potential that the average weights bias the outcome of the evaluation.

Often, there is a diversity of opinion in the group as to what weight is appropriate for a factor or sub-factor. When an average weight is used to capture the preferences of the group it loses valuable information on the range of values of the group. To test the range of perspective of the Study Team, the highest and lowest weights suggested by anyone in the group are defined as a reasonable range of weights to test. A series of sensitivity tests are performed for the evaluation of alternatives. This allows the team an opportunity to assess the outcome of the evaluation if different weights (different perspectives of importance) are assigned to the factors and sub-factors from the average weights defined by the Study Team members. In this way, trade-offs can be identified, credibility can be achieved with the public, and “what if” questions can be answered quickly. See **Figure 5.5** for an example of the typical range of project team weights and **Table 5.4** for a sample ranking of alternatives.

Following the above methodology, a series of tests can be performed varying the weights for each factor. These tests include:

- Average Study Team Weight
- Highest Weight by any Team Member
- Lowest Weight by any Team Member

Following this series of tests, the results can be reviewed to assess whether the preferred alternative changes when the weights are varied.

Using this information alone is not the only justification for selecting a particular alternative, but it does provide a level of confidence in the selection. This information is used in the decision-making process before the TPAs are recommended to be carried forward.

Figure 5.5: Sample Range of Weights for Traffic and Transportation

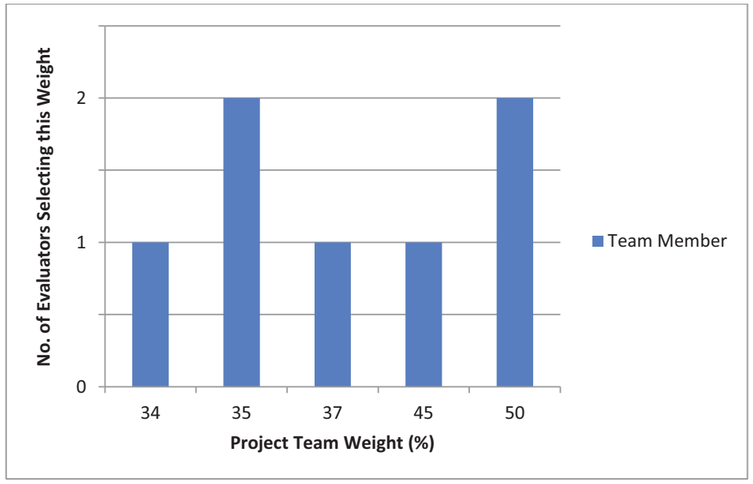


Table 5.4: Sample Ranking of Alternatives

Testing	Weight	Alt 1A	Alt 1A'	Alt 1B	Alt 1C
Study Team Average Team Scores	N/A	2	1	3	4
High Traffic and Transportation	65%	2	1	3	4
Low Traffic and Transportation	30%	2	1	3	4
High Natural Environment	20%	2	1	3	4
Low Natural Environment	5%	1	2	3	4
High Economic Environment	30%	1	2	3	4
Low Economic Environment	5%	2	1	3	4
Low Economic Environment	5%	2	1	3	4

5.7 Selection of Technically Preferred Alternatives

The TPA identifies the preferred solution by taking into account the technical analysis, environmental considerations and comments of all study participants.

The TPA is then presented to the public and external stakeholders at the second POH. This allows for any comments or questions regarding the proposed design.

It should be recognized that the information and conclusions obtained using the evaluation method are only tools used to assist in the evaluation process and identifying trade-offs. In the end, it is the Study Team (Evaluation Committee) which makes the final decision on the selection of the TPA(s), using both the information obtained throughout the evaluation process and their individual experience and expertise, and through additional input from senior management on funding availability or other program constraints.

The findings of the analysis and evaluation process will be included as a component of the EA Process and documented in the Environmental Study Report (ESR). The principles and methodology of the EA process assist the Study Team in the analysis and evaluation of alternatives and the selection of the TPA. The public and government agencies have the opportunity to provide input throughout the course of the study.

APPENDIX B: Sub-factor Definitions

BT ENGINEERING

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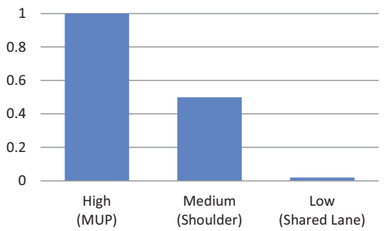
Pedestrians – Performance – Level of Service



Definition: This sub-factor measures the performance for pedestrians. The most desirable performance (10) reflects having pedestrians separated from traffic with an unobstructed wide walking surface typical of a separate sidewalk, multi-use path or trail. A performance of zero (0) reflects a shared use of the general lane. A paved shoulder with a minimum 1.5 m walking space received a score of 0.5.. See **Figure 1**.Other types of facilities are rated as desirable under this criterion and receive a score of 1.

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
H/M/L	L	L	M	L	M	L	M	M	M	M	L	M	M	10	M	M	L	L	L	L
Utility Score	0	0	0.5	0	0.5	0	0.5	0.5	0.5	0.5	0	0.5	0.5	1	0.5	0.5	0	0	0	0

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
H/M/L	L	M	L	L	M	M	M	M	L	M	L	L	M	M	L	L	L	L	M	H
Utility Score	0	0.5	0	0	0.5	0.5	0.5	0.5	0	0.5	0	0	0.5	0.5	0	0	0	0	0.5	1

Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
H/M/L	L	L	M	M	M	L	M	L	M	M	M	H	M	H	H	H	H	M	H	H
Utility Score	0	0	0.5	0.5	0.5	0	0.5	0	0.5	0.5	0.5	1	0.5	1	1	1	1	0.5	1	1

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
H/M/L	H	M	H	M	H	H	H	H	M	H	H	H	M	M	M	H	L	H	H	M
Utility Score	1	0.5	1	0.5	1	1	1	1	0.5	1	1	1	0.5	0.5	0.5	1	0	1	1	0.5

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
H/M/L	M	L	L	M	L	M	M	L	L	L	M	L	L	M	L	L	M	L	M	M	H
Utility Score	0.5	0	0	0.5	0	0.5	0.5	0	0	0	0.5	0	0	0.5	0	0	0.5	0	0.5	0.5	1

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
H/M/L	M	M	L	L	L	L	L	L	H	H	H	H	H	H	M	M	M	L	M	M
Utility Score	0.5	0.5	0	0	0	0	0	0	1	1	1	1	1	1	0.5	0.5	0.5	0	0.5	0.5

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Cross Section Elements

Figure 2.2.6.3 Sidewalk Requirements and Typical Dimensions

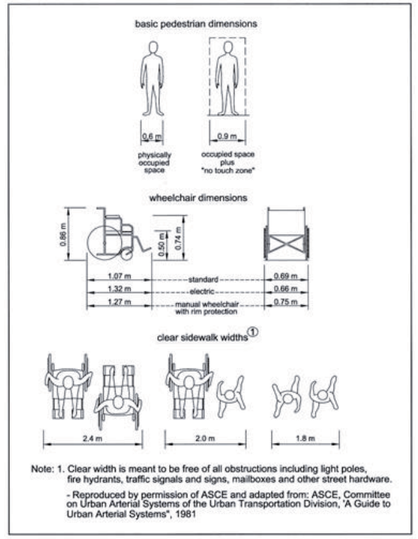

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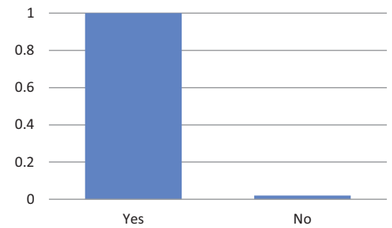
Figure 1: Sidewalk Requirements and Typical Dimensions

countyof peterborough active transportation

Pedestrians – Performance – Surface Type



Definition: This sub-factor measures the performance for pedestrians in terms of the provision of a hard walking surface to reduce slipping hazards. A hard surface, “Yes”, is desirable. A granular surface, “No”, is less desirable. Other types of facilities are rated as desirable under this criterion and receive a utility score of 1 (“Yes”).

