

## Assessment of Group #3 and Group #4 Transportation Alternatives

### 4.1. ANALYSIS OVERVIEW

#### 4.1.1. Triple Bottom Line Approach

The evaluation of Group #3 and Group #4 alternatives was divided into work streams, based on consideration of the “triple bottom line” (i.e. Environment, Community and Economy), as well as Transportation and Engineering considerations. The approach includes consideration of:

- Environment– typically include impacts to fish and fish habitat; terrestrial ecosystems; groundwater; etc.
- Community – typically include impacts to residences; businesses; agriculture; noise; air quality; built heritage; archaeology; etc.
- Economy– typically include economic benefits of increased transportation capacity to all sectors of the GGH economy, as well as the ability of each alternative to support future employment growth (including tourism) and municipal economic development objectives.
- Transportation & Engineering– future traffic capacity, operational and safety conditions as well significant constructability issues, and costs.

The evaluation factors (and criteria) stemming from the “triple bottom line” approach (as described in greater detail in subsequent sections) included Natural Environment, Land Use / Social Environment, Cultural Environment, Area Economy, Transportation and Cost / Constructability.

The Community work stream was divided into two factor groups, namely Land Use / Social and Cultural Environments, to differentiate the unique factors/ criteria that fall under this stream and therefore require a more detailed analysis. The Transportation and Engineering work stream was also divided into two factor groups, namely Transportation and Cost / Constructability, to facilitate an assessment of transportation factors and criteria separately from cost and constructability related issues. For each criterion, potential effects were measured using qualitative and quantitative measures.

It should be noted that additional analysis was carried out

following the release of the draft Transportation Development Strategy Report (February 2011) in the Halton area. Findings of the additional analysis are documented in Chapter 5 and should be read in conjunction with the evaluation results in Chapter 4.

#### 4.1.2. Reasoned Argument

The environmental, community, economic, and transportation criteria to support the assessment of alternatives are outlined below. A “Reasoned Argument” method of evaluation was used to select a preferred alternative(s). The reasoned argument method highlights the differences in net effects associated with the various alternatives. Based on these differences, the advantages and disadvantages of each alternative are identified according to the evaluation of tradeoffs between the various evaluation factors, criteria and indicators. The relative significance of potential impacts is examined to provide a clear rationale for the selection of a preferred alternative(s). The rationale that favoured selection of one alternative over all others was derived from the following sources:

- Secondary source information (and mapping) of significant or sensitive environmental features;
- Government legislation, policies and guidelines;
- Municipal policy (i.e. official plans);
- Issues and concerns identified during consultation with ministries and agencies, municipalities, ratepayer and interest groups and the general public; and,
- Study Team expertise.

The reasoned argument method compares each alternative to others in each criteria and provides an overall assessment of each alternative (in all factor groups), as shown in Exhibit 4-1.

### 4.2. FACTORS AND CRITERIA

Evaluation factors and criteria used to evaluate the short-list of Area Transportation System Alternatives for Group #3 and #4 alternatives were consistent with the evaluation factor groups and assessment of the Alternatives to the Undertaking, established as part of the Terms of Reference (ToR) (July 2007, approved March 2008). The criteria in each factor group (and measures for each) were intended to assist the factor-specific environmental specialists in determining the overall impact of the various alternatives on the natural, social and cultural environments. In determining the overall impact, the specialists considered how the various factors and criteria interact and function together.

As previously noted, the evaluation factors and criteria used to assess the Group #3 and #4 alternatives at this stage of the study were divided into the following groups:

- Natural Environment;
- Land Use / Social Environment;
- Cultural Environment;
- Area Economy;
- Transportation; and
- Cost and Constructability.

**Exhibit 4-2** (as presented at Public Information Centre (PIC) #4), which highlights and defines factors, sub-factors, evaluation criteria and measurements of the effects, was used for the assessment and evaluation of the short-listed Group #3 and Group #4 alternatives.

Each alternative was analyzed and evaluated on the basis of a confirmation of the following:

- Quantitative measures of potential “footprint” impacts;
- Qualitative measures of potential impacts; and
- Transportation and Economic benefits that could be anticipated.

The subsequent sections describe in further detail the evaluation process that considered the advantages and disadvantages of each alternative and the relative significance of the potential impacts, based on the following factors and criteria.

**4.3. OVERVIEW OF EVALUATION PROCESS FOR GROUP #3 AND GROUP #4 ALTERNATIVES**

The evaluation of alternative corridors included three evaluation processes that are each documented in this report. The initial evaluation process of Alternatives 3-1, 4-1, 4-2, 4-3, 4-4, and 4-5 as described in Section 4.4 culminated in the decision to CARRY FORWARD Alternatives 4-2 and 4-3 since the selection process identified both alternatives to have comparable advantages and disadvantages at the level of detail that was adopted at the time.

The second evaluation process of Alternatives 4-2 and 4-3 as noted in Section 5.1 culminated in the preference for elements of Alternatives 4-2 and 4-3 as documented in the draft Transportation Development Strategy Report (February 2011).

On the basis of public input received on the draft Transportation Development Strategy Report (February 2011), a third round of analysis and evaluation was carried out to compare a “New Corridor” through Halton Hills and “Further widening of Highway 401” as an alternative. These were representative of elements of Alternative 4-2 and Alternative 4-3 as noted above. This evaluation process is described in Sections 5.2 to 5.8 and also as presented at Public Information Centre #5 (see Section 7.8.3).

**4.4. ROAD BASED IMPROVEMENT ALTERNATIVES**

Six alternatives (namely Alternatives 3-1, 4-1, 4-2, 4-3, 4-4 and 4-5) were evaluated as part of the initial evaluation process. All road improvement alternatives also include the Group #1 and Group #2 initiatives that would contribute to addressing the preliminary study area’s transportation problems and opportunities. These alternatives are shown in Exhibit 4-3 through Exhibit 4-8.

	Group 3-1	Group 4-1	Group 4-2	Group 4-3	Group 4-4	Group 4-5
<b>Natural</b>						
<b>Land Use/Social (includes Air Quality)</b>						
<b>Cultural</b>						
<b>Economic</b>						
<b>Transportation</b>						
<b>Cost and Constructability</b>						
<b>SUMMARY</b>						

How does this alternative compare (in relation to the others) in this factor group? Is it most, moderately or least preferred?

How does this alternative rate in all factors? Is it overall preferred or not?

Exhibit 4-1: Rationale for Decision Making and Identification of Preferred Alternative(s)

FACTOR	SUB-FACTOR	EVALUATION CRITERIA	MEASUREMENT OF THE EFFECTS
Natural Environment 1.1 Fish and Fish Habitat	1.1.1 Fish Habitat	Potential to affect sensitive fish habitat and fish community	Qualitative assessment of the nature, significance and sensitivity of fisheries and aquatic habitat using the presence and density of watercourses and aquatic Species at Risk (SAR) as indicators
	1.1.2 Fish Community		Qualitative assessment using the presence and density of watercourses and aquatic Species at Risk (SAR) as indicators
	1.2 Terrestrial Ecosystems	1.2.1 Wetlands	Potential to affect provincially and locally significant wetlands
	1.2.2 Woodlands and Other Vegetated Areas	Potential to affect significant forest and vegetation communities	Qualitative assessment of impacts to woodlots greater than 40 ha in size using linear distance impacts as indicator
	1.2.3 Wildlife Habitats and Movements (including Species at Risk (SAR))	Potential to affect significant wildlife habitat and wildlife movement opportunities	Qualitative assessment of nature, significance and sensitivity of significant wildlife habitat and landscape connectivity based on presence and density of SAR, known wildlife use (i.e., deer wintering, waterfowl staging etc.) and landscape – level habitat connectivity
1.3 Groundwater	1.3.1 Areas of Groundwater Recharge and Discharge	Potential to affect areas of groundwater recharge and discharge	Qualitative assessment based on soil type and permeability to identify areas of high, moderate, low groundwater recharge capability, including consideration of number and location of groundwater recharge and discharge areas
	1.3.2 Groundwater Source Areas and Wellhead Protection Areas	Potential to affect groundwater source areas and wellhead protection areas	Wellhead protection areas that are potentially affected and their location
1.4 Surface Water	1.4.1 Watershed / Sub-Watershed Drainage Features / Patterns	Potential to affect existing drainage systems associated with permanent watercourses	Qualitative assessment of new pavement area, and new / existing watercourse crossings

Exhibit 4-2: Evaluation Factors and Criteria

FACTOR	SUB-FACTOR	EVALUATION CRITERIA	MEASUREMENT OF THE EFFECTS
1.5 Designated Areas	<p>Designated Areas are defined by resource agencies, municipalities, the government and/or the public through legislation, policies, or approved management plans, to have special or unique value. Examples of Designated Areas include:</p> <ul style="list-style-type: none"> <li>• Niagara Escarpment;</li> <li>• Oak Ridges Moraine;</li> <li>• Greenbelt;</li> <li>• Bruce Trail;</li> <li>• TransCanada Trail;</li> <li>• National and provincial parks;</li> <li>• Designated federal wildlife/marine areas;</li> <li>• RAMSAR wetlands;</li> <li>• Remedial Action Plan (RAP) areas;</li> <li>• International Biological Program areas;</li> <li>• World Biosphere Reserves;</li> <li>• Designated heritage rivers;</li> <li>• Environmentally Sensitive Areas (ESAs);</li> <li>• Environmentally Sensitive Policy Areas (ESPAs);</li> <li>• Provincially Significant Areas of Natural and Scientific Interest (ANSIs); Conservation Authority parks/open space lands;</li> <li>• Stewardship lands; and</li> <li>• Land trust areas (such as Nature Conservancy of Canada and others).</li> </ul>	Potential to affect designated areas	Qualitative assessment of nature, number and significance of designated areas potentially impacted, including consideration of ability to avoid designated area or mitigate impacts
<b>Land Use / Social Environment</b>			
2.1 Land Use Planning Policies, Plans, Goals, Objectives	2.1.1 Provincial/Federal land use planning policies/goals/objectives	Potential to support federal/provincial land use policies/plans/goals/objectives	Qualitative assessment of ability to support federal/provincial land use policies, plans, goals and objectives
	2.1.2 Municipal land use planning policies/goals/objectives	Potential to support municipal Official Plans	Qualitative assessment of potential to support municipal Official Plans

Exhibit 4-2: Evaluation Factors and Criteria

FACTOR	SUB-FACTOR	EVALUATION CRITERIA	MEASUREMENT OF THE EFFECTS
2.2 Land Use / Community	2.2.1 Indian Reserves	Potential to affect Indian Reserves	Qualitative assessment of potential to avoid Indian Reserves
	2.2.2 First Nations Sacred Grounds	Potential to affect First Nations Sacred Grounds	Qualitative assessment of potential to avoid First Nation Sacred grounds
	2.2.3 Residential (Urban and Rural)	Potential to affect urban and residential areas	Qualitative assessment of potential to affect urban and rural residential areas, using number of areas affected and potential to avoid or mitigate impacts as indicator
	2.2.4 Commercial / Industrial	Potential to affect commercial and industrial areas	Qualitative assessment of potential to impact commercial and industrial areas using estimated number of properties/industrial parks potentially impacted as indicator
	2.2.5 Tourism Operations	Potential to support tourist areas and attractions	Qualitative assessment of potential to impact or support tourist areas and attractions in the study area.  NOTE: Potential impacts/benefits to tourism travel beyond the study area are dealt with under Area Economy
	2.2.6 Community Facilities / Institutions	Potential to affect major community facilities and institutions	Qualitative assessment of potential to affect major community facilities and institutions using approximate number and type as indicators
2.3 Noise	2.3.1 Transportation Noise	Potential for increased transportation noise in Noise Sensitive Areas (NSAs) (residential areas and sensitive institutional uses)	Qualitative description of different types of noise impacts, locations of increased noise, proximity to NSAs and magnitude/severity of impacts
2.4 Air	2.4.1 Local Air Quality	Potential for exposure of sensitive receptors to various levels of air pollution (including extent and duration of exposure)	Potential for exposure of sensitive receptors to various levels of air pollution
	2.4.2 Regional Air Quality	Incremental annual amounts of air pollutants emitted into the region for the horizon year	Incremental annual amounts of air pollutants (air contaminants emitted into the region for the horizon year)
	2.4.3 Greenhouse Gas Emissions	Incremental annual amounts of greenhouse gas emitted per annum for the horizon year	Incremental annual amounts of greenhouse gases emitted per annum for the horizon year

Exhibit 4-2: Evaluation Factors and Criteria

FACTOR	SUB-FACTOR	EVALUATION CRITERIA	MEASUREMENT OF THE EFFECTS	
2.5 Land Use / Resources	2.5.1 First Nations Treaty Rights and Interests or Use of Land and Resources for Traditional Purposes	Potential to affect First Nations Treaty Rights and Interest or use of land and resources for traditional purposes	Potential to impact First Nations Treaty rights and interests or use of land and resources for traditional purposes (i.e., hunting, fishing, harvesting food and medicinal plants, etc.)	
	2.5.2 Agriculture	Potential to affect specialty crop areas and/or areas of Canada Land Inventory Classes 1, 2 and 3 soils	Qualitative assessment of potential impacts to prime agricultural lands outside of future development areas and woodlots, measured by linear distance of Class 1 to 3 agricultural lands potentially impacted	
	2.5.3 Recreational Lands and Natural Areas of Provincial Significance (e.g. national/provincial parks, conservation areas, major trails)	Potential to affect parks and recreational areas	Number of parks and recreational areas potentially affected	
	2.5.4 Aggregate and Mines	Potential to affect aggregates and mineral resources sites	Number of pits and quarries potentially affected	
	2.6 Municipal Services	2.6.1 Major Utility Transmission Corridors	Potential to affect major utility transmission corridors	Number of potential major utility transmission corridors that could be potentially impacted
	2.7 Contaminated Property Identification and Management	Landfills, Hazardous Waste Sites, Brownfield Areas, etc.	Potential to release existing site contamination from landfills (open and closed), hazardous waste sites and other known contaminants	Number and type of contaminated sites potentially affected
		<b>Cultural Environment</b>		
3.1 Cultural Heritage – Built Heritage and Cultural Heritage Landscapes	3.1.1 Buildings (i.e., standing sites of architectural or heritage significance, Ontario Heritage Properties, heritage bridges, cemeteries) and Cultural Heritage Landscapes (i.e., areas of historic 19 <sup>th</sup> century settlement).	Potential to affect cultural heritage areas/resources	Qualitative assessment of the potential to impact built cultural heritage areas and resources	
	3.1.2 First Nations Burial Sites	Potential to affect known burial sites	Qualitative assessment of the potential to impact First Nation Burial Sites	
	3.2.1 Pre-Historic and Historic First Nations Sites	Potential to affect significant pre-historic and historic First Nations archaeological sites of extreme local, provincial or national interest	Qualitative assessment of potential to impact archaeological sites of historical significance to First Nations	
3.2 Cultural Heritage – Archaeology	3.2.2 Archaeological Sites or Resources	Potential to affect significant archaeological sites of extreme local, provincial or national interest	Qualitative assessment of impacts to archaeological sites or resources using impacts to undisturbed areas as indicator	
	<b>Area Economy</b>			
4.1 First Nations Industry		The potential to support First Nations industry		
	4.2 Heavy Industry and Trade	Potential to support heavy industry and trade by efficient and reliable goods movement	Qualitative description of how industry and trade are supported	
			TREDIS economic impact evaluation of alternatives	