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Utility Score	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
Yes/No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utility Score	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1

Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
Yes/No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utility Score	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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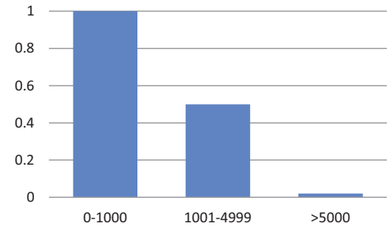
Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	1	1

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
Yes/No	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Utility Score	1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1

Pedestrians – Performance – Safety



Definition: This sub-factor measures the safety for pedestrians. Linkages adjacent to low volumes (less than 1000 AADT) and low speed roads for automobiles, trucks and cyclists are preferred compared to higher volume roads (greater than 5000 AADT) which are rated low unless protected by sidewalks. Other types of facilities are rated as desirable under this criterion and receive a utility score of 1.

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
AADT	1000	1000	5800	1000	1000	1000	5400	2350	2500	3000	1000	2500	11500	11500	1500	3750	1000	1000	1000	1000
Utility Score	1	1	0	1	1	1	0	0.5	0.5	0.5	1	0.5	0	0	0.5	0.5	1	1	1	1

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
AADT	1000	2150	1000	1000	650	1250	700	5550	1000	2500	1000	1000	1600	1500	1000	1000	1000	1000	0	0
Utility Score	1	0.5	1	1	1	0.5	1	0	1	0.5	1	1	0.5	0.5	1	1	1	1	1	1

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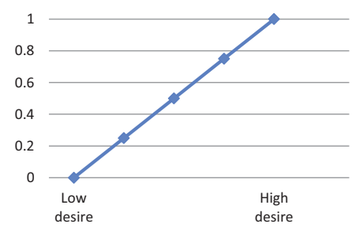
Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
AADT	1000	1000	1375	2500	1750	1000	650	1000	500	500	750	0	0	0	0	0	0	3500	3500	0
Utility Score	1	1	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1	1	1	1	0.5	0.5	1

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
AADDT	9225	1875	1875	2100	2100	0	0	0	5000	5000	0	0	0	4025	3450	3450	1000	1000	0	2283
Utility Score	0.5	0.5	0.5	0.5	0.5	1	1	1	0	0	1	1	1	0.5	0.5	0.5	1	1	1	0.5

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
AADT	1700	1000	1000	5616	1000	700	2700	1000	1000	1000	1700	1000	1000	4850	1000	1000	5733	1000	1000	6000	6000
Utility Score	0.5	1	1	0.5	1	1	0.5	1	1	1	0.5	1	1	0.5	1	1	0.5	1	1	0	1

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
AADT	1500	10750	1000	1000	1000	1000	1000	1000	0	0	0	0	0	10000	500	1000	500	1000	14700	3733
Utility Score	0.5	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0.5

Pedestrians – Connectivity – Desire Lines



Definition: This sub-factor measures whether the project provides connectivity to pedestrian destinations such as attractions, schools, recreational/tourist linkages (resorts) etc. Alternatives that serve a high pedestrian desire, i.e. high demand, are preferred.

Mitigation: None

Alternatives:

Measurement	**1**	2	3	4	5	6	**7**	8	9	10	11	**12**	13A	13B	14	15	16	17	18	**19**
Ped Desire (1-10)	**4**	4	4	2	3	2	0	2	4	2	1	**2**	10	10	3	1	4	0	4	**2**
Utility Score	**0.4**	0.4	0.4	0.2	0.3	0.2	0	0.2	0.4	0.2	0.1	**0.2**	1	1	0.3	0.1	0.4	0	0.4	**0.2**

Measurement	20	**21**	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	**38A**	**38B**
Ped Desire (1-10)	1	**10**	4	1	2	1	1	1	1	1	1	1	2	2	6	1	1	1	**0**	**6**
Utility Score	0.1	**1**	0.4	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.6	0.1	0.1	0.1	**0**	**0.6**

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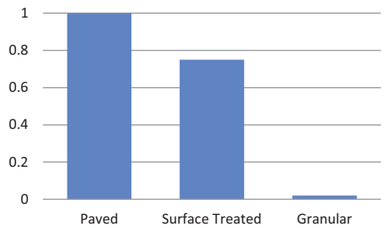
Measurement	39	40	41	42	43	44	45	46	47	**48**	49	50	**51**	52	53	54	55	56A	56B	57
Ped Desire (1-10)	1	3	3	2	1	1	0	3	3	**2**	3	10	**1**	0	8	8	8	0	6	8
Utility Score	0.1	0.3	0.3	0.2	0.1	0.1	0	0.3	0.3	**0.2**	0.3	1	**0.1**	0	0.8	0.8	0.8	0	0.6	0.8

Measurement	58	59A	59B	60A	60B	**61**	62	63	64A	64B	65	66	67	68	**69A**	**69B**	70	71	72	73
Ped Desire (1-10)	1	3	8	3	8	**10**	8	0	0	7	10	8	0	2	**3**	**7**	5	8	8	2
Utility Score	0.1	0.3	0.8	0.3	0.8	**1**	0.8	0	0	0.7	1	0.8	0	0.2	**0.3**	**0.7**	0.5	0.8	0.8	0.2

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Ped Desire (1-10)	1	2	1	6	2	0	0	0	0	2	3	2	1	2	4	3	1	0	1	0	1
Utility Score	0.1	0.2	0.1	0.6	0.2	0	0	0	0	0.2	0.3	0.2	0.1	0.2	0.4	0.3	0.1	0	1	0	0.1

Measurement	94	95	96	97	98	99	100	101	102	103	**104**	105	106	107	108	109	110	111	112	113
Ped Desire (1-10)	3	4	1	6	4	2	4	4	5	4	**4**	4	10	6	2	2	2	0	2	3
Utility Score	0.3	0.4	0.1	0.6	0.4	0.2	0.4	0.4	0.5	0.4	**0.4**	0.4	1	0.6	0.2	0.2	0.2	0	0.2	0.3

Cyclists – Performance – Surface Type



Definition: This sub-factor measures the performance for cyclists in terms of obstructions or hazards on the travel surface for road bicycles. A paved surface, "10", is desirable. A surface treated travel surface scores a "7.5". Granular surfaces, "zero", restrict the range of bicycle types and are less preferred.

Mitigation: None.

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
Surface Type	ST	ST	P	ST	P	P	P	P	P	P	G	P	P	P	P	P	G	ST	ST	ST
Utility Score	0.75	0.75	1	0.75	1	1	1	1	1	1	0	1	1	1	1	1	0	0.75	0.75	0.75

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
Surface Type	ST	P	ST	G	P	P	P	P	G	P	ST	P	P	P	ST	ST	ST	ST	P	P
Utility Score	0.75	1	0.75	0	1	1	1	1	0	1	0.75	1	1	1	0.75	0.75	0.75	0.75	1	1

Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
Surface Type	ST	ST	P	P	P	G	P	ST	P	P	P	P	P	P	P	P	P	P	P	P
Utility Score	0.75	0.75	1	1	1	0	1	0.75	1	1	1	1	1	1	1	1	1	1	1	1

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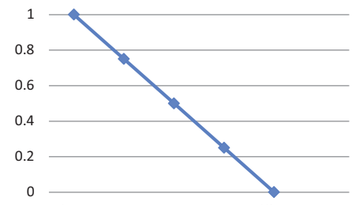
Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
Surface Type	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	ST	P	P	P
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.75	1	1	1

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Surface Type	P	ST	P	P	P	P	P	ST	ST	ST	P	ST	ST	P	ST	G	P	G	G	P	P
Utility Score	1	0.75	1	1	1	1	1	0.75	0.75	0.75	1	0.75	0.75	1	0.75	0	1	0	0	1	1

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
Surface Type	P	P	ST	ST	G	G	ST	G	P	P	P	P	P	P	P	P	P	P	P	P
Utility Score	1	1	0.75	0.75	0	0	0.75	0	1	1	1	1	1	1	1	1	1	1	1	1

Cyclists –Performance – Safety – Bicycle Compatibility Index



Definition: This sub-factor measures the rural bicycle compatibility index (RBCI) of each project. The RBCI is based on extensive research building on the Federal Highway Administration's (FHWA) Bicycle Compatibility Index, but applied to a rural context. The RBCI measures the attractiveness of a given project based on traffic volume and the shoulder width. The *lower* the RBCI, the *safer* the cycling route. Multi-use pathways were assumed a RBCI of 0. The *higher* the RBCI, the *less* safe the cycling route. Utility scores are assigned to each project as follows: The project(s) with the *lowest* RBCI is assigned a utility score of 1, the project with the *highest* RBCI is assigned a utility score of 0. Other projects will be assigned a utility score between 0 and 1 based on a linear relationship between the highest and lowest RBCI project scores. Other types of facilities are rated as desirable and received an RBCI of 0.

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
R.B.C.I.	2.7	2.7	2.48	2.7	2.49	2.7	2.08	2.2	2.14	2.25	2.7	2.18	3.18	0	2.16	2.14	2.7	2.7	2.7	2.7
Utility Score	0.15	0.15	0.22	0.15	0.22	0.15	0.35	0.31	0.33	0.29	0.15	0.31	0	1	0.32	0.33	0.15	0.15	0.15	0.15

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Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
R.B.C.I.	2.7	2.12	2.7	2.7	2.48	2.06	2.5	1.75	2.7	2.1	2.7	2.7	2.22	2.07	2.7	2.7	2.7	2.7	1.98	0
Utility Score	0.15	0.33	0.15	0.15	0.22	0.35	0.21	0.45	0.15	0.34	0.15	0.15	0.3	0.35	0.15	0.15	0.15	0.15	0.38	1

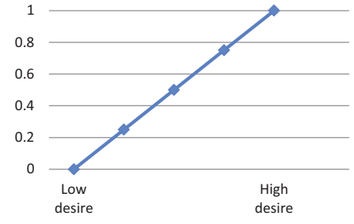
Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
R.B.C.I.	2.7	2.7	2.18	2.45	2.08	2.7	2.48	2.7	2.54	2.51	2.49	0	2.17	0	0	0	0	2.62	0	0
Utility Score	0.15	0.15	0.31	0.23	0.35	0.15	0.22	0.15	0.2	0.21	0.22	1	0.32	1	1	1	1	0.18	1	1

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
R.B.C.I.	1.87	2.17	0	2.15	0	0	0	0	2.51	0	0	0	1.84	2.12	2.36	0	2.7	2.7	0	2.3
Utility Score	0.41	0.32	1	0.32	1	1	1	1	0.21	1	1	1	0.42	0.33	0.26	1	0.15	0.15	1	0.28

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
R.B.C.I.	2.13	2.7	2.13	1.76	2.7	2.48	2.14	2.7	2.7	2.7	2.08	2.7	2.7	2.17	2.7	2.7	2.32	2.7	2.7	1.95	0
Utility Score	0.33	0.15	0.33	0.45	0.15	0.22	0.33	0.15	0.15	0.15	0.35	0.15	0.15	0.32	0.15	0.15	0.27	0.15	0.15	0.39	1

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
R.B.C.I.	2.12	2.91	2.7	2.7	2.7	2.7	2.7	2.7	0	0	0	0	0	0	0	2.54	2.56	2.54	2.7	2.56
Utility Score	0.33	0.08	0.15	0.15	0.15	0.15	0.15	0.15	1	1	1	1	1	1	1	0.2	0.19	0.2	0.15	0.19

Cyclists – Connectivity – Desire Lines



Definition: This sub-factor measures whether the project provides connectivity to destinations for cyclists such as attractions, schools, recreational/tourist linkages (resorts) etc. Alternatives that serve a high cyclist desire, i.e. high demand, are preferred.

Mitigation: None

Alternatives:

Measurement	**1**	2	3	4	5	6	**7**	8	9	10	11	**12**	13A	13B	14	15	16	17	18	**19**
Cycle Desire (1-10)	**4**	6	6	6	5	6	**10**	7	7	7	6	**10**	8	10	7	6	5	5	7	**8**
Utility Score	**0.4**	0.6	0.6	0.6	0.5	0.6	**1**	0.7	0.7	0.7	0.6	**1**	0.8	1	0.7	0.6	0.5	0.5	0.7	**0.8**

Measurement	20	**21**	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	**38A**	**38B**
Cycle Desire (1-10)	7	**10**	7	4	8	6	6	6	5	6	3	3	7	10	7	6	9	3	**8**	**10**
Utility Score	0.7	**1**	0.7	0.4	0.8	0.6	0.6	0.6	0.5	0.6	0.3	0.3	0.7	1	0.7	0.6	0.9	0.3	**0.8**	**1**

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Measurement	39	40	41	42	43	44	45	46	47	**48**	49	50	**51**	52	53	54	55	56A	56B	57
Cycle Desire (1-10)	6	7	6	6	5	4	5	5	5	**4**	8	10	**5**	2	8	8	8	8	10	8
Utility Score	0.6	0.7	0.6	0.6	0.5	0.4	0.5	0.5	0.5	**0.4**	0.8	1	**0.5**	0.2	0.8	0.8	0.8	0.8	1	0.8

Measurement	58	59A	59B	60A	60B	**61**	62	63	64A	64B	65	66	67	68	**69A**	**69B**	70	71	72	73
Cycle Desire (1-10)	8	7	8	7	8	**10**	8	5	8	10	5	5	8	5	**10**	**5**	6	2	8	6
Utility Score	0.8	0.7	0.8	0.7	0.8	**1**	0.8	0.5	0.8	1	0.5	0.5	0.8	0.5	**1**	**0.5**	0.6	0.2	0.8	0.6

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Cycle Desire (1-10)	7	7	5	7	5	2	6	7	7	7	10	7	8	8	7	4	9	3	4	3	5
Utility Score	0.7	0.7	0.5	0.7	0.5	0.2	0.6	0.7	0.7	0.7	1	0.7	0.8	0.8	0.7	0.4	0.9	0.3	0.4	0.3	0.5

Measurement	94	95	96	97	98	99	100	101	102	103	**104**	105	106	107	108	109	110	111	112	113
Cycle Desire (1-10)	6	8	5	7	7	7	7	7	7	8	**8**	8	5	8	6	7	6	3	8	8
Utility Score	0.6	0.8	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.8	**0.8**	0.8	0.5	0.8	0.6	0.7	0.6	0.3	0.8	0.8

Cyclists – Performance – Shared Use of Space

Definition: This sub-factor measures the proximity of cyclists to the vehicular corridor and traffic. Dedicated facilities (multi-use trail) are preferred as they provide a buffer between the vehicular traffic and cyclists. An adjacent facility (paved shoulder or bike lane) provides a separate travel space for cyclists. Shared use of the vehicular lane provides no buffer between vehicles and cyclists. This sub-factor measures the level of service for cyclists.