Exhibit 4.2: Evaluation Factors and Criteria

FACTOR	SUB-FACTOR	EVALUATION CRITERIA	MEASUREMENT OF THE EFFECTS
4.3 Tourism and Recreation Industry		Potential to support tourism and recreation industry by efficient and reliable movement of people	Qualitative description of how provincial/regional/municipal tourism and recreation are supported  TREDIS economic impact evaluation of hotel/restaurant sector
4.4 Agriculture Industry		Potential to support area agriculture industry by efficient movement of goods	A qualitative assessment of potential impacts to farming operations and fragmentation of agricultural operations
<b>Transportation</b>			
5.1 Traffic Operations		Potential impact on traffic operations due to factors such as design features and transportation network connections	Peak period performance of key corridors – forecast volume/capacity issues at critical screenlines  Peak period performance of key inter-regional corridors – forecast volume/capacity issues at critical screenlines  Potential to provide for higher order inter-regional transportation corridors (qualitative)  Percentage of inter-regional trips on key corridors at critical screenlines
5.2 Commuter Travel Characteristics		Potential impact on commuter trip distribution and trip length	Percentage of peak period self-containment of trips with the municipality/region  Average automobile trip length (km)  Potential to support transit opportunities on a new corridor
5.3 Efficient Movement of People		Potential to support the efficient movement of people between communities and regions by road	Percentage of inter-regional network operating better than LOS D (automobile km)  Percentage of local road network operating better than LOS D (automobile km)  Percentage of inter-regional automobile trips using the local road network  Automobile hours of delay on the inter-regional transportation network (automobile hours)  Average automobile vehicle occupancy  Total persons moved in study area

Exhibit 4-2: Evaluation Factors and Criteria

FACTOR	SUB-FACTOR	EVALUATION CRITERIA	MEASUREMENT OF THE EFFECTS
5.4 Efficient Movement of Goods		Potential to support the efficient movement of goods between communities and regions by road	Percentage of inter-regional system operating better than LOS D (truck km) Percentage inter-regional truck trips using the local road network Truck hours of delay on the inter-regional transportation network
5.5 System Reliability / Redundancy		Potential to support system reliability and redundancy for travel (people and goods) between regions and communities during adverse conditions	Availability of alternate routes/facilities for inter-regional transportation between regions, communities and terminals (qualitative) Potential to improve transportation system reliability (qualitative)
5.6 Safety		Potential to improve traffic safety based on opportunity to reduce congestion on the area road network	Potential to improve response times for emergency service providers due to reduced congestion on the inter-regional road network (refer to volume-capacity ratio in Traffic Operations) Potential to reduce collisions due to improved network LOS (refer to LOS in Traffic Operations)
5.7 Modal Integration, Balance and Choice for Movement of People (commuters, recreation/tourist)		Potential to improve modal integration, balance and choice for person trips between communities, employment centres and major transit hubs	Potential to increase attractiveness/effectiveness of existing, new and improved transit services (qualitative) Peak period transit mode share (by destination) Provision of higher order inter-regional transit services (qualitative) Provision of linkages between inter-regional and regional/community (local) transit systems (qualitative) Bus operational performance on inter-regional road network (refer to LOS in Traffic Operations) Availability/provision of alternate travel modes for tourism/recreational travel (qualitative) Provision of/allowance for active transportation measures (e.g., bike lanes, bike racks on buses/trains) (qualitative)
5.8 Modal Integration, Balance and Choice for Movement of Goods		Potential to improve modal integration, balance and choice for goods movement between ports and terminals, communities and employment centres	Potential to improve accessibility of inter-modal centres, ports and terminals (qualitative)



Exhibit 4-2: Evaluation Factors and Criteria

FACTOR	SUB-FACTOR	EVALUATION CRITERIA	MEASUREMENT OF THE EFFECTS
5.9 Linkages to Population and Employment Centres		Potential to improve accessibility to Urban Growth Centres, Gateway Economic Centres and Gateway Economic Zones for people and goods movement based on higher order network continuity and connectivity	Availability/provision of higher order linkages between Urban Growth Centres, Gateway Economic Centres and Gateway Economic Zones (qualitative)  Accessibility of Urban Growth Centres, Gateway Economic Centres and Gateway Economic Zones (qualitative)  Percentage change in peak hour travel times between Urban Growth Centres
5.10 Recreation and Tourism Travel		Potential to support recreation and tourism travel within and to/from the study area	Directness of routes between population centres, international gateways and tourism/recreation destinations (qualitative)  Peak period (summer/weekend) transportation system performance on key inter-regional corridors – forecast volume/capacity issues at critical screenlines  Diversion of summer recreational trips from local and regional roadways (qualitative)
<b>6.0 Cost and Constructability</b>			
6.1 Potential to Ease Implementation Considering Relative Cost, Relative Property Impacts, Feasibility / Difficulty and Requirements for Environmental Mitigation.	6.1.1 Cost (range)		"Order of magnitude" range of cost
	6.1.2 Feasibility of implementation (including interchange reconstruction requirements, impacts on existing schemes, etc.)		Qualitative assessment of feasibility of construction
	6.1.3 Potential transportation construction staging impacts.		Qualitative assessment of potential construction staging impacts
	6.1.4 Requirements for environmental mitigation / compensation / restoration.		Qualitative assessment of potential environmental mitigation required

Exhibit 4-3: Road Improvement Alternative 3-1 - Widening Existing Provincial Highways

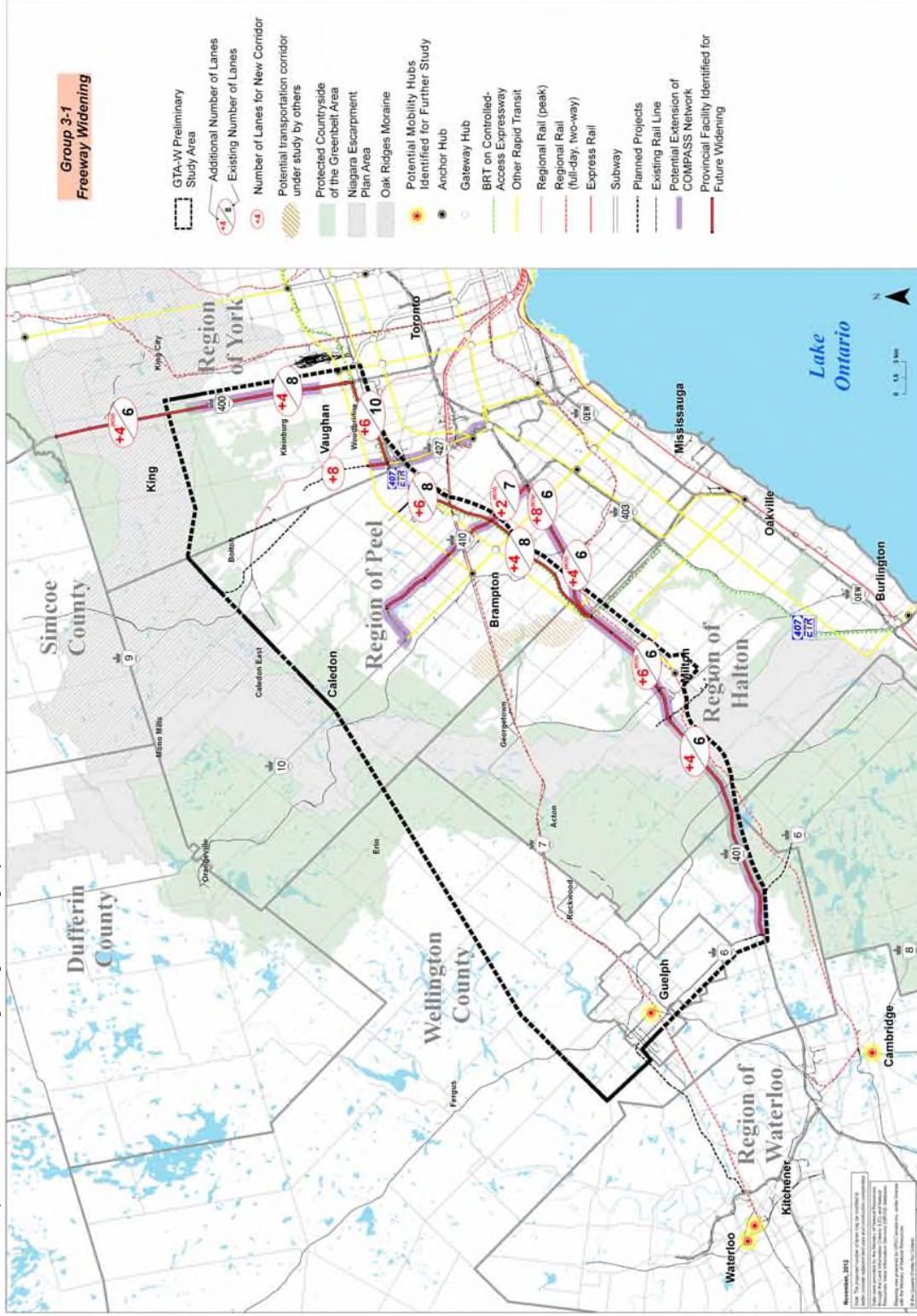


Exhibit 4-4: Road Improvement Alternative 4-1 - New Corridor from Highway 400 to Highway 410 with Provincial Highway Widening

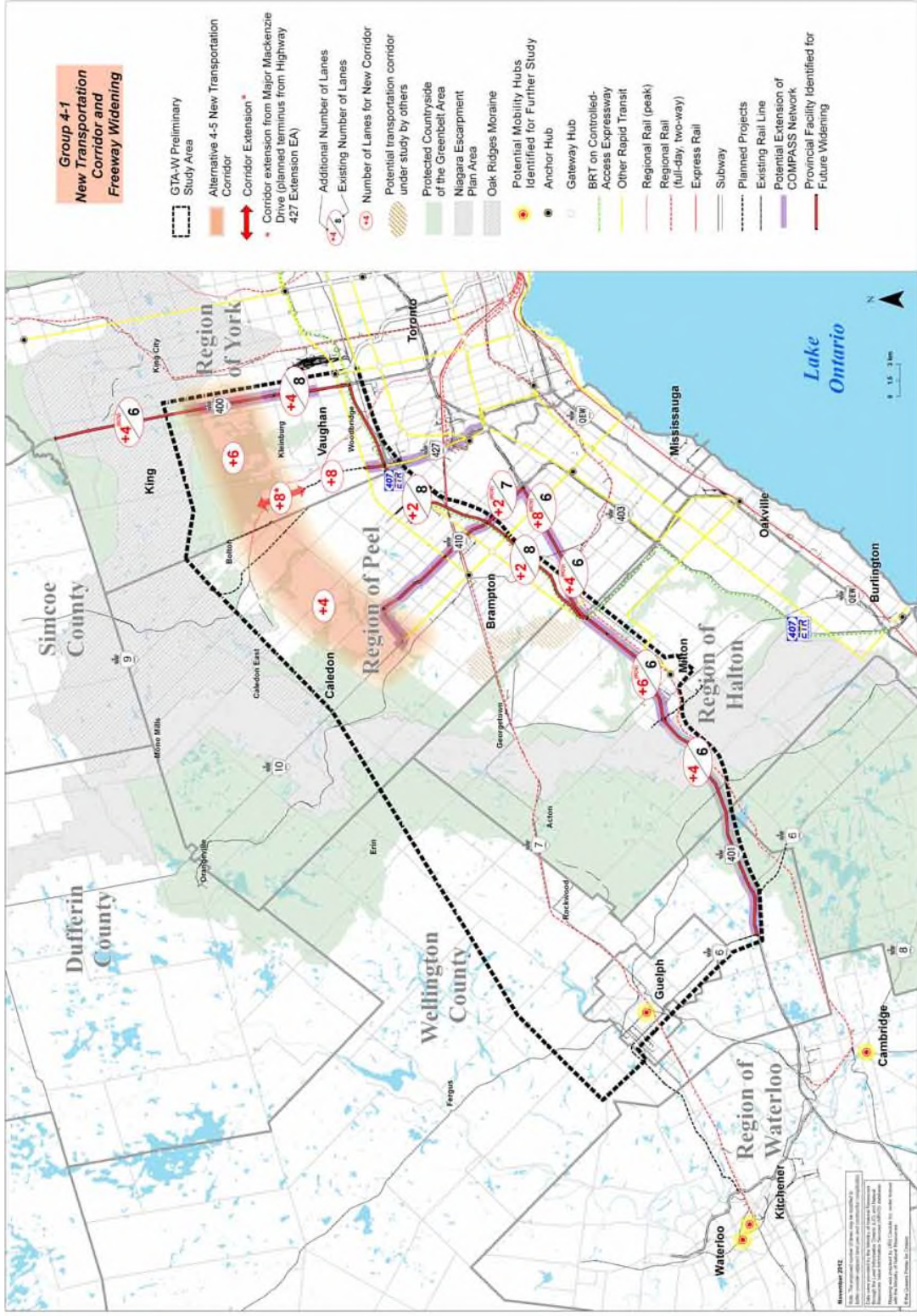


Exhibit 4-5: Road Improvement Alternative 4-2 - New Corridor from Highway 400 to Highway 401 with Provincial Highway Widening