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
Sh/Adj/Ded	Sh	Sh	Adj	Sh	Adj	Sh	Adj	Adj	Adj	Adj	Sh	Adj	Adj	Ded	Adj	Adj	Sh	Sh	Sh	Sh
Utility Score	0	0	0.5	0	0.5	0	0.5	0.5	0.5	0.5	0	0.5	0.5	1	0.5	0.5	0	0	0	0

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
Sh/Adj/Ded	Sh	Adj	Sh	Sh	Adj	Adj	Adj	Adj	Sh	Adj	Sh	Sh	Adj	Adj	Sh	Sh	Sh	Sh	Adj	Ded
Utility Score	0	0.5	0	0	0.5	0.5	0.5	0.5	0	0.5	0	0	0.5	0.5	0	0	0	0	0.5	1

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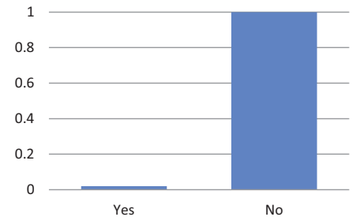
Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
Sh/Adj/Ded	Sh	Sh	Adj	Adj	Adj	Sh	Adj	Sh	Adj	Adj	Adj	N/A	Adj	Ded	Ded	Ded	Ded	Adj	Ded	Ded
Utility Score	0	0	0.5	0.5	0.5	0	0.5	0	0.5	0.5	0.5	1	0.5	1	1	1	1	0.5	1	1

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
Sh/Adj/Ded	Ded	Adj	Ded	Adj	Ded	Ded	Ded	Ded	Adj	Ded	Ded	Adj	Adj	Adj	Adj	Ded	Sh	Ded	Ded	Adj
Utility Score	1	0.5	1	0.5	1	1	1	1	0.5	1	1	0.5	0.5	0.5	0.5	1	0	1	1	0.5

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Sh/Adj/Ded	Adj	Sh	Sh	Adj	Sh	Adj	Adj	Sh	Sh	Sh	Adj	Sh	Sh	Adj	Sh	Sh	Adj	Sh	Adj	Adj	Ded
Utility Score	0.5	0	0	0.5	0	0.5	0.5	0	0	0	0.5	0	0	0.5	0	0	0.5	0	0.5	0.5	1

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
Sh/Adj/Ded	Adj	Adj	Sh	Sh	Sh	Sh	Sh	Sh	Ded	Ded	Ded	Ded	Ded	Ded	Adj	Adj	Adj	Sh	Adj	Adj
Utility Score	0.5	0.5	0	0	0	0	0	0	1	1	1	1	1	1	0.5	0.5	0.5	0	0.5	0.5

Cyclists – Performance – Parallel Facility



Definition: This sub-factor measures the availability of a parallel lower volume route. If a parallel route is available, the project receives a score of zero as cyclists have an alternate route. If a lower volume parallel route is not available, the project receives a score of 1. Other types of facilities are rated as desirable under this criterion and given a utility score of 1.

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
Yes/No	No	No	Yes	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
Utility Score	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
Yes/No	No	Yes	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Utility Score	1	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1

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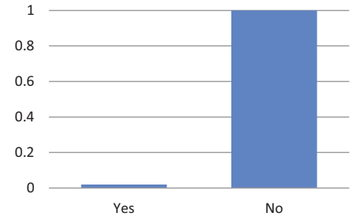
Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
Yes/No	No	No	No	No	No	No	No	No	No	No	No	#N/A	Yes	#N/A	#N/A	#N/A	#N/A	No	No	#N/A
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
Yes/No	No	No	No	No	No	#N/A	#N/A	#N/A	Yes	Yes	#N/A	#N/A	No	No	No	No	No	No	#N/A	No
Utility Score	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Yes/No	No	No	No	No	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Utility Score	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
Yes/No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	Yes	No
Utility Score	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1

Cost – Environmental Effects



Definition: This sub-factor measures whether the project will require loss of right-of-way to construct the facility. The construction of an off-road multi-use path is measured as potentially resulting in loss of vegetation (i.e. trees), increased visual intrusion to adjacent residents or conflicts with driveways. This sub-factor is measured as a present or absent effect. Those measured as "Yes" have the potential for natural or social environmental impacts while a measurement of "No" has low potential and is considered to be within an existing transportation facility.

Mitigation: Property acquisition/compensation if Multi-use Path (MUP) grading requires additional right-of-way.

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
Yes/No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
Yes/No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

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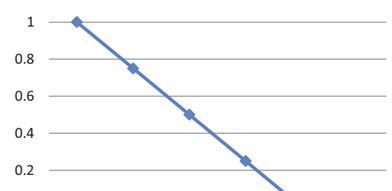
Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
Yes/No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
Yes/No	Yes	No	Yes	No	Yes	No	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No
Utility Score	0	1	0	1	0	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Yes/No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
Yes/No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
Utility Score	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1

Cost – Capital Costs



Definition: This sub-factor measures the capital cost of implementing the project in 2016 dollars. This cost is expected to occur during the next rehabilitation cycle for the road. For example, paved shoulders could be implemented when the next resurfacing project is implemented. Doing so reduces the forecast capital cost. (Societal collision life cycle savings and reduced maintenance life cycle costs are measured under separate sub-factors).

Mitigation: Coordinating implementation with planned construction.