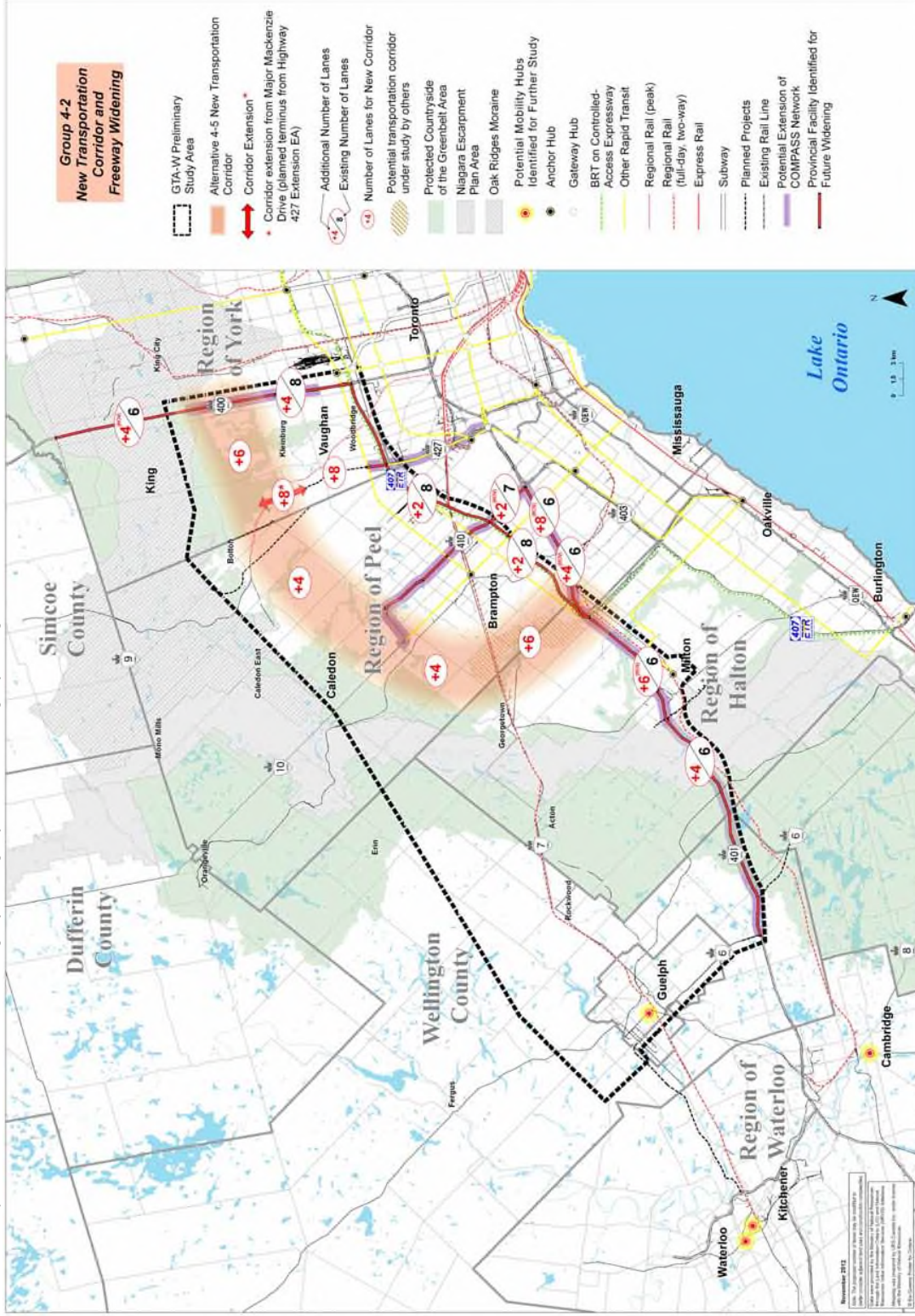


Exhibit 4-6: Road Improvement Alternative 4-3 - New Corridor from Highway 400 to Highway 401 West of Milton with Provincial Highway Widening

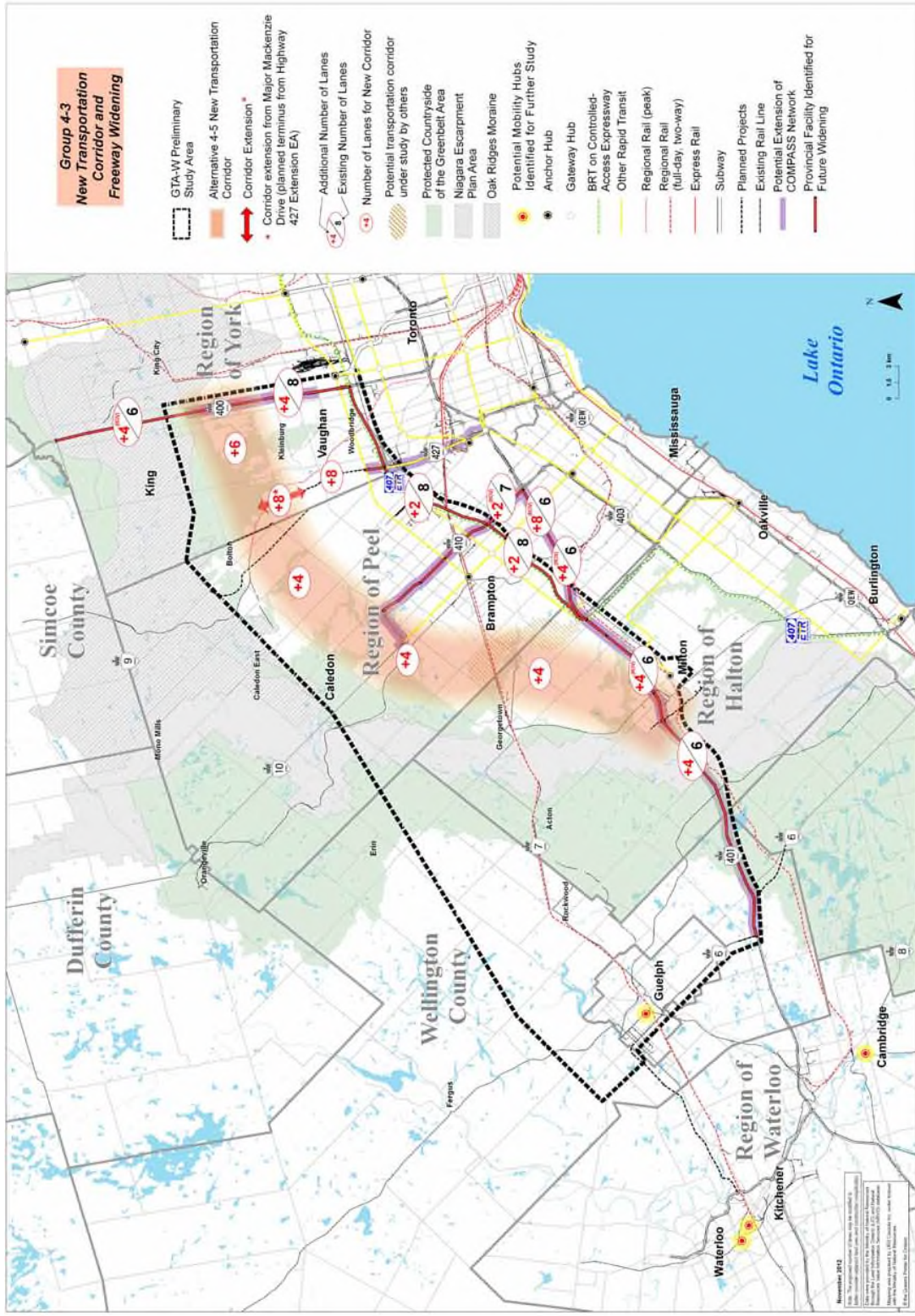


Exhibit 4-7: Road Improvement Alternative 4-4 - New Corridor from Highway 400 to Highway 6 North of Guelph with Provincial Highway Widening

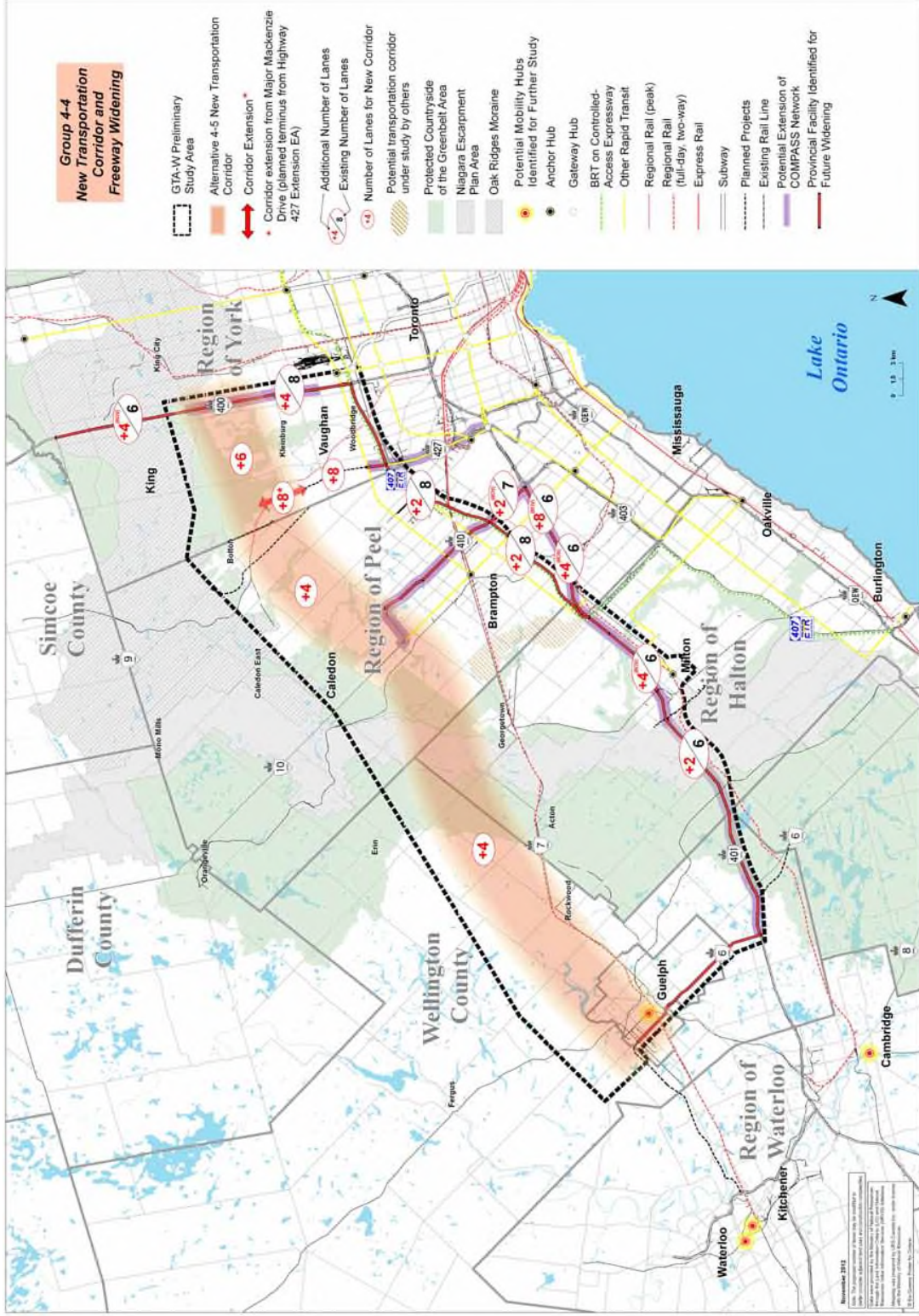
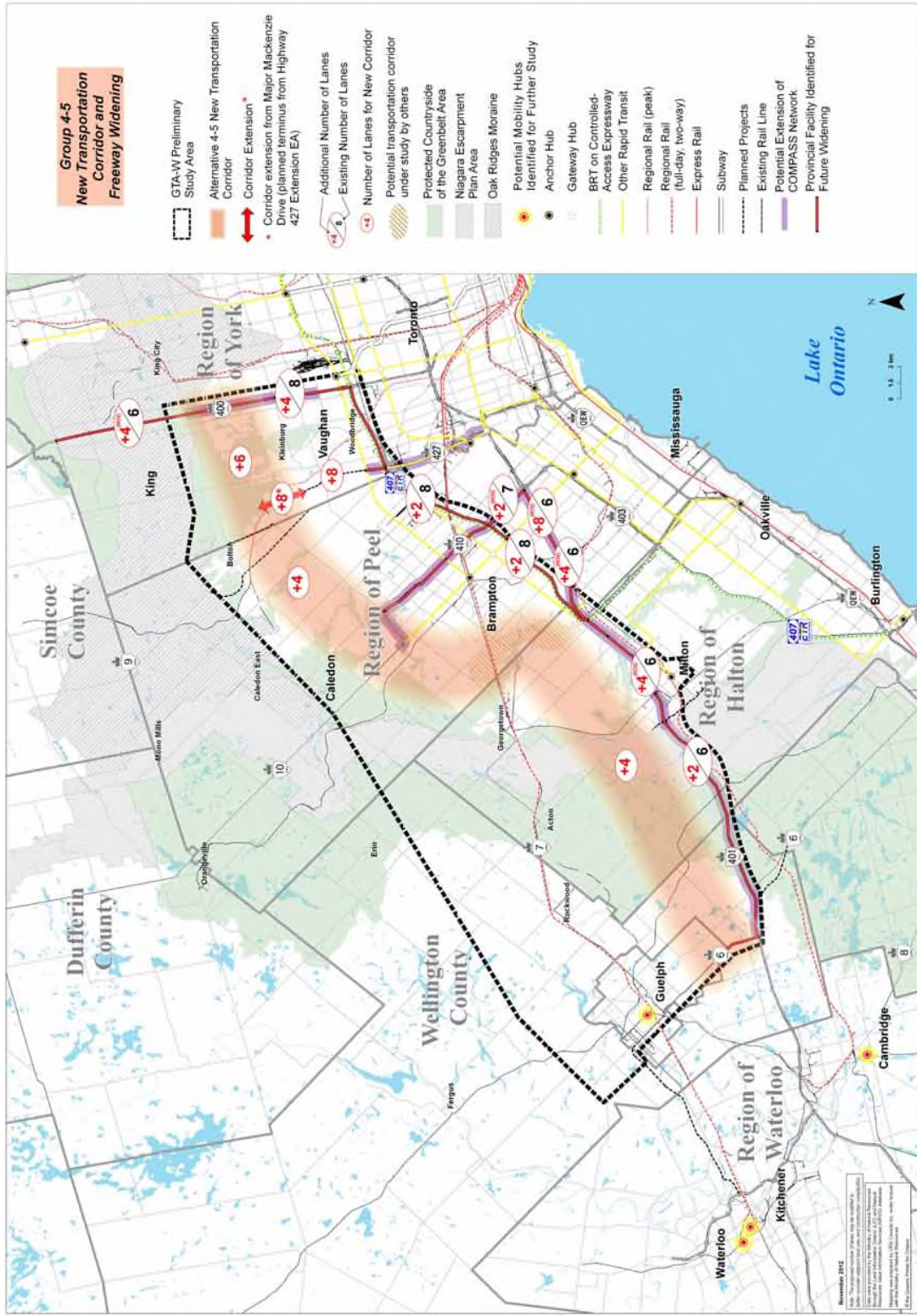