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A
$	3,030	2,110	213,600	4,970	430,800	2,230	402,600	882,000	335,400	666,000	2,510	1,368,000	130,500
Utility Score	1	1	0.95	1	0.9	1	0.91	0.79	0.92	0.84	1	0.68	0.97

Measurement	13B	14	15	16	17	18	19	20	21	22	23	24	25
$	750,000	706,200	10,450	5,215	5,550	4,615	10,050	3,765	502,800	5,900	5,500	316,800	1,206,000
Utility Score	0.83	0.84	1	1	1	1	1	1	0.88	1	1	0.93	0.72

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Measurement	26	27	28	29	30	31	32	33	34	35	36	37	38A
$	432,000	660,000	7,050	79,800	1,215	1,485	606,000	110,400	4,005	2,285	1,495	6,350	1,338,000
Utility Score	0.90	.85	1	0.98	1	1	0.86	0.97	1.00	1.00	1.00	1.00	0.69

Measurement	38B	39	40	41	42	43	44	45	46	47	48	49
$	2,308,050	3,795	966,000	724,000	1,776,000	493,800	2,865	168,000	4,065	612,000	1,446,000	1,008,000
Utility Score	0.46	1.00	0.77	0.83	0.59	0.88	1.00	0.96	1.00	0.86	0.66	0.76

Measurement	50	51	52	53	54	55	56A	56B	57	58	59A	59B
$	30,000	4,283,400	10,000	50,000	50,000	10,000	2,268,000	3,912,300	25,000	1,190,250	156,600	270,135
Utility Score	0.99	0	1	0.99	0.99	1	0.47	0.09	0.99	0.72	0.96	0.94

Measurement	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B
$	13,320	88,182	423,600	30,000	50,000	261,600	451,260	100,000	5,000	1,152,000	254,400	852,000	1,469,700
Utility Score	1	0.98	0.90	0.99	0.99	0.94	0.89	0.98	1	0.73	0.94	0.80	0.66

Measurement	70	71	72	73	74	75	76	77	78	79	80	81	82	83
$	1,240	77,580	15,000	996,000	174,600	3,165	3,580	199,800	4,545	192,600	147,000	2,530	2,915	3,875
Utility Score	1	0.98	1	0.77	0.96	1	1	0.95	1	0.96	0.97	1	1	1

Measurement	84	85	86	87	88	89	90	91	92	93A	93B	94	95
$	358,200	3,175	1,505	324,000	1,750	1,780	1,008,000	2,890	416,400	960,000	1,656,000	406,800	297,600
Utility Score	0.92	1	1	0.92	1	1	0.76	1	0.90	0.78	0.61	0.91	0.93

Measurement	96	97	98	99	100	101	102	103	104	105	106	107	108	109
$	2,650	1,820	1,315	1,730	2,130	1,465	114,300	156,600	1,938,000	816,000	15,000	115,200	2,622,000	1,674,000
Utility Score	1	1	1	1	1	1	0.97	0.96	0.55	0.81	1	0.97	0.39	0.61

Measurement	110	111	112	113
$	750,000	2,060	129,000	1,404,000
Utility Score	0.83	1	0.97	0.67

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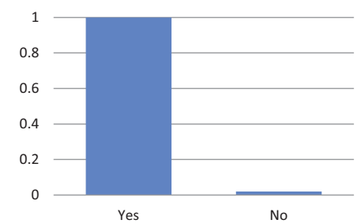
Cost – Maintenance



Definition: This sub-factor measures the maintenance savings from implementing paved shoulders. Although the upfront capital costs, to pave shoulders, are relatively high many Public Works Agencies, in Canada and the United States, have concluded that paved shoulders create long-term road maintenance savings and improves road safety. Most sources state that the payback period, for such savings, is about 10 years. Such savings include the elimination of the labour, materials and equipment used for shoulder maintenance and reduced life cycle costs resulting from extending the service life of the road surface. Alternatives with paved shoulders are measured as “Yes” and are preferred. Other types of facilities are rated as desirable under this criterion and given a utility score of 1.

Mitigation: None.

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
Yes/No	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No
Utility Score	0	0	1	0	1	0	1	1	1	1	0	1	1	0	1	1	0	0	0	0

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
Yes/No	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	No	No	No	No	Yes	No
Utility Score	0	1	0	0	1	1	1	1	0	1	0	0	1	1	0	0	0	0	1	0

Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
Yes/No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes	No	No
Utility Score	1	0	1	1	1	0	1	0	1	1	1	0	1	0	0	0	0	1	0	0

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
Yes/No	No	Yes	No	Yes	No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	No	No	No	No	Yes
Utility Score	0	1	0	1	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Yes/No	Yes	No	No	Yes	No	Yes	Yes	No	No	No	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes	No
Utility Score	1	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	1	0	1	1	0

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
Yes/No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Utility Score	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1

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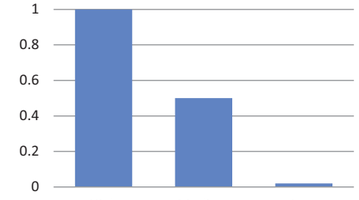
Other Benefits – Tourism/Economic Environment



Definition: This sub-factor measures whether the project supports the marketing of the County for visitors. Projects that link destinations such as resorts to the cycling network provide facilities that support walking or cycling for tourists and provide a direct end destination or activity i.e. a trail for visitors to use are measured as “High” supporting tourism. Facilities that provide connectivity but no direct end destination are considered to be less supportive and are measured as “Medium” while facilities that provide limited connectivity to destinations are measured as “Low” supporting tourism.

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
H / M / L	L	L	M	M	M	L	M	H	H	H	M	H	M	H	H	M	H	M	H	M
Utility Score	0	0	0.5	0.5	0.5	0	0.5	1	1	1	0.5	1	0.5	1	1	0.5	1	0.5	1	0.5

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
H / M / L	M	H	H	H	L	L	M	M	L	L	L	L	H	L	M	M	H	L	H	H
Utility Score	0.5	1	1	1	0	0	0.5	0.5	0	0	0	0	1	0	0.5	0.5	1	0	1	1

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Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
H / M / L	M	H	H	H	L	L	L	M	M	M	H	H	L	L	H	H	H	H	H	H
Utility Score	0.5	1	1	1	0	0	0	0.5	0.5	0.5	1	1	0	0	1	1	1	1	1	1

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
H / M / L	M	H	H	M	M	H	M	M	H	H	L	L	H	M	M	H	L	L	H	H
Utility Score	0.5	1	1	0.5	0.5	1	0.5	0.5	1	1	0	0	1	0.5	0.5	1	0	0	1	1

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
H / M / L	M	M	M	H	M	L	M	M	M	M	H	M	M	H	M	L	H	L	M	M	H
Utility Score	0.5	0.5	0.5	1	0.5	0	0.5	0.5	0.5	0.5	1	0.5	0.5	1	0.5	0	1	0	0.5	0.5	1

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
H / M / L	L	M	M	M	M	H	H	H	H	H	H	H	M	H	M	H	M	M	L	H
Utility Score	0	0.5	0.5	0.5	0.5	1	1	1	1	1	1	1	0.5	1	0.5	1	0.5	0.5	0	1

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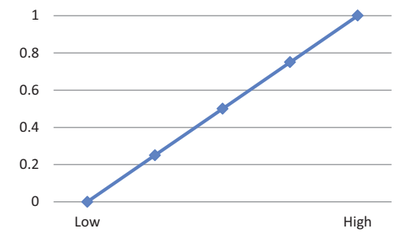
Other Benefits – Promote Public Health



Definition: This sub-factor measures the level to which the project contributes to healthy communities. It reflects the anticipated utilization by pedestrians and cyclists. Alternatives that would attract a high number of people, promoting them to adopt a more active lifestyle are preferred (10) while projects that are expected to attract a limited number of people are less beneficial (0).

Mitigation: None

Alternatives:

Measurement	**1**	2	3	4	5	6	**7**	8	9	10	11	**12**	13A	13B	14	15	16	17	18	**19**
Health (0 – 10)	**2**	3	3	3	3	3	**5**	3	6	3	2	**8**	8	10	4	1	4	1	5	**5**
Utility Score	**0.2**	0.3	0.3	0.3	0.3	0.3	**0.5**	0.3	0.6	0.3	0.2	**0.8**	0.8	1	0.4	0.1	0.4	0.1	0.5	**0.5**

Measurement	20	**21**	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	**38A**	**38B**
Health (0 – 10)	2	**10**	6	1	5	2	2	2	1	2	1	1	3	8	6	1	7	1	**1**	**6**
Utility Score	0.2	**1**	0.6	0.1	0.5	0.2	0.2	0.2	0.1	0.2	0.1	0.1	0.3	0.8	0.6	0.1	0.7	0.1	**0.1**	**0.6**

countyof peterborough active transportation

Measurement	39	40	41	42	43	44	45	46	47	**48**	49	50	**51**	52	53	54	55	56A	56B	57
Health (0 – 10)	2	3	3	3	1	1	2	3	2	**1**	4	10	**2**	1	8	8	8	1	6	8
Utility Score	0.2	0.3	0.3	0.3	0.1	0.1	0.2	0.3	0.2	**0.1**	0.4	1	**0.2**	0.1	0.8	0.8	0.8	0.2	0.6	0.8

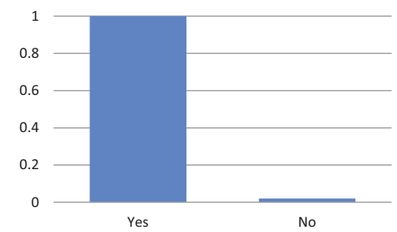
Measurement	58	59A	59B	60A	60B	**61**	62	63	64A	64B	65	66	67	68	**69A**	**69B**	70	71	72	73
Health (0 – 10)	2	4	8	4	8	**10**	8	5	2	7	10	5	1	2	**7**	**9**	5	4	8	3
Utility Score	0.2	0.4	0.8	0.4	0.8	**1**	0.8	0.5	0.2	0.7	1	0.5	0.1	0.2	**0.7**	**0.9**	0.5	0.4	0.8	0.3

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Health (0 – 10)	3	3	1	6	2	0	2	2	2	3	7	3	2	3	3	2	3	0	1	0	2
Utility Score	0.3	0.3	0.1	0.6	0.2	0	0.2	0.2	0.2	0.3	0.7	0.3	0.2	0.3	0.3	0.2	0.3	0	0.1	0	0.2

Measurement	94	95	96	97	98	99	100	101	102	103	**104**	105	106	107	108	109	110	111	112	113
Health (0 – 10)	5	4	1	6	6	3	6	6	6	6	**6**	6	10	6	3	5	3	0	6	5
Utility Score	0.5	0.4	0.1	0.6	0.6	0.3	0.6	0.6	0.6	0.6	**0.6**	0.6	1	0.6	0.3	0.5	0.3	0	0.6	0.5

County of Peterborough
Active Transportation Master Plan – Candidate Projects
Analysis and Evaluation – November 2016
Sub-factor Definitions

Other Benefits – Performance for Vehicle Safety



Definition: Paved shoulders reduce vehicle collision frequency and severity by providing a recovery area for errant vehicles. Alternatives that provide a paved shoulder, “Yes”, are preferred. Other types of facilities are rated as desirable under this criterion, and score “Yes”.

Mitigation: None

Alternatives:

Measurement	1	2	3	4	5	6	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19
Yes/No	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	No	No	No
Utility Score	0	0	1	0	1	0	1	1	1	1	0	1	1	0	1	1	0	0	0	0

Measurement	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38A	38B
Yes/No	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	No	No	No	No	Yes	No
Utility Score	0	1	0	0	1	1	1	1	0	1	0	0	1	1	0	0	0	0	1	0

Measurement	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56A	56B	57
Yes/No	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	-	Yes	No	No	No	No	Yes	No	No
Utility Score	1	0	1	1	1	0	1	0	1	1	1	1	1	0	0	0	0	1	0	0

Measurement	58	59A	59B	60A	60B	61	62	63	64A	64B	65	66	67	68	69A	69B	70	71	72	73
Yes/No	No	Yes	No	Yes	No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	No	No	No	No	Yes
Utility Score	0	1	0	1	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1

Measurement	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93A	93B
Yes/No	Yes	No	No	Yes	No	Yes	Yes	No	No	No	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes	Yes
Utility Score	1	0	0	1	0	1	1	0	0	0	1	0	0	1	0	0	1	0	1	1	0

Measurement	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113
Yes/No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Utility Score	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1

APPENDIX C: Stakeholder Meeting Notes

BT ENGINEERING

MEETING NOTES

BT ENGINEERING BTE	**Project Name:** Peterborough Active Transportation Master Plan	**Project Number:** BT 15-041

TYPE/NUMBER:	Stakeholder Meeting
DATE:	September 7, 2016
LOCATION/TIME:	Bridgenorth Library 7:00 – 9:00 pm
PURPOSE:	Stakeholder input on Project Performance under Evaluation Criteria

NAME	COMPANY	PROJECT ROLE
PRESENT		
Doug Saccoccia	County of Peterborough	County Project Manager
Peter Nielsen	County of Peterborough	
Kieran Andrews	PBAC/PCC/Wild Rock Outfitters	
Bruce Bellchambers	Lakefield Trail Association, Selwyn Trail Association	
Paul Buttiman	Ganaraska Freewheelers	
Lisa Doyle	Peterborough Council on Ageing	
Marilyn Freeman	PBAC	
Paul Hurley	PBAC/PCC	
Bill Rasberry		
Brianne Salmon	GreenUP/PBAC	
Stephen Brook	BT Engineering	Project Manager
Steve Taylor	BT Engineering	
Darcie Dillon	BT Engineering	
Chris Watson	BT Engineering	
DISTRIBUTION		
All Present		

Item		Assigned
1.0	**Introduction**	
1.1	The consultant presented the status of the project and the evaluation process. A brief outline for the evening session was provided.	
1.2	Stakeholders were asked to provide comments/opinions on what would constitute a high scoring project and what would constitute a low scoring project under the following evaluation	

Item		Assigned
	criteria: • Performance for Pedestrians; • Performance for Cyclists; and • Promote Public Health. Stakeholders were told that their input would be used to develop utility scores under each of the three criteria. These scores, in conjunction with scores under various other criteria would be used to develop the candidate list of projects that will form the County's Active Transportation Network. An interactive map was displayed using a projector illustrating the long list of projects.	
2.0	**Stakeholder Input**	
2.1	Stakeholders were asked to identify what attributes of a project would result in a **high** score under each of the three criteria. Responses are as follows:	
2.1.1	**High** Scores for Projects under "Performance For Pedestrians" would include: 1. Feels safe for a parent pushing a stroller/carriage 2. Separation from motorized traffic/higher speed bicycle traffic 3. Close proximity to population (i.e. subdivisions) 4. Connects to destinations (i.e. schools, trail networks, parks etc) 5. Attracts many diverse user groups such as seniors, school children, joggers, dog-walkers etc. 6. Flat surface (i.e. not sloped) 7. Maintained year-round 8. Wheelchair accessible 9. Low range between highest and lowest speed users 10. Illuminated	
2.1.2	**High** Scores for Projects under "Performance For Cyclists" would include: 1. Connectivity to destinations 2. Continuous bicycle facility 3. Hard, smooth surface for riding	