Exhibit 4-8: Road Improvement Alternative 4-5 - New Corridor from Highway 400 to Highway 6 South of Guelph with Provincial Highway Widening



**4.4.1. Consideration of HP BATS**

A number of separate roadway improvement initiatives are occurring in parallel with the GTA West Corridor Planning and EA Study, including the Halton-Peel Boundary Area Transportation Study (HP BATS). This is a joint study between the Region of Peel, Halton Region, City of Brampton, Town of Caledon, and the Town of Halton Hills to identify the long-term (2021 and 2031) transportation network required to support provincial and inter-municipal planning goals and to serve future transportation demands within the HP BATS study area. The GTA West Study Team worked with the HP BATS Study Team during Stage 1 of the EA process. Findings from the HP BATS process indicated that among several transportation improvements, the major road component is the Halton-Peel Freeway (HPF), to be located from approximately the Highway 401 / 407 ETR interchange to Mayfield Road. It was noted in the study report that this is required whether the GTA West transportation corridor proceeds or not.

In Alternative 4-2, it is assumed that the HP BATS freeway component would become part of the GTA West transportation corridor and therefore, would be pursued through MTO. The analysis and evaluation for Alternative 4-2 assumed that the direct physical impact and the estimated construction cost are attributed as a provincial initiative. This infrastructure was therefore included from evaluation of natural, cultural, social and cost / constructability aspects of the GTA West corridor alternatives.

In Alternatives 4-3 and 4-5, some infrastructure in the HP BATS Corridor would be a provincial initiative and some would be municipal. In Alternatives 4-3 and 4-5, the operational / transportation benefit from both the provincial portion and municipal portion of the GTA West / HP BATS corridor were accounted for in the traffic analysis. However, only impacts associated with the provincial portion of the HP BATS corridor (i.e. part of the GTA West corridor) have been accounted for in the analysis and evaluation; the potential direct physical impacts associated with the municipal portion of the HP BATS corridor, including the construction costs, were not included in the analysis and evaluation.

In Alternatives 3-1, 4-1 and 4-4, however, the HP BATS corridor would remain under the jurisdiction of the municipalities and would be a separate undertaking from the GTA West EA Study process. The operational benefit from the HP BATS corridor was taken into consideration in the traffic analysis of Alternatives 3-1, 4-1 and 4-4 (i.e. assuming that the HP BATS corridor would be pursued by the municipalities), and Alternative 4-4 would be connected to the HP BATS corridor. However, the potential direct physical impacts associated with the HP BATS corridor, as well as the construction costs of the HP BATS corridor were not included in the analysis and evaluation of Alternatives 3-1, 4-1 and 4-4; this applies to all factors and criteria in the analysis and evaluation.

The following table, presented as **Exhibit 4-9**, summarizes the proportion of the different sections of HP BATS corridor under each Group #4 alternatives, as well as whether that particular section of the HP BATS corridor was considered as part of the analysis and evaluation process in terms of transportation benefits, environmental impact and capital cost.

Recently, the Peel and Halton members of the HP BATS Study Team have finalized and agreed upon a Memorandum of Understanding (MOU) regarding the intent to pursue the HP BATS recommendations. Additionally, municipal initiatives are underway on both Peel and Halton Regions to pursue early corridor planning for the Halton-Peel Freeway that was recommended in the earlier study.

It should be noted that the above assumptions regarding the HP BATS corridor were used as part of the high-level analysis and evaluation of alternatives, as documented in **Sections 4.5 to 4.10**.

ALTERNATIVE	SECTIONS OF HP BATS CORRIDOR	
	Mayfield Road to Credit River	West of Credit River to Highway 401/407 ETR
<b>Alternative 4-1</b>		
Proponency	Municipal	Municipal
Transportation Benefits	✓	✓
Environmental Impact	x	x
Capital Cost	x	x
<b>Alternative 4-2</b>		
Proponency	Provincial	Provincial
Transportation Benefits	✓	✓
Environmental Impact	✓	✓
Capital Cost	✓	✓
<b>Alternative 4-3</b>		
Proponency	Provincial	Municipal
Transportation Benefits	✓	✓
Environmental Impact	✓	x
Capital Cost	✓	x
<b>Alternative 4-4</b>		
Proponency	Municipal	Municipal
Transportation Benefits	✓	✓
Environmental Impact	x	x
Capital Cost	x	x
<b>Alternative 4-5</b>		
Proponency	Provincial	Municipal
Transportation Benefits	✓	✓
Environmental Impact	✓	x
Capital Cost	✓	x

✓ - Benefits / impacts / costs of the HP BATS corridor was assumed to be part of the GTA West transportation corridor  
 x - Benefits / impacts / costs of the HP BATS corridor was not included be part of the GTA West transportation corridor

Exhibit 4-9: Proponency Assumed for HP BATS Corridor in GTA West Alternatives





## 4.5. EVALUATION OF ALTERNATIVES – NATURAL ENVIRONMENT

### 4.5.1. Methodology

The Study Team used secondary source information (i.e. mapping, aerial photography, documentation, other studies / reports, websites, etc.) obtained from agencies (e.g., Conservation Authorities, Niagara Escarpment Commission), ministries (Ministry of Natural Resources) and municipalities during the study to map existing natural environmental features in accordance with the factors and criteria under natural environment (as described in **Section 4.2**). Secondary source information was supplemented by local knowledge obtained through consultation with the public, agencies, municipalities and First Nations. The major environmental features were also confirmed in the field during this stage of the study. Additional, more detailed environmental field work will be carried out during the next stage of the Environmental Assessment (EA) process as part of the route planning exercise.

There are several considerations regarding potential challenges and limitations of the data and information used to support the assessment and evaluation:

- The Stage 1 assessment is based on secondary source information, which is appropriate given the broad scale and high-level strategic planning nature of this stage. Field-based data collection programs will be a major component of future stages and this more detailed information will guide the finer levels of planning and design. As such, this assessment is based on information received from the province and agencies. The scope of work in Stage 1 did not include detailed assessments by the Ontario Ministry of Transportation (MTO), for example to define significant woodlands and significant wildlife habitat using regional and provincial guidelines, wetland evaluation and species-at-risk surveys.

- The ability to incorporate more detailed local information from agencies and municipalities was limited by the fact that this information is inconsistent in its coverage on a regional level. That is, the information provided by one conservation authority, municipality or agency is not necessarily matched in other areas.

- Rare species information obtained from the Ontario Ministry of Natural Resources' (MNR) Natural Heritage Information Centre (NHIC) database was used to inform the sensitivity and significance of habitats potentially affected by the transportation planning alternatives. However, rare species information has certain limitations for use in the assessment and evaluation. Records of rare species occurrences depend greatly on where surveys are undertaken and particular survey methods. On such a broad / regional scale, high densities of rare species occurrences may be a function of surveys being preferentially targeted in certain areas (e.g. an abundance of information is available for areas of the Niagara Escarpment). The absence of rare species records does not necessarily mean that rare species are not present. Therefore, while rare species information was useful where it was present, a lack of information was not interpreted as an absence of rare species and, as such, caution was applied in using this information.

Recognizing that Stage 1 of the EA process identifies wide corridors (new corridors were presented schematically to be about 4 kilometres wide in GTA West preliminary study area), the Study Team understood that every natural feature in the corridor would not be impacted by future routes, and that some features could be avoided in the next stage of the EA, when route planning and generation of design alternatives will occur. In other instances, it was apparent that the natural feature was so large that it crossed the entire width of the corridor (or study area) and could not be avoided (i.e. Niagara Escarpment). These types of distinctions about the magnitude of potential impacts and the likelihood of avoidance or mitigation were noted in the evaluation tables (as described in **Section 4.4.2**). Although significant natural features within the Group #3 and #4 alternatives could be named and in some cases counted or “measured” to provide a comparison between alternatives, other criteria required a qualitative assessment of potential impacts or benefits

at a higher level of detail. Names of the most significant / largest features potentially impacted by each alternative were documented in the evaluation tables. Additional information on the environmental features is provided in the Existing Environmental Conditions and Constraints Report, as described in **Section 2.3**.

### 4.5.2. Findings

**Exhibit 4-10** describes the evaluation of the alternatives for the Natural Environment, as presented at PIC #4. A summary of the findings is provided below.

#### Fish and Fish Habitat

As shown in the table below, of the new corridor alternatives, Alternatives 4-4 and 4-5 have the highest potential to impact sensitive fisheries watercourses. These include the main Credit River branch as well as: Marden Creek, Rogers Creek and Snow Creek for Alternative 4-4, and Etobicoke Creek, Levi's Creek, Middle Sixteen Mile Creek, Mountsberg Creek and Bronte Creek for Alternative 4-5, in addition to the numerous unnamed tributaries. Alternatives 4-3 and 4-5 have moderate to high potential to impact fish species and communities. Aquatic Species at Risk found in the GTA West preliminary study area include Redside Dace, Atlantic Salmon and Lake Sturgeon.

GROUP #4 - NEW CORRIDOR SECTIONS	4-1	4-2	4-3	4-4	4-5
Potential Impact to Watercourses (number)	48	93	103	113	118
Potential Impact to Watercourses with Aquatic Species at Risk (number)	16	24	32	20	36

**Terrestrial Ecosystems**

The table below shows that of the new corridor alternatives, Alternatives 4-4 and 4-5 have the highest potential to impact the greatest number of evaluated wetland complexes that have been identified by MNR as significant ecological areas. Alternatives 4-4 and 4-5 will also impact the greatest linear length of woodlots over 40 ha in size. Additionally, these alternatives will impact several deer wintering areas and a number of areas where Wildlife Species at Risk (SAR) have been identified. As a result, Alternatives 4-4 and 4-5 also have a high potential to impact the SAR at the Niagara Escarpment. Alternative 3-1 has the least potential for impact to the terrestrial ecosystems.

GROUP #4 - NEW CORRIDOR SECTIONS	4-1	4-2	4-3	4-4	4-5
Potential Impact to Evaluated Wetland Complexes (number)	2	7	8	13	15
Potential Impact to Significant Woodlands (linear distance km)	4	10	13	23	24
Potential Impact to Wildlife Species at Risk (SAR) (number)	8	8	10	19	20

**Groundwater**

All alternatives cross through areas characterized by a moderate level of permeability for groundwater recharge. Alternatives 4-4 and 4-5 will also cross through areas that support the potential for groundwater upwelling and have high soil permeability for groundwater recharge capability.

**Surface Water**

Alternative 3-1 has the lowest potential impact to surface water because it results in a relatively minor amount of new pavement (when compared with new corridor alternatives). As shown below, Alternatives 4-4 and 4-5 are longer corridors, will cross the greatest number of watercourses and therefore have the highest potential to increase surface water runoff in the preliminary study area.

GROUP #4 - NEW CORRIDOR SECTIONS	4-1	4-2	4-3	4-4	4-5
Approximate Length of New Corridor (km)	27	47	53	72	76

**Designated Areas**

Alternative 3-1 has the least potential to impact the Greenbelt, Niagara Escarpment and designated areas and features because widening impacts will occur at the fringes of sensitive areas. As shown in the table below, Alternatives 4-4 and 4-5 have long sections through the Greenbelt and result in new crossings of the Niagara Escarpment. Some sensitive features cannot be avoided because of their size (i.e. the entire width of the new corridor crossed the designated features). Alternatives 4-4 and 4-5 have the highest potential to impact designated areas.

GROUP #4 - NEW CORRIDOR SECTIONS	4-1	4-2	4-3	4-4	4-5
Designated Features (ESAs, ANSIs, etc.)	4	7	7	14	15
Number of New Escarpment Crossings	0	0	0	1	1
Highway Length through Greenbelt (km)	15	19	21	25	31
Approximate Length of New Corridor (km)	27	47	53	72	76

A summary of the Natural Environment findings is provided in **Section 4.11**.







FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
1.1 Fish and Fish Habitat	1.1.1 Fish Habitat Measure: Qualitative assessment of the nature, significance and sensitivity of fisheries and aquatic habitat using the presence and density of watercourses and aquatic Species at Risk (SAR) as indicators.	WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401)	REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
		Although this alternative impacts numerous watercourses (129), it does so at existing highway crossings. In some areas widening may fit on existing structures. In other areas structures (i.e., existing bridges or culverts) may require widening. The new corridor section of this alternative results in new crossings of the East and Main Humber Rivers and several unnamed tributaries (48 watercourses). Potential impacts at the new corridor can be reduced through route selection and sensitive design of crossings. Mitigation should be relatively standard at widening locations.	This alternative impacts numerous watercourses (129) at existing highway crossings. In some areas widening may fit on existing structures. In other areas structures (i.e., existing bridges or culverts) may require widening. The new corridor section of this alternative results in new crossings of the East and Main Humber Rivers and several unnamed tributaries. This alternative also impacts Levi's Creek, Mullet Creek, tributaries of the Credit River, Etobicoke Creek and Fletcher's Creek (93 watercourses). Potential impacts at the new corridor can be reduced through route selection and sensitive design of crossings. Mitigation should be relatively standard at widening locations.	This alternative impacts numerous watercourses (129) at existing highway crossings. In some areas widening may fit on existing structures. In other areas structures (i.e., existing bridges or culverts) may require widening. The new corridor section of this alternative results in new crossings of the East and Main Humber Rivers and several unnamed tributaries. This alternative also impacts Levi's Creek, Mullet Creek, tributaries of the Credit River, Etobicoke Creek and Fletcher's Creek (93 watercourses). Potential impacts at the new corridor can be reduced through route selection and sensitive design of crossings. This scenario will require a crossing of the Credit River. Mitigation measures should include open span structures where feasible including open span culverts, bridges that span the valley, siting the crossings at areas of less dense and less mature vegetation.	This alternative impacts numerous watercourses (129) at existing highway crossings. In some areas widening may fit on existing structures. In other areas structures (i.e., existing bridges or culverts) may require widening. The new corridor section of this alternative results in new crossings of the East and Main Humber Rivers and several unnamed tributaries. This alternative also impacts Levi's Creek, Mullet Creek, tributaries of the Credit River, Etobicoke Creek and Fletcher's Creek (93 watercourses). Potential impacts at the new corridor can be reduced through route selection and sensitive design of crossings. This scenario will require a crossing of the Credit River. Mitigation measures should include open span structures where feasible including open span culverts, bridges that span the valley, siting the crossings at areas of less dense and less mature vegetation.	This alternative impacts numerous watercourses (129) at existing highway crossings. In some areas widening may fit on existing structures. In other areas structures (i.e., existing bridges or culverts) may require widening. The new corridor section of this alternative results in new crossings of the East and Main Humber Rivers and several unnamed tributaries. This alternative also impacts Levi's Creek, Mullet Creek, tributaries of the Credit River, Etobicoke Creek and Fletcher's Creek (93 watercourses). Potential impacts at the new corridor can be reduced through route selection and sensitive design of crossings. This scenario will require a crossing of the Credit River. Mitigation measures should include open span structures where feasible including open span culverts, bridges that span the valley, siting the crossings at areas of less dense and less mature vegetation.	This alternative impacts numerous watercourses (129) at existing highway crossings. In some areas widening may fit on existing structures. In other areas structures (i.e., existing bridges or culverts) may require widening. The new corridor section of this alternative results in new crossings of the East and Main Humber Rivers and several unnamed tributaries. This alternative also impacts Levi's Creek, Mullet Creek, tributaries of the Credit River, Etobicoke Creek and Fletcher's Creek (93 watercourses). Potential impacts at the new corridor can be reduced through route selection and sensitive design of crossings. This scenario will require a crossing of the Credit River. Mitigation measures should include open span structures where feasible including open span culverts, bridges that span the valley, siting the crossings at areas of less dense and less mature vegetation.
		This alternative has low potential to impact fish communities because highway widening occurs at existing structures or crossings (i.e., culverts). Mitigation should be relatively standard. DFO delineates approximately 31 watercourse crossings that have Aquatic Species at Risk known as Redside Dace. It is noted that watercourses near Regional Road 25 may also support Atlantic Salmon and / or Lake Sturgeon.	This alternative has slightly more potential to impact fish communities because the new corridor alignment creates new crossings of watercourses east of Highway 427. Some impacts can be dealt with through sensitive design, construction / timing restrictions, etc. The widening sections of this alternative have approximately 31 watercourse crossings with Aquatic Species at Risk known as Redside Dace and some with Atlantic Salmon and Lake Sturgeon. The new corridor section has Aquatic SAR at an additional 16 watercourse crossings.	This alternative has moderate potential to impact fish communities because the new corridor alignment creates new crossings of watercourses from Highway 401 / 407 ETR to Highway 400. Some impacts can be dealt with through sensitive design, construction / timing restrictions, etc. The widening sections of this alternative have approximately 31 watercourse crossings with Aquatic Species at Risk known as Redside Dace and some with Atlantic Salmon and Lake Sturgeon. The new corridor section has Aquatic SAR at an additional 24 watercourse crossings.	The longer new corridor section has moderate potential to impact fish species and communities. Some impacts can be dealt with through sensitive design, construction / timing restrictions, etc. The widening sections of this alternative have approximately 31 watercourse crossings with Aquatic Species at Risk known as Redside Dace and some with Atlantic Salmon and Lake Sturgeon. The new corridor section has Aquatic SAR at an additional 32 watercourse crossings. It is noted that Middle Sixteen Mile Creek within the new corridor may potentially support five Species of Special Concern known as American Eel, Bridle Shiner, Deepwater Sculpin, Silver Shiner, and Upper Great Lakes Kiyi.	The second longest new corridor section has a high potential to impact many fish species and communities. Some impacts can be dealt with through sensitive design, construction / timing restrictions, etc. The widening sections of this alternative have approximately 31 watercourse crossings with Aquatic Species at Risk known as Redside Dace and some with Atlantic Salmon and Lake Sturgeon. The new corridor section has Aquatic SAR at an additional 20 watercourse crossings.	The longest new corridor section has a high potential to impact many fish species and communities. Some impacts can be dealt with through sensitive design, construction / timing restrictions, etc. The widening sections of this alternative have approximately 31 watercourse crossings with Aquatic Species at Risk known as Redside Dace and some with Atlantic Salmon and Lake Sturgeon. The new corridor section has Aquatic SAR at an additional 36 watercourse crossings. It is noted that Middle Sixteen Mile Creek within the new corridor may potentially support five Species of Special Concern known as American Eel, Bridle Shiner, Deepwater Sculpin, Silver Shiner, and Upper Great Lakes Kiyi.

Exhibit 4-10: Natural Environment Evaluation

FACTOR	SUB-FACTOR AND MEASURE	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401)	4-1 REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
1.2 Terrestrial Ecosystems	<p>1.2.1 Wetlands</p> <p><b>Measure:</b></p> <p>Qualitative assessment considering the nature, significance and sensitivity of wetland units based on density and classification, including qualitative assessment of potential to avoid or mitigate impacts.</p>	<p>This alternative potentially impacts <b>five evaluated wetlands</b> including Mill Creek, Badenoch-Moffat, Mounsborg Reservoir Marsh, Guelph Junction Wetland and Milton Heights Marsh in widening sections.</p> <p>The new corridor section also potentially impacts <b>two evaluated wetlands</b>, namely Tormore Wetland Complex and Heart Lake Wetland Complex, in addition to several unevaluated wetlands.</p>	<p>This alternative potentially impacts <b>five evaluated wetlands</b> including Mill Creek, Badenoch-Moffat, Mounsborg Reservoir Marsh, Guelph Junction Wetland and Milton Heights Marsh in widening sections.</p> <p>The new corridor section also potentially impacts <b>two evaluated wetlands</b>, namely Tormore Wetland Complex and Heart Lake Wetland Complex, in addition to several unevaluated wetlands.</p>	<p>This alternative potentially impacts <b>five evaluated wetlands</b> including Mill Creek, Badenoch-Moffat, Guelph Junction Wetland, Milton Heights Marsh and Eaton Hall-Mary-Hackett Lakes Wetland Complex in widening sections.</p> <p>The new corridor section also potentially impacts <b>two evaluated wetlands</b>, namely Tormore Wetland Complex and Heart Lake Wetland Complex, in addition to several unevaluated wetlands.</p>	<p>This alternative potentially impacts <b>five evaluated wetland complexes</b> including Mill Creek, Badenoch-Moffat, Guelph Junction Wetland, Milton Heights Marsh and Eaton Hall-Mary-Hackett Lakes Wetland Complex in widening sections.</p> <p>The new corridor section also potentially impacts <b>two evaluated wetlands</b>, namely Tormore Wetland Complex and Heart Lake Wetland Complex, in addition to several unevaluated wetlands.</p>	<p>This alternative potentially impacts <b>five evaluated wetland complexes</b> including Mill Creek, Badenoch-Moffat, Guelph Junction Wetland, Milton Heights Marsh and Eaton Hall-Mary-Hackett Lakes Wetland Complex in widening sections.</p> <p>The new corridor section also potentially impacts <b>two evaluated wetlands</b>, namely Tormore Wetland Complex and Heart Lake Wetland Complex, in addition to several unevaluated wetlands.</p>	<p>This alternative potentially impacts <b>five evaluated wetland complexes</b> including Mill Creek, Badenoch-Moffat, Guelph Junction Wetland, Milton Heights Marsh and Eaton Hall-Mary-Hackett Lakes Wetland Complex in widening sections.</p> <p>The new corridor section also potentially impacts <b>two evaluated wetlands</b>, namely Tormore Wetland Complex and Heart Lake Wetland Complex, in addition to several unevaluated wetlands.</p>
	<p>1.2.2 Woodlands and Other Vegetated Areas</p> <p><b>Measure:</b></p> <p>Qualitative assessment of impacts to woodlots greater than 40 ha in size using linear distance impacts as indicator.</p>	<p>This alternative potentially impacts approximately <b>3.6 km</b> of linear distance through woodlots over 40 ha in size along Highway 401 between Highway 6 and Bronte Road (Regional Road 25).</p> <p>The new corridor section potentially impacts an additional <b>4.3 km</b> of linear distance through woodlots over 40 ha in size.</p>	<p>This alternative potentially impacts approximately <b>3.6 km</b> of linear distance through woodlots over 40 ha in size along Highway 401 between Highway 6 and Bronte Road (Regional Road 25).</p> <p>The new corridor section potentially impacts an additional <b>10.3 km</b> of linear distance through woodlots over 40 ha in size.</p>	<p>This alternative potentially impacts approximately <b>3.6 km</b> of linear distance through woodlots over 40 ha in size along Highway 401 between Highway 6 and Bronte Road (Regional Road 25).</p> <p>The new corridor section potentially impacts an additional <b>13.3 km</b> of linear distance through woodlots over 40 ha in size.</p>	<p>This alternative potentially impacts approximately <b>3.6 km</b> of linear distance through woodlots over 40 ha in size along Highway 401 between Highway 6 and Bronte Road (Regional Road 25).</p> <p>The new corridor section potentially impacts an additional <b>13.3 km</b> of linear distance through woodlots over 40 ha in size.</p>	<p>This alternative potentially impacts approximately <b>1.7 km</b> of linear distance through woodlots over 40 ha in size along Highway 401 between Highway 6 and Bronte Road (Regional Road 25).</p> <p>The new corridor section potentially impacts an additional <b>23.3 km</b> of linear distance through woodlots over 40 ha in size.</p>	<p>This alternative potentially impacts approximately <b>1.7 km</b> of linear distance through woodlots over 40 ha in size along Highway 401 between Highway 6 and Bronte Road (Regional Road 25).</p> <p>The new corridor section potentially impacts an additional <b>24.3 km</b> of linear distance through woodlots over 40 ha in size.</p>

FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
1.3 Groundwater	<p>1.2.3 Wildlife Habitats and Movements (including Species at Risk (SAR))</p> <p><u>Measure:</u> Qualitative assessment of nature, significance and sensitivity of significant wildlife habitat and landscape connectivity based on presence and density of SAR, known wildlife use (i.e., deer wintering, waterfowl staging etc.) and landscape-level habitat connectivity.</p> <p>1.3.1 Areas of Groundwater Recharge and Discharge</p> <p><u>Measure:</u> Qualitative assessment based on soil type and permeability to identify areas of high, moderate, low groundwater recharge capability, including consideration of number and location of groundwater recharge and discharge areas.</p> <p>1.3.2 Groundwater Source Areas and Wellhead Protection Areas</p> <p><u>Measure:</u> Wellhead protection areas that are potentially affected and their location.</p>	<p>This alternative potentially impacts several deer wintering areas and <b>three wildlife SAR</b>. Minimal potential for change to landscape level habitat connectivity.</p> <p>The new corridor section potentially impacts <b>eight SAR</b> and a Great Blue Heron Nesting Site / Colony north of Kirby Road. Some potential to impact habitat connectivity in vicinity of Humber Valley. However, impacts can be mitigated through long spans of valley and design features that ensure continuous movement of wildlife through valley.</p>	<p>This alternative potentially impacts several deer wintering areas and <b>three wildlife SAR</b> in the widening sections.</p> <p>The new corridor section potentially impacts <b>eight SAR</b> and a Great Blue Heron Nesting Site / Colony north of Kirby Road. Potential impacts at major valleys (i.e., Humber River, Credit River) can be mitigated through long spans of valley and design features that provide for continuous movement of wildlife through valley.</p>	<p>This alternative potentially impacts several deer wintering areas and <b>three wildlife SAR</b> in the widening sections.</p> <p>The new corridor section potentially impacts <b>ten SAR</b>, a Great Blue Heron Nesting Site / Colony north of Kirby Road and at 5<sup>th</sup> Line, north of Highway 401. Potential impacts at major valleys (i.e., Humber River, Credit River) can be mitigated through long spans of valley and design features that provide for continuous movement of wildlife through valley.</p>	<p>This alternative potentially impacts several deer wintering areas and <b>three wildlife SAR</b> in the widening sections.</p> <p>The new corridor section potentially impacts <b>19 SAR</b>, a Great Blue Heron Nesting Site / Colony north of Kirby Road and two Great Blue Heron Nesting Sites east of 5<sup>th</sup> Line. There is a high probability of impacting the SAR at the Niagara Escarpment, based on density and frequency of occurrences at the corridor. Potential impacts at major valleys (i.e., Humber River, Credit River) can be mitigated through long spans of valley and design features that provide for continuous movement of wildlife through valley.</p>	<p>This alternative potentially impacts several deer wintering areas and <b>three wildlife SAR</b> in the widening sections.</p> <p>The new corridor section potentially impacts <b>20 SAR</b>, a Great Blue Heron Nesting Site / Colony north of Kirby Road and two Great Blue Heron Nesting Sites east of 5<sup>th</sup> Line. There is a high probability of impacting the SAR at the Niagara Escarpment, based on density and frequency of occurrences at the corridor. Potential impacts at major valleys (i.e., Humber River, Credit River) can be mitigated through long spans of valley and design features that provide for continuous movement of wildlife through valley.</p>	<p>Soil types near existing highways in the widening sections are generally characterized by a low to moderate level of permeability.</p> <p>Soils along the new corridor section are characterized by a moderate level of permeability for groundwater recharge capability. West of Brookville, the soils have high permeability. Soils south of Guelph (west of Nassagaweya-Pulinch Townline) are classified as having high level of permeability for groundwater recharge capability.</p>
		<p>This alternative potentially impacts several deer wintering areas and <b>three wildlife SAR</b> in the widening sections.</p> <p>The new corridor section is in proximity to wellhead protection zones in Kleinburg / Vaughan and in Halton north of Highway 401 at Tremaine Road.</p>	<p>Wellhead protection zones in Halton Region, along Highway 401 are potentially impacted.</p> <p>The new corridor section is in proximity to wellhead protection zones in Kleinburg / Vaughan.</p>	<p>Wellhead protection zones in Halton Region, along Highway 401 are potentially impacted.</p> <p>The new corridor section is in proximity to wellhead protection zones in Kleinburg / Vaughan. West of Highway 10, the new corridor section potentially impacts additional wellhead protection zones in Halton Region and Wellington County. A 25-year wellhead protection zone located north of Rockwood bisects the corridor and would therefore be directly impacted by this alternative.</p>	<p>Wellhead protection zones in Halton Region, along Highway 401 are potentially impacted.</p> <p>The new corridor section is in proximity to wellhead protection zones in Kleinburg / Vaughan. West of Highway 10, the new corridor section potentially impacts additional wellhead protection zones in Halton Region and Wellington County. There are approximately four wellhead locations within the corridor between Gordon Street (Wellington Road 48) and Victoria Street South, near Guelph.</p>		

FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
1.4 Surface Water	<p>1.4.1 Watershed / Sub-Watershed Drainage Features / Patterns</p> <p><u>Measure:</u> Qualitative assessment of new pavement area, and new / existing watercourse crossings.</p>	<p>This alternative will result in the least amount of new pavement in the watersheds. Additional runoff will be dealt with in the MTO highway right-of-way.</p>	<p>This alternative will result in a relatively minor amount of new pavement in the watersheds. New corridor section crosses East and main Humber River flood plains, mapped by TRCA. Additional runoff will be dealt with in the MTO highway right-of-way.</p>	<p>This alternative will result in a moderate amount of new pavement in the watersheds. New corridor sections cross East and main Humber River flood plains, mapped by TRCA and the main Credit River floodplain mapped by CVC. Additional runoff will be dealt with in the MTO highway right-of-way.</p>	<p>This alternative will result in a moderate amount of new pavement in the watersheds. New corridor sections cross East and main Humber River flood plains, mapped by TRCA, the main Credit River floodplain mapped by CVC as well as many tributaries of Sixteen Mile Creek in Halton Region. Additional runoff will be dealt with in the MTO highway right-of-way.</p>	<p>This alternative will result in a significant amount of new pavement in the watersheds. New corridor sections cross East and main Humber River flood plains, mapped by TRCA, the main Credit River floodplain mapped by CVC as well as numerous other watercourses mapped by GRCA. Additional runoff will be dealt with in the MTO highway right-of-way.</p>	<p>This alternative will result in a significant amount of new pavement in the watersheds. New corridor sections cross East and main Humber River flood plains, mapped by TRCA, the main Credit River floodplain mapped by CVC as well as numerous other watercourses mapped by GRCA. Additional runoff will be dealt with in the MTO highway right-of-way.</p>
1.5 Designated Areas	<p>Designated Areas are defined by resource agencies, municipalities, the government and / or the public through legislation, policies, or approved management plans, to have special or unique value. Examples of designated areas include ESAs, ANSIs, Bruce Trail, Niagara Escarpment, Greenbelt and Oak Ridges Moraine.</p> <p><u>Measure:</u> Qualitative assessment of nature, number and significance of designated areas potentially impacted, including consideration of ability to avoid designated area or mitigate impacts.</p>	<p>This alternative crosses the Greenbelt and Niagara Escarpment lands along Highway 401 between Highway 6 and Bronte Road (Regional Road 25) and the Oak Ridges Moraine at Highway 400. There are <b>four ESAs</b> (Guelph Junction Woods, Meadowvale Station Woods, Happy Valley Infiltration Area and Kettleby Infiltration Area ) and <b>five ANSIs</b> (Meadowvale Station Woods, Mountsberg Wildlife Centre, Ekhumed Siluran Reef, Strange Till Plain and Happy Valley) potentially affected by this alternative. The Highway 401 widening also has potential to impact the Bruce Trail and MNR trail segments near the escarpment.</p> <p>Widening impacts are on the edges of designated areas.</p> <p>This alternative crosses approximately <b>14.4 km of Greenbelt</b>.</p>	<p>The widening component of this alternative crosses the <b>same ESAs, ANSIs and Bruce Trail</b> as Alternative 3-1.</p> <p>In addition, the new corridor section crosses <b>two ESAs</b> (Kings Creek Forest and East Humber River) and <b>two ANSIs</b> (Humber River Valley-Kleinberg and Gooseville Moraine). It is possible to avoid some of these designated areas through the route planning and selection process.</p> <p>This alternative crosses approximately <b>14.4 km of Greenbelt</b> in widening <b>corridor sections</b>.</p>	<p>The widening component of this alternative crosses the <b>same ESAs, ANSIs and Bruce Trail</b> as Alternative 3-1.</p> <p>In addition, the new corridor section crosses <b>four ESAs</b> (Kings Creek Forest, East Humber River, Georgetown Credit River Valley and Hungry Hollow Ravine) and <b>three ANSIs</b> (Humber River Valley-Kleinberg, Gooseville Moraine and Georgetown Credit Valley). It is possible to avoid some of these designated areas through the route planning and selection process.</p> <p>The new corridor section west of Highway 10 also potentially impacts the Credit Valley Footpath.</p> <p>This alternative crosses approximately <b>14.4 km of Greenbelt</b> in widening <b>corridor sections</b> and <b>19 km in new corridor sections</b>.</p>	<p>The widening component of this alternative crosses the <b>same ESAs, ANSIs and Bruce Trail</b> as Alternative 3-1.</p> <p>In addition, the new corridor section crosses <b>six ESAs</b> (Kings Creek Forest, East Humber River, Georgetown Credit River Valley, Caledonia Mountain, Terra Cotta Woods, Silver Creek Valley and Acton Swamp III). Given that two ESAs bisect the corridor, it is likely that a portion of the ESAs will be fragmented and directly impacted. The new corridor segment also impacts <b>eight ANSIs</b> (Humber River Valley-Kleinberg, Gooseville Moraine, Terra Cotta Forest, Silver Creek Valley, Eramosa River Valley, Amabel Formation, Guelph Drumlin Field and Eramosa Esker Channel). Three of these ANSIs cross the full width of the corridor and <b>cannot be avoided</b>. Numerous MNR trail segments are situated in the corridor at the Niagara Escarpment as well as the Guelph Trans Canada Trail at the western end of the corridor.</p> <p>This alternative crosses approximately <b>14.4 km of Greenbelt</b> in widening <b>corridor sections</b> and <b>25 km in new corridor sections</b>.</p>	<p>The widening component of this alternative crosses the <b>same ESAs, ANSIs and Bruce Trail</b> as Alternative 3-1.</p> <p>In addition, the new corridor section crosses <b>six ESAs</b> (Kings Creek Forest, East Humber River, Georgetown Credit River Valley, Hungry Hollow Ravine, Hilton Falls Complex and Brookville Swamp). Given that Hilton Falls Complex bisects the corridor, it is likely that a portion of the ESAs will be fragmented and directly impacted. The new corridor segment also impacts <b>nine ANSIs</b> (Humber River Valley-Kleinberg, Gooseville Moraine, Georgetown Credit River Valley, Speyside Forest, Halton Forest North, Halton Forest South, Brookville Swamp, Galt Moraine and Paris Moraine). Two of these ANSIs cross the full width of the corridor and <b>cannot be avoided</b>. Numerous MNR trail segments are situated in the corridor at the Niagara Escarpment.</p> <p>This alternative crosses approximately <b>14.4 km of Greenbelt</b> in widening <b>corridor sections</b> and <b>31 km in new corridor sections</b>.</p>	

FACTOR	SUB-FACTOR AND MEASURE	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401)	4-1 REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
SUMMARY		<p><b>MOST PREFERRED</b> - because it results in the fewest impacts in most criteria. Impacts are on fringes of sensitive areas that have already been disturbed and most can be mitigated through standard mitigation measures.</p>	<p><b>MODERATELY PREFERRED</b> because it results in slightly more potential impacts, but does not encroach on the most sensitive areas along and west of the escarpment. Impacts at Humber River can potentially be mitigated through design (i.e., long spans etc.) and route selection.</p> <p>Some impacts in new corridor section can be minimized through the route planning and selection process as well as design.</p>	<p><b>MODERATELY PREFERRED</b> because it results in slightly more potential impacts, but does not encroach on the most sensitive areas along and west of the escarpment. Impacts at Humber River can potentially be mitigated through design (i.e., long spans etc.) and route selection.</p> <p>Some impacts in new corridor section can be minimized through the route planning and selection process as well as design.</p>	<p><b>MODERATELY PREFERRED</b> because it results in slightly more potential impacts, but does not encroach on the most sensitive areas along and west of the escarpment. Impacts at Humber River can potentially be mitigated through design (i.e., long spans etc.) and route selection.</p> <p>Some impacts in new corridor section can be minimized through the route planning and selection process as well as design.</p>	<p><b>LEAST / NOT PREFERRED</b> because it results in high potential for impacts to undisturbed sensitive areas along and west of the escarpment. Some impacts can be minimized through the route planning and selection process as well as design. However, many sensitive areas are quite large and cannot be avoided because they cross the full width of the corridor. Therefore mitigation in these areas is difficult and will likely require compensation for loss of habitat.</p>	<p><b>LEAST / NOT PREFERRED</b> because it results in a high potential for impacts to undisturbed sensitive areas along and west of the escarpment. Some impacts can be minimized through the route planning and selection process as well as design. However, many sensitive areas are quite large and cannot be avoided because they cross the full width of the corridor. Therefore mitigation in these areas is difficult and will likely require compensation for loss of habitat.</p>
NATURAL ENVIRONMENT							
OVERALL NATURAL ENVIRONMENT		<p>Alternative 3-1 results in the fewest impacts in most criteria in the natural environment factor. Impacts are on the fringe of sensitive areas that have already been disturbed and most can be mitigated with standard mitigation measures. Alternatives 4-1, 4-2 and 4-3 result in more potential impacts than Alternative 3-1, because of new footprints in new corridor sections. These alternatives are considered relatively moderate and impacts can be mitigated through route location and design. Alternative 4-1 is the shortest of the new corridor sections and therefore has slightly fewer impacts than Alternatives 4-2 and 4-3. Alternatives 4-4 and 4-5 result in significantly higher impacts to natural environment because they cross many sensitive aquatic and terrestrial features and designated areas at and west of the Niagara Escarpment. These sensitive features include evaluated wetland complexes, wildlife SAR, ESAs and ANSIs that are quite large and in many cases will be difficult (if not impossible) to avoid. Therefore mitigation of the impacts to natural environment for Alternative 4-4 and 4-5 is difficult and impacts of new footprint in sensitive areas is expected to require compensation for loss of habitat etc.</p>	<p>Overall, Alternative 3-1 is Most Preferred from a Natural Environment perspective. Alternatives 4-1, 4-2 and 4-3 all result in relatively similar moderate impacts. Alternatives 4-4 and 4-5 result in significantly higher impacts than the other alternatives.</p>				

## 4.6. EVALUATION OF ALTERNATIVES – SOCIAL ENVIRONMENT

### 4.6.1. Methodology

The Study Team used secondary source information (i.e. mapping and content from provincial plans and local official plans, secondary plans, etc.) obtained from agencies (i.e. Niagara Escarpment Commission (NEC)), ministries (i.e. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)), the Ministry of Energy and Ministry of Infrastructure (formerly Ministry of Energy and Infrastructure (MEI)), and municipalities during the study to map and document existing land uses and social environmental conditions in accordance with the factors and criteria under the land use / social environment. Secondary source information was supplemented by local knowledge obtained through consultation with the public, agencies, municipalities and First Nations.

In addition, the Study Team carried out an air quality analysis for this stage of the EA. The air quality analysis work was specifically initiated to provide a meaningful way of comparing the Group #3 and Group #4 alternatives, using the evaluation criteria established.

Major community features and land uses were also confirmed in the field to determine the presence / absence of small rural communities, community facilities (such as churches, schools, etc.) and to gain a general understanding of the land use characteristics of each alternative.

Similarly to the Natural Environmental analysis, recognizing that Stage 1 of the EA process identifies wide corridors (new corridors are conceptually identified with a 4 kilometre band in the GTA West Preliminary Study Area), the Study Team acknowledged that every feature in the corridor would not be impacted by future routes, and that some features (i.e. small hamlets, pockets of existing residential areas or agricultural operations, etc.) could be avoided in the next stage of the EA, when route planning and generation will occur. In other instances, it was apparent that the feature was so large that the entire width of the preliminary study area crossed it (i.e. lands designated for future urban expansion in some municipalities, Greenbelt and Niagara Escarpment Commission policy areas, etc.). Distinctions about the magnitude of potential impacts and the likelihood of avoidance or mitigation were noted

in the evaluation tables (as described later in this section). Although significant features within the Group #3 and #4 alternatives could be named and in some cases counted or “measured” to provide a comparison between alternatives, other criteria required a qualitative assessment of potential impacts or benefits of the Group #3 and #4 alternatives, at a higher level of detail. The most significant or largest features potentially impacted by each alternative were documented in the evaluation tables. Additional information on land use and community features is provided in the *Existing Environmental Conditions and Constraints Report*, summarized in **Section 2.3**.

Finally, the methodology for evaluating potential impacts to residential, business and industrial properties was further supplemented by initial footprint widening analysis carried out for the widening sections of each alternative as part of the Cost and Constructability analysis (as described in **Section 4.8**). This work provided some opportunity to estimate the number of residential, commercial and industrial properties potentially impacted in widening sections of each alternative.

### 4.6.2. Findings

**Exhibit 4-11** provides the evaluation of the alternatives for the Land Use factors, as presented at PIC #4. A summary of the findings is provided below.

#### Provincial / Federal Land use Planning / Goals / Objectives

Alternative 3-1 does not sufficiently support growth, especially in York and Peel Regions, because the widening improvements are too far south to effectively serve the areas identified for future growth and development. Alternatives 4-1, 4-2 and 4-3 address growth and land use pressures in York, Peel and Halton Regions because they are located closer to future growth areas.