Item		Assigned
	4. Scenic routes 5. Available lateral space between cyclists and other road users 6. Minimizes conflicts between cyclists and other road users 7. Low Traffic Volume 8. Benefits a large number of cyclists from diverse user groups It was further noted that gravel roads/trails, while perhaps not receiving as high a score, are acceptable for inclusion in the cycling network.	
2.1.3	**High** Scores for Projects under "Promote Public Health" would include: 1. Proximity to population 2. Perception of safety 3. Socially acceptable (i.e. cycling on the particular facility would not violate perceived social norms) 4. Easy for beginners (opportunity to give beginners the experiences to turn them into "Lifetime Cyclists") 5. Creation of buy-in (opportunity to give users a feeling of ownership over the facility) 6. Use of the facility can easily be added to part of their daily/weekly routine 7. Accessible to diverse age groups 8. Accessible to diverse range of physical abilities 9. Opportunity to "piggy-back" with other functions (i.e. commute to work AND burn calories) 10. Available year-round 11. Visible to many potential users	
2.2	Stakeholders were asked to identify what attributes of a project would result in a **low** score under each of the three criteria. Responses are as follows:	
2.2.1	**Low** Scores for Projects under "Performance For Pedestrians" would include: 1. No sidewalk/separation from other uses 2. Dangerous 3. Dark	

Item		Assigned
	4. Far from settlements/population	
2.2.2	**Low** Scores for Projects under "Performance For Cyclists" would include: 1. Gravel/rough surface 2. Dangerous 3. Dark 4. Far from settlements/population	
2.2.3	**Low** Scores for Projects under "Promote Public Health" would include: 1. Many conflicting uses 2. High truck volumes 3. Remote (far from population) 4. Lack of promotion (potential users unaware of the existence of facility)	
3.0	**Scoring Exercise**	
3.1	In order to ensure that BTE staff were clear on appropriate scores under each category, sample projects from the long list were assigned a score out of 10 under each criterion. Scores were assigned based on the consensus of the stakeholder group. Sample projects were selected to reflect a range of the following: • Performance under the criteria; • Facilities under Provincial, County, and lower tier municipal jurisdiction; and • Facility types (shared use of lane, paved shoulder, multi-use path, or trail). The projects scored by the stakeholder group included projects 1, 7, 12, 19, 21, 38A, 38B (see note 3.2), 48, 51, 61, 69A, 69B (see note 3.2) and 104.	
3.2	In order to reduce confusion on letter suffixes on projects, BTE agreed to match the letter suffix to the facility type indicated on the long list of projects (i.e. A's refer to shared use of lane, B's a paved shoulder, C's bike lanes, D's fully paved shoulder)	BTE
4.0	**Additional Projects**	
	Discussion with stakeholders yielded additional projects to be added to the long list of candidate projects. BTE staff will	BTE

Item		Assigned
	add the projects to the interactive map and the workbook.	
5.0	**Next Steps**	
5.1	Based on comments received from the stakeholder group, BTE staff will assign scores to each of the projects under each of the 3 criteria. Stakeholders will be contacted when the scoring is complete. All scores will be available to stakeholders for review and comment.	BTE

Prepared by
Darcie Dillon, Partner

Sent via email

Attachments

Attachment 1: Memorandum

APPENDIX D: Programs and Policies Technical Memorandum

BT ENGINEERING

Peterborough Regional ATMP
Preliminary Programs and Policies

June 2017

Introduction

The County of Peterborough is developing a Regional Active Transportation Master Plan (ATMP) to promote leadership and community partnerships that make it a healthy, prosperous and sustainable community, with Active Transportation as a key component of a safe, accessible, integrated transportation system linking where we live, work and play.

The ATMP is proposing *Policies, Programs and Projects* that help fulfil this vision.

The attached memorandum summarizes the proposed *Policies* and *Programs* recommended for inclusion in the ATMP.

Policies are principles and/or guidelines designed to be used by County and Lower Tier decision makers to influence greater adoption of active transportation. Proposed policies have been divided into the following categories:

1. Planning;
2. Design and Construction; and
3. Financing.

Programs are further plans of action that could involve the County, Lower Tier Municipalities, and/or partnerships with other organizations (such as the City of Peterborough, GreenUP, Peterborough Public Health etc.) designed to increase Active Transportation throughout Peterborough County. *Programs* have been divided into the following categories:

1. General;
2. Safety and Education; and
3. Promotion / Marketing / Encouragement / Tourism.

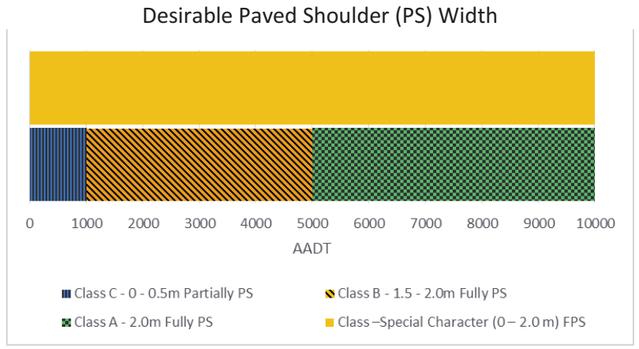
BT ENGINEERING
BTE
25 Base Line Road West, London
London, Ontario, N6J 1V1

MEMORANDUM

TO: Doug Saccoccia | DATE: June 14, 2017
FROM: Stephen Brook | PROJECT #: BTE15-041
PROJECT: Peterborough Regional Active Transportation Master Plan
SUBJECT: Active Transportation (AT) Preliminary Programs and Policies

	Policies	Comments
1	***Planning*** Rationale: The Official Plans are policy documents that guide Councils in their decisions about how land in the Municipality should be used and how growth can be managed. The Official Plan contains objectives, policies and development standards for, among others, the location of public services such as roads and utility corridors. As such this document is important for the implementation of facilities for walking and cycling. Adopting Active Transportation (AT) strategies and initiatives as part of the planning process is an opportunity for the County and Lower Tier Municipalities (the municipalities) to improve economic prosperity through the promotion of tourism, economic development and healthy lifestyles for residents and visitors. Municipalities can draw from the following best practices to support AT.	
1.1	Municipalities should consider the opportunity and benefit of protecting future cycling and pedestrian linkages prior to disposing of any unopened road allowances and right-of-ways.	
1.2	Municipalities should encourage private developments adjacent to waterways to dedicate land for greenways and public spaces.	
1.3	The protection of municipal rights-of-way, utility easements and abandoned railway corridors should be considered where feasible for the construction of multi-use recreational pathways (trails) and linkages to adjacent communities.	
1.4	The permitted uses of County Forest are described in the County's Forest Management Plan. Recreational use of the County Forest is a privilege. Continued or expanded use of trail systems within the County Forest should reflect forest management objectives.	
1.5	Municipalities should consider the protection of public water access to support tourism within the County.	

1.6	Municipal planning should consider the importance of AT as part of the Regional Age Friendly Action Plan and in support of the Sustainable Peterborough Plan together with the Climate Change Action Plan.	
1.7	Municipal support should be provided for Provincial initiatives to promote active transportation such as #CycleON and #PaddleON.	
1.8	Municipalities should clearly indicate the type of users allowed on designated trails through by-laws, trail rules or other means. It is preferred that motorized vehicles not be permitted on recreational trails identified in the ATMP unless otherwise designated through a by-law.	
1.9	Due to the increasing demand for AT, municipal official plan updates, municipal zoning bylaws, and subdivision codes should consider a "Complete Streets" approach containing policies enhancing facilities for active transportation.	
1.10	Bicycle parking facilities/amenities should be considered as a requirement in new buildings, through Site Plan Control, as part of the development application process where appropriate.	
2	***Design and Construction (Public Works)*** Rationale: Municipalities have a desire to promote safety and accessibility for both on-street and off-street walking and cycling facilities. Where determined to be feasible, paved shoulders on County roads and paved recreational trails will reduce long term maintenance costs, enhance safety and improve accessibility for all permitted road users.	
2.1	Municipalities should thoroughly review Ontario Traffic Manual (OTM) Books 15 and 18 as guideline documents/references, where specific municipal policies have not been developed and apply generally accepted engineering principles and design concepts where applicable complying with applicable laws and regulations.	OTM Book 15 has already been adopted by the County of Peterborough
2.2	Municipalities should consider incorporating provisions for "Complete Streets" as part of Municipal planning and reconstruction projects in urban and rural areas.	

2.3	The County and the Townships should consider a policy for the provision of a stepped warrant for the provision of paved shoulders, where feasible and as part of rural reconstruction and resurfacing projects, to improve safety, reduce maintenance costs and support active transportation. An example is as follows: - Low volume roads (AADT< 1000): shared use of the traffic lane with a desirable 0 - 0.5 m partially paved shoulder. - Medium volume roads (1000 < AADT <5000): a desirable 1.5 – 2.0* m fully paved shoulder. - Higher volume roads (AADT > 5000): a desirable 2.0 m fully paved shoulder. * on higher speed roadways with a posted speed limit > 60 km/h  AADT – Average Annual Daily Traffic	Paved shoulders where available will not be designated for bicycles only but will be available for multiple uses and benefits, including the provision of an improved surface for pedestrians, cyclists and e-bikes. It is recognized that the feasibility of providing paved shoulders on roadways classified by the County of Peterborough as "Special Character" will vary.
2.4	"Share the Road" pavement marking and signage policies should be developed for consistent application across municipal boundaries within the County of Peterborough.	
2.5	On high volume roadways with an AADT > 10,000, consideration should also be given to the provision of a separate facility such as a multi-use pathway.	
2.6	Maintenance of roads shall meet or exceed minimum maintenance standards.	
2.7	A standard for the maintenance of trails, multi-use pathways and sidewalks should be developed by municipalities upon completion of the ATMP. The standard should address all seasons. Some trails may not be maintained in the winter.	

Subject: Active Transportation (AT) Preliminary Policies and Programs
Project: BTE15-041
Date: June 14, 2017

3	***Financing*** Rationale: Reliable consistent funding is the key to the successful phased implementation of the ATMP.	
3.1	The County and local municipalities should establish 10-year capital programs for AT based on Council approved recommendations of the ATMP. Allocations will be through the annual budget process.	
3.2	Funding for AT facilities can be considered from the capital works program according to the following priorities: 1. Roads that are going to be reconstructed or resurfaced 2. Road sections or crossings with major safety concerns 3. Major AT corridors 4. Corridors providing network connectivity 5. Roads that were reconstructed recently, i.e. next reconstruction is still many years away	
3.3	Municipalities should pursue all eligible federal and provincial funds for the further planning and implementation of the network. Capital funding received from successful applications will be used to advance priority projects identified in the ATMP.	
3.4	Municipalities should encourage employers to provide secure bicycle storage, lockers and shower facilities for their employees.	
3.5	Municipalities should investigate partnership opportunities as sources for funding active transportation facilities and programs.	

Preliminary Programs		Comments
General		
A	Cycling Inventory Database - Maintain the ATMP database for all AT road sections and trails; the database lists information such as AADT, AT volumes (e.g. pedestrian and cyclist counts) number of traffic lanes, cycling facility type and status of implementation.	
B	Bicycle Parking Program - Install very specific bicycle stands in commercial and Municipal areas, public facilities, parks, carpool areas, and trailheads - Establish public-private partnerships for funding	
C	Warranted Sidewalk Programs - Municipalities establish annual Warranted Sidewalk Programs to prioritize extensions to the existing sidewalks and eliminate missing links from their sidewalk networks.	
D	Signage Program - Annual program for signage and pavement marking improvement along designated cycling routes - Way-finding: route naming and destination with distance signs. Encourage way-finding with signs, maps, and landscape cues to direct pedestrians and bicyclists to major attractions, scenic points, etc. - Establish public-private partnerships for funding	
E	Amenity Program - Provide benches, information kiosks, etc. and other support facilities at key locations in partnership with local community groups - Improve streetscapes through landscaping, lighting, and public art - Establish public-private partnerships for funding	
F	STOP (Selective Traffic Operations Program) Objective: Small construction improvements to promote safety, not exceeding $5,000.00 per improvement - Typical examples: install missing way-finding signs, placement of warning signs, placement of vehicle detection equipment	

Subject: Active Transportation (AT) Preliminary Policies and Programs
Project: BTE15-041
Date: June 14, 2017

	for cyclists at signalized intersections, detour signing, pavement repair, etc.	
G	Training Program Objective: training and professional development for municipal staff on AT facilities (needs, design, benefits, costs, best practices, implementation and maintenance)	
Safety and Education		
H	Safe Routes to School Program - The Municipalities support community agencies and organizations (such as Peterborough Public Health and GreenUP) to: • Deliver programs and events that promote safe access to and from schools for pedestrians and cyclists • Encourage bicycling promotion events aimed at increasing the number of children cycling to school, in Hamlet/Village areas, and receiving bicycle safety education • Make facilities available for cycling skills development and helmet use programs through on-road and class training	
I	Enforcement Program - Partner with police for a 'Share the Road' campaign - Collision review aimed at reducing motor vehicle / bicycle collisions by targeting those Highway Traffic Act and Municipal By-laws most violated, e.g. crosswalk cycling at intersections and motorized vehicles on multi-use recreational trails	
J	Information Program - To promote AT by disseminating information to the public about AT issues including but not limited to: existing facilities, improvements completed, safety, benefits, and legislation	
Promotion / Marketing / Encouragement / Tourism		
K	County AT Website - Establish and maintain, in partnership with Peterborough & the Kawarthas Economic Development, an up-to-date AT website with a variety of information, including: • Pedestrian and safety guides • Tourism related information (e.g. "Experience Cycling in	

	Peterborough & the Kawarthas" video) • Highlight cycling activities at local and regional events • Legislation updates, e.g. the *Keep Ontario Safe Act* (June 2014) • Best areas to bike/walk/ roller blade, etc. • Parking areas for canoe landing areas • Publish stories of personal experiences and articles about the economic benefits generated through cycling tourism	
L	Create an "Open for AT Business" Program - Develop partnerships with organizations such as Peterborough & the Kawarthas Tourism, the Trent –Severn Waterway and cycling-related businesses/industries. - Develop and supply Government of Ontario Travel offices and municipal tourist offices with cycling, hiking and canoeing maps, lists of events and other useful tourism information related to cycling, hiking and canoeing. - Involve local businesses to see the economic benefits, i.e. business generated in bicycle-friendly communities, such as bike shops, rentals, tourism, consulting, bike racing, etc. - Promote fundraising with local businesses, service clubs and organizations that focus on environmental issues and stewardship (e.g. GreenUP).	