#### Land Use / Community

As shown below, Alternative 3-1 has the highest potential to impact residential, industrial and commercial properties in built-up areas adjacent to existing highways, at its widest sections along Highways 401, 407 and 400. Group #4 impacts to residential, industrial, commercial and tourism properties are reduced along existing highways and can potentially be minimized through the route selection process in new

corridor sections. Alternative 4-4 provides improved access to eco-tourism / recreational areas at the western end of the preliminary study area.

POTENTIAL PROPERTY IMPACTS IN HIGHWAY WIDENING SECTIONS	3-1	4-1	4-2	4-3	4-4	4-5
Residential Properties (number)	23	7	7	7	3	3
Industrial Properties (number)	22	12	12	3	1	1
Commercial Properties (number)	20	7	7	6	1	1

Note: Property impacts are approximate and based on preliminary highway widening “footprint” analysis – to be confirmed in future study process



FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
2.1 Land Use Planning Policies, Plans, Goals, Objectives	2.1.1 Provincial / Federal land use planning / goals / objectives <b>Measure:</b> Qualitative assessment of ability to support federal/provincial land use policies, plans, goals and objectives.	WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401) Widening existing freeways supports the PPS by optimizing the use of existing infrastructure. This alternative includes widening of Highway 401 through designated NEC and Greenbelt lands. This alternative does not sufficiently support some planned future growth areas in York and Peel regions. However, by widening existing highways, the alternative provides improvement to the connections between Urban Growth Centres (i.e., Vaughan Metropolitan Centre, Downtown Guelph). It also supports the <i>Growth Plan's</i> focus on intensification by providing additional capacity to existing employment areas.	REDUCED 407 ETR WIDENING (EAST DOR FROM HIGHWAY 410 TO HIGHWAY 400 TO HIGHWAY 410) Widening existing freeways supports the PPS by optimizing the use of existing infrastructure. This alternative includes widening of Highway 401 through designated NEC and Greenbelt lands. The new corridor section between Highway 400 and a N/S link to Highway 427 crosses the <i>Greenbelt Plan</i> area in the vicinity of the Humber River. Other <i>Greenbelt Plan</i> areas are crossed north of Brampton.	REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 Widening existing freeways supports the PPS by optimizing the use of existing infrastructure. This alternative includes widening of Highway 401 through designated NEC lands. The new corridor section between Highway 400 and a N/S link to Highway 427 crosses the <i>Greenbelt Plan</i> area in the vicinity of the Humber River. Other <i>Greenbelt Plan</i> areas are crossed north of Brampton.	REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON Widening existing freeways supports the PPS by optimizing the use of existing infrastructure. This alternative includes widening of Highway 401 through designated NEC lands. The new corridor section between Highway 400 and a N/S link to Highway 427 crosses the <i>Greenbelt Plan</i> area in the vicinity of the Humber River. Other <i>Greenbelt Plan</i> areas are crossed north of Brampton and across the centre of the study area, north of Georgetown (near Chellenham and Ballinlad).	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH) Widening existing freeways supports the PPS by optimizing the use of existing infrastructure. This alternative includes widening of Highway 401 and a new transportation corridor through designated NEC lands and the <i>Greenbelt Plan</i> area. The new corridor section between Highway 400 and a N/S link to Highway 427 crosses the <i>Greenbelt Plan</i> area in the vicinity of the Humber River. Other <i>Greenbelt Plan</i> areas are crossed north of Brampton and across the centre of the study areas further west near Speyside, Scotch Block and Brookville.	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH) Widening existing freeways supports the PPS by optimizing the use of existing infrastructure. This alternative includes widening of Highway 401 and a new transportation corridor through designated NEC lands and the <i>Greenbelt Plan</i> area. The new corridor section between Highway 400 and a N/S link to Highway 427 crosses the <i>Greenbelt Plan</i> area in the vicinity of the Humber River. Other <i>Greenbelt Plan</i> areas are crossed north of Brampton and across the centre of the study areas further west near Speyside, Scotch Block and Brookville. This alternative supports planned future land use and growth as identified in the <i>Growth Plan</i> and, in conjunction with widening the existing highway system, provides an alternate indirect route connecting Urban Growth Centres (i.e., Vaughan Metropolitan Centre, Downtown Brampton, Downtown Guelph).
2.1.2 Municipal land use planning policies / goals / objectives <b>Measure:</b> Qualitative assessment of potential to support municipal Official Plans.	2.1.2 Municipal land use planning policies / goals / objectives <b>Measure:</b> Qualitative assessment of potential to support municipal Official Plans.	This alternative has limited ability to accommodate planned future growth and development pressures in Peel and York Regions. This alternative also does not serve the Milton / Halton Hills growth areas and therefore only partly addresses growth pressures and the <i>Growth Plan</i> .	This alternative accommodates planned future growth and addresses development pressures in Peel and York Regions. This alternative does not serve the Milton / Halton Hills growth areas and therefore only partly addresses growth pressures and the <i>Growth Plan</i> . This alternative would impact the future employment areas along Steeles Boulevard and Whiston Road, which are envisioned in Halton Region's plan. However, this alternative would not impact the land use in Halton's plans south of Georgetown.	This alternative accommodates planned future growth and addresses development pressures in Peel and York. However, this alternative would impact the existing and future land use in Halton's plans between Georgetown and Milton.	This alternative accommodates planned future growth and addresses development pressures in Peel and York. This alternative also serves growth in Guelph.	This alternative accommodates planned future growth and addresses development pressures in Peel and York. This alternative also serves growth in Guelph.	This alternative accommodates planned future growth and addresses development pressures in Peel and York. This alternative also serves growth in Guelph.
2.2 Land Use / Community	2.2.1 Indian Reserves <b>Measure:</b> Qualitative assessment of potential to avoid Indian Reserves. 2.2.2 First Nations Sacred Grounds <b>Measure:</b> Qualitative assessment of potential to avoid First Nation Sacred grounds.	There are no First Nation Indian Reserves in the study area.  Potential impacts to First Nation Sacred Grounds will be identified through discussions with First Nations as the study progresses and study area reduces in size.	There are no First Nation Indian Reserves in the study area.  Potential impacts to First Nation Sacred Grounds will be identified through discussions with First Nations as the study progresses and study area reduces in size.	There are no First Nation Indian Reserves in the study area.  Potential impacts to First Nation Sacred Grounds will be identified through discussions with First Nations as the study progresses and study area reduces in size.	There are no First Nation Indian Reserves in the study area.  Potential impacts to First Nation Sacred Grounds will be identified through discussions with First Nations as the study progresses and study area reduces in size.	There are no First Nation Indian Reserves in the study area.  Potential impacts to First Nation Sacred Grounds will be identified through discussions with First Nations as the study progresses and study area reduces in size.	There are no First Nation Indian Reserves in the study area.  Potential impacts to First Nation Sacred Grounds will be identified through discussions with First Nations as the study progresses and study area reduces in size.

FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5	
	2.2.3 Residential (Urban and Rural) <b>Measure:</b> Qualitative assessment of potential to affect urban and rural residential areas, using number of areas affected and potential to avoid or mitigate impacts as indicator.	Widening existing freeways has some potential to impact residential areas especially in urban, built up areas. This alternative has some potential to indirectly impact residential areas in Milton, Brampton, Woodridge and Vaughan. This alternative impacts approximately <b>23 residential properties</b> directly.	The widening sections of this alternative have some potential to indirectly impact residential areas in Milton, Brampton, Woodridge and Vaughan. This alternative impacts approximately <b>7 residential properties</b> directly in widening sections. The new corridor section has potential to impact rural residential areas (directly or indirectly) near Nobleton, Laskey and Kleinburg between Highways 400 and 427. Rural residences in southern portions of Bolton and Caledon could potentially be impacted west of Highway 427. West of Highway 10, some residential areas may be impacted on the outskirts of Brampton and in the southern rural sections of Georgetown, including two rural areas known as Mansewood and Boston. In comparison with other alternatives Alternative 4-2 has a moderate to low potential to impact residential areas.	The widening sections of this alternative have some potential to indirectly impact residential areas in Milton, Brampton, Woodridge and Vaughan. This alternative impacts approximately <b>7 residential properties</b> directly in widening sections. The new corridor section has potential to impact rural residential areas (directly or indirectly) near Nobleton, Laskey and Kleinburg between Highways 400 and 427. Rural residences in southern portions of Bolton and Caledon could potentially be impacted west of Highway 427. West of Highway 10, some residential areas may be impacted on the outskirts of Brampton and in the southern rural sections of Georgetown, including two rural areas known as Mansewood and Boston. In comparison with other alternatives Alternative 4-3 has a moderate to low potential to impact residential areas.	The widening sections of this alternative have some potential to indirectly impact residential areas in Milton, Brampton, Woodridge and Vaughan. This alternative impacts approximately <b>7 residential properties</b> directly in widening sections. The new corridor section has potential to impact rural residential areas (directly or indirectly) near Nobleton, Laskey and Kleinburg between Highways 400 and 427. Rural residences in southern portions of Bolton and Caledon could potentially be impacted west of Highway 427. West of Highway 10, some residential areas may be impacted on the outskirts of Brampton and in the southern rural sections of Georgetown, including two rural areas known as Mansewood and Boston. In comparison with other alternatives Alternative 4-3 has a moderate to low potential to impact residential areas.	The widening sections of this alternative have some potential to indirectly impact residential areas in Milton, Brampton, Woodridge and Vaughan. This alternative impacts approximately <b>7 residential properties</b> directly in widening sections. The new corridor section has potential to impact rural residential areas (directly or indirectly) near Nobleton, Laskey and Kleinburg between Highways 400 and 427. Rural residences in southern portions of Bolton and Caledon could potentially be impacted west of Highway 427. West of Highway 10, some residential areas may be impacted on the outskirts of Brampton and in the southern rural sections of Georgetown, including two rural areas known as Mansewood and Boston. In comparison with other alternatives Alternative 4-3 has a moderate to low potential to impact residential areas.	The widening sections of this alternative have some potential to indirectly impact residential areas in Milton, Brampton, Woodridge and Vaughan. This alternative impacts approximately <b>7 residential properties</b> directly in widening sections. The new corridor section has potential to impact rural residential areas (directly or indirectly) near Nobleton, Laskey and Kleinburg between Highways 400 and 427. Rural residences in southern portions of Bolton and Caledon could potentially be impacted west of Highway 427. West of Highway 10, some residential areas may be impacted on the outskirts of Brampton and in the southern rural sections of Georgetown, including two rural areas known as Mansewood and Boston. In comparison with other alternatives Alternative 4-3 has a moderate to low potential to impact residential areas.	The widening sections of this alternative have some potential to indirectly impact residential areas in Milton, Brampton, Woodridge and Vaughan. This alternative impacts approximately <b>7 residential properties</b> directly in widening sections. The new corridor section has potential to impact rural residential areas (directly or indirectly) near Nobleton, Laskey and Kleinburg between Highways 400 and 427. Rural residences in southern portions of Bolton and Caledon could potentially be impacted west of Highway 427. West of Highway 10, some residential areas may be impacted on the outskirts of Brampton and in the southern rural sections of Georgetown, including two rural areas known as Mansewood and Boston. In comparison with other alternatives Alternative 4-3 has a moderate to low potential to impact residential areas.
	2.2.4 Commercial / Industrial <b>Measure:</b> Qualitative assessment of potential to impact commercial and industrial areas using estimated number of properties/industrial parks potentially impacted as indicator.	This alternative potentially impacts approximately <b>20 commercial and 22 industrial properties</b> directly in widening sections. In comparison with other alternatives, Alternative 3-1 has a moderate to high potential to impact residential areas.	Widening sections of this alternative potentially impacts approximately <b>7 commercial and 12 industrial properties</b> directly. The new corridor section includes several commercial / industrial properties (approximately 50) that could potentially be impacted, east of Highway 427. It is possible to avoid some of these land uses through the route planning and selection process. In comparison with other alternatives, Alternative 4-1 has moderate potential to impact commercial / industrial areas. This alternative has moderate potential to impact existing commercial and industrial areas.	Widening sections of this alternative potentially impacts approximately <b>7 commercial and 12 industrial properties</b> directly. The new corridor section includes several commercial / industrial properties (approximately 50) that could potentially be impacted, east of Highway 427, and additional properties (approximately 10) west of Highway 410 to Highway 401. It is possible to avoid some of these land uses through the route planning and selection process. This alternative has moderate potential to impact existing commercial and industrial areas.	Widening sections of this alternative potentially impacts approximately <b>6 commercial and 3 industrial properties</b> directly. The new corridor section includes several commercial / industrial properties (approximately 50) that could potentially be impacted, east of Highway 427, and additional properties (approximately 25) west of Highway 410 to Highway 401. It is possible to avoid some of these land uses through the route planning and selection process. This alternative has moderate potential to impact existing commercial and industrial areas.	Widening sections of this alternative potentially impacts approximately <b>1 commercial and 1 industrial properties</b> directly. The new corridor section includes several commercial / industrial properties (approximately 50) that could potentially be impacted, east of Highway 427. It is possible to avoid some of these land uses through the route planning and selection process. The new corridor section west of Highway 10, to Highway 6 in north Guelph has very few commercial / industrial areas. This alternative has moderate to low potential to impact existing commercial and industrial areas.	Widening sections of this alternative potentially impacts approximately <b>1 commercial and 1 industrial properties</b> directly. The new corridor section includes several commercial / industrial properties (approximately 50) that could potentially be impacted, east of Highway 427. It is possible to avoid some of these land uses through the route planning and selection process. The new corridor section west of Highway 10, to Highway 6 in south Guelph crosses portions of a Duferin Aggregates yard in Hutton Hills and the Hanton Industrial Park south of Guelph. This alternative has moderate to high potential to impact existing commercial and industrial areas.	Widening sections of this alternative potentially impacts approximately <b>1 commercial and 1 industrial properties</b> directly. The new corridor section includes several commercial / industrial properties (approximately 50) that could potentially be impacted, east of Highway 427. It is possible to avoid some of these land uses through the route planning and selection process. The new corridor section west of Highway 10, to Highway 6 in south Guelph crosses portions of a Duferin Aggregates yard in Hutton Hills and the Hanton Industrial Park south of Guelph. This alternative has moderate to high potential to impact existing commercial and industrial areas.

FACTOR	SUB-FACTOR AND MEASURE	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401)	4-1 REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
	<p>2.2.9 Tourism Operations</p> <p><u>Measure:</u></p> <p>Qualitative assessment of potential to impact or support tourist areas and attractions in the study area.</p> <p>NOTE: Potential impacts/benefits to tourism travel beyond the study area are dealt with under Area Economy.</p>	<p>This alternative supports travel to tourism operations close to existing Provincial highways such as Mohawk Race Track, Chudleigh's Farm, Country Heritage Park, Downey's Children's Farm, Canada's Wonderland and McMichael's Art Museum as well as Conservation Areas such as Kelso Lake, Hilton Falls, Mountsberg Reservoir (at the Niagara Escarpment), Albion Hills, and the Boyd and Kortright Centre.</p> <p>The new corridor section potentially impacts Downey's Farm north of Brampton, although impacts may be minimized (and benefits maximized) through the route planning and selection process.</p>	<p>This alternative supports travel to tourism operations close to existing Provincial highways such as Mohawk Race Track, Chudleigh's Farm, Country Heritage Park, Downey's Children's Farm, Canada's Wonderland and McMichael's Art Museum as well as Conservation Areas such as Kelso Lake, Hilton Falls, Mountsberg Reservoir (at the Niagara Escarpment), Albion Hills, and the Boyd and Kortright Centre.</p> <p>The new corridor section potentially impacts Downey's Farm (north of Brampton), some apple orchards /tourist farms along Heritage Road and Scotch Block Winery (west of Highway 410). Impacts may be minimized (and benefits maximized) through the route planning and selection process.</p>	<p>This alternative supports travel to tourism operations close to existing Provincial highways such as Mohawk Race Track, Chudleigh's Farm, Country Heritage Park, Downey's Children's Farm, Canada's Wonderland and McMichael's Art Museum as well as Conservation Areas such as Kelso Lake, Hilton Falls, Mountsberg Reservoir (at the Niagara Escarpment), Albion Hills, and the Boyd and Kortright Centre.</p> <p>The new corridor section potentially impacts Downey's Farm (north of Brampton), some apple orchards /tourist farms along Heritage Road and Scotch Block Winery (west of Highway 410). Impacts may be minimized (and benefits maximized) through the route planning and selection process.</p> <p>The new corridor section from Highway 10 to Highway 6 in north Guelph provides improved access to eco-recreational areas such as the Forks of the Credit, Terra Cotta, Elora Gorge, Guelph Lake and Rockwood Conservation Area.</p>	<p>This alternative supports travel to tourism operations close to existing Provincial highways such as Mohawk Race Track, Chudleigh's Farm, Country Heritage Park, Downey's Children's Farm, Canada's Wonderland and McMichael's Art Museum as well as Conservation Areas such as Kelso Lake, Hilton Falls, Mountsberg Reservoir (at the Niagara Escarpment), Albion Hills, and the Boyd and Kortright Centre.</p> <p>The new corridor section potentially impacts Downey's Farm (north of Brampton), some apple orchards /tourist farms along Heritage Road and Scotch Block Winery (west of Highway 410). Impacts may be minimized (and benefits maximized) through the route planning and selection process.</p>	<p>This alternative supports travel to tourism operations close to existing Provincial highways such as Mohawk Race Track, Chudleigh's Farm, Country Heritage Park, Downey's Children's Farm, Canada's Wonderland and McMichael's Art Museum as well as Conservation Areas such as Kelso Lake, Hilton Falls, Mountsberg Reservoir (at the Niagara Escarpment), Albion Hills, and the Boyd and Kortright Centre.</p> <p>The new corridor section potentially impacts Downey's Farm (north of Brampton), some apple orchards /tourist farms along Heritage Road and Scotch Block Winery (west of Highway 410). Impacts may be minimized (and benefits maximized) through the route planning and selection process.</p>	<p>This alternative supports travel to tourism operations close to existing Provincial highways such as Mohawk Race Track, Chudleigh's Farm, Country Heritage Park, Downey's Children's Farm, Canada's Wonderland and McMichael's Art Museum as well as Conservation Areas such as Kelso Lake, Hilton Falls, Mountsberg Reservoir (at the Niagara Escarpment), Albion Hills, and the Boyd and Kortright Centre.</p> <p>The new corridor section potentially impacts Downey's Farm (north of Brampton), some apple orchards /tourist farms along Heritage Road and Scotch Block Winery (west of Highway 410). Impacts may be minimized (and benefits maximized) through the route planning and selection process.</p>
	<p>2.2.6 Community Facilities / Institutions</p> <p><u>Measure:</u></p> <p>Qualitative assessment of potential to affect major community facilities and institutions using approximate number and type as indicators.</p>	<p>No community facilities or institutions have the potential to be directly impacted by the widening alternatives.</p> <p>The new corridor section has the potential to impact 11 schools, 7 community recreation centres/arenas, 3 children's camps, 10 places of worship, as well as 5 clubs/meeting halls.</p> <p>Direct impacts can be minimized through the route planning and selection process.</p>	<p>No community facilities or institutions have the potential to be directly impacted by the widening alternatives.</p> <p>The new corridor section has the potential to impact 15 schools, 8 community recreation centres/arenas, 3 children's camps, 18 places of worship, 3 municipal facilities as well as 5 clubs/meeting halls.</p> <p>Direct impacts can be minimized through the route planning and selection process.</p>	<p>No community facilities or institutions have the potential to be directly impacted by the widening alternatives.</p> <p>The new corridor section has the potential to impact 14 schools, 17 community recreation centres/arenas, 5 children's camps, 15 places of worship, 2 municipal facilities as well as 6 clubs/meeting halls.</p> <p>Direct impacts can be minimized through the route planning and selection process.</p>	<p>No community facilities or institutions have the potential to be directly impacted by the widening alternatives.</p> <p>The new corridor section has the potential to impact 18 schools, 13 community recreation centres/arenas, 3 children's camps, 23 places of worship, 7 municipal facilities as well as 5 clubs/meeting halls.</p> <p>Direct impacts can be minimized through the route planning and selection process.</p>	<p>No community facilities or institutions have the potential to be directly impacted by the widening alternatives.</p> <p>The new corridor section has the potential to impact 18 schools, 13 community recreation centres/arenas, 3 children's camps, 23 places of worship, 7 municipal facilities as well as 5 clubs/meeting halls.</p> <p>Direct impacts can be minimized through the route planning and selection process.</p>	<p>No community facilities or institutions have the potential to be directly impacted by the widening alternatives.</p> <p>The new corridor section has the potential to impact 18 schools, 13 community recreation centres/arenas, 3 children's camps, 23 places of worship, 7 municipal facilities as well as 5 clubs/meeting halls.</p> <p>Direct impacts can be minimized through the route planning and selection process.</p>
2.3 Noise	<p>2.3.1 Transportation Noise</p> <p><u>Measure:</u></p> <p>Qualitative description of different types of noise impacts, locations of increased noise, proximity to NSAs and magnitude / severity of impacts.</p>	<p>Nuisance / proximity impacts (increased noise, illumination etc) may occur in built-up areas.</p> <p>This alternative has the most widening and therefore potential to have the largest noise increases along existing corridors.</p>	<p>Nuisance / proximity impacts (increased noise, illumination etc) may occur in built-up areas.</p> <p>New corridors may result in increased nuisance impacts such as noise and illumination to areas closest to the new facility.</p> <p>Proximity to residential areas is described in "residential" criteria.</p>	<p>Nuisance / proximity impacts (increased noise, illumination etc) may occur in built-up areas.</p> <p>New corridors may result in increased nuisance impacts such as noise and illumination to areas closest to the new facility.</p> <p>Proximity to residential areas is described in "residential" criteria.</p>	<p>Nuisance / proximity impacts (increased noise, illumination etc) may occur in built-up areas.</p> <p>New corridors may result in increased nuisance impacts such as noise and illumination to areas closest to the new facility.</p> <p>Proximity to residential areas is described in "residential" criteria.</p>	<p>Nuisance / proximity impacts (increased noise, illumination etc) may occur in built-up areas.</p> <p>New corridors may result in increased nuisance impacts such as noise and illumination to areas closest to the new facility.</p> <p>Proximity to residential areas is described in "residential" criteria.</p>	<p>Nuisance / proximity impacts (increased noise, illumination etc) may occur in built-up areas.</p> <p>New corridors may result in increased nuisance impacts such as noise and illumination to areas closest to the new facility.</p> <p>Proximity to residential areas is described in "residential" criteria.</p>

<p>2.4 Air</p>	<p><b>SUB-FACTOR AND MEASURE</b></p> <p>2.4.1 Local and regional air quality impacts; greenhouse gas emissions</p> <p><u>Measures:</u> Potential for exposure of sensitive receptors to various levels of air pollution.</p>	<p><b>3-1</b></p> <p>WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401)</p> <p>For many sections of freeway, the traffic volume in 2031 will be approximately the same as for other alternatives.</p> <p>However, 407 ETR between Winston Churchill and Highway 400, and Highway 400 north of 407 ETR have higher projected traffic volumes in 2031 than for other alternatives. On Highway 400, the approximate predicted area of influence potentially affects residences located between Rutherford Road and Teston Road. On Highway 407, it potentially affects residences in the vicinity of Mavis Drive and Hurontario Street and at Pine Valley Drive.</p>	<p><b>4-1</b></p> <p>REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410</p> <p>Lower traffic volume on 407 ETR and Highway 400 reduces the zone of above-background pollutant levels identified in Alternative 3-1.</p> <p>2031 traffic volume on proposed new corridor is relatively low; however, the highway will be in a rural setting with less turbulence and less dispersion of pollutants. Predicted influence area is similar or larger than that for existing highways. Depending on the choice of alignment, it could potentially affect some residences in northern Brampton, northern Vaughan, Wildfield or Nobleton.</p>	<p><b>4-2</b></p> <p>REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401</p> <p>Additional new corridor in this alternative has an approximate influence area of 180m. The potential number of affected residences will depend on the choice of alignment but, in general, there are relatively few residences along this route.</p> <p>Along existing highways, this alternative has approximately the same air quality impact as Alternative 4-1.</p>	<p><b>4-3</b></p> <p>REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON</p> <p>Additional new corridor in this alternative has an approximate influence area of 160m. The potential number of affected residences will depend on the choice of alignment but, in general, there are relatively few residences along this route.</p> <p>Along existing highways, this alternative has approximately the same air quality impact as Alternative 4-1.</p>	<p><b>4-4</b></p> <p>NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)</p> <p>Additional new corridor in this alternative has an approximate influence area of 160m. The potential number of affected residences will depend on the choice of alignment but, in general, there are relatively few residences along this route.</p> <p>Along existing highways, this alternative has approximately the same air quality impact as Alternative 4-1, but with somewhat reduced influence area along Highway 401, potentially benefiting residences near Campbellville and on Maple Avenue in Milton.</p>	<p><b>4-5</b></p> <p>NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)</p> <p>Along existing highways and new corridor, this alternative has approximately the same air quality impact as Alternative 4-4.</p>
<p>Incremental annual amounts of air pollutants (air contaminants emitted into the region for the horizon year).</p>	<p>Network-wide, peak hour vehicle kilometres travelled (VKT) and pollutant emissions are slightly lower than other alternatives.</p>	<p>Network-wide, peak hour VKT and pollutant emissions are slightly higher than Alternative 3-1, and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and pollutant emissions are slightly higher than Alternative 3-1, and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and pollutant emissions are slightly higher than Alternative 3-1, and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and pollutant emissions are slightly higher than Alternative 3-1, and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and pollutant emissions are slightly higher than Alternative 3-1, and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and pollutant emissions are slightly higher than Alternative 3-1, and approximately the same as other Group #4 alternatives.</p>
<p>Incremental annual amounts of greenhouse gases emitted per annum for the horizon year.</p>	<p>Network-wide, peak hour vehicle kilometres travelled and GHG emissions are slightly lower than other alternatives.</p>	<p>Network-wide, peak hour VKT and GHG emissions are slightly higher than Alternative 3-1 and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and GHG emissions are slightly higher than Alternative 3-1 and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and GHG emissions are slightly higher than Alternative 3-1 and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and GHG emissions are slightly higher than Alternative 3-1 and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and GHG emissions are slightly higher than Alternative 3-1 and approximately the same as other Group #4 alternatives.</p>	<p>Network-wide, peak hour VKT and GHG emissions are slightly higher than Alternative 3-1 and approximately the same as other Group #4 alternatives.</p>
<p>2.5 Land Use / Resources</p> <p>2.5.1 First Nations Treaty Rights and Interests or Use of Land and Resources for Traditional Purposes</p> <p><u>Measure:</u> Potential to impact FN Treaty rights and interests or use of land and resources for traditional purposes (i.e., hunting fishing, harvesting food and medicinal plants, etc.)</p>	<p>The potential significance to impact First Nations Treaty Rights and Interests or use of land and resources for traditional purposes will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential significance to impact First Nations Treaty Rights and Interests or use of land and resources for traditional purposes will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential significance to impact First Nations Treaty Rights and Interests or use of land and resources for traditional purposes will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential significance to impact First Nations Treaty Rights and Interests or use of land and resources for traditional purposes will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential significance to impact First Nations Treaty Rights and Interests or use of land and resources for traditional purposes will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential significance to impact First Nations Treaty Rights and Interests or use of land and resources for traditional purposes will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential significance to impact First Nations Treaty Rights and Interests or use of land and resources for traditional purposes will be confirmed through discussions with First Nations as part of the EA process.</p>



FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
	WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401)	REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 401 TO HIGHWAY 410	REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
	2.5.2 Agriculture <i>Measure:</i> Qualitative assessment of potential impacts to prime agricultural lands outside of future development areas and measures to be implemented by landowners of Class 1-3 agricultural lands potentially impacted.	This alternative has potential to impact agricultural land as follows: <b>Class 1 – 10 km</b> <b>Class 2 – 2.54 km</b> In comparison with other alternatives, Alternative 3-1 has lowest potential to impact agricultural lands.	Widening sections impact agricultural land as follows: Class 1 – 10 km Class 2 – 2.54 km The new corridor section potentially impacts the following linear distance of Class 1-3 agricultural land: <b>Class 1 – 16 km</b> <b>Class 2 – 3 km</b> <b>Class 3 – 1 km</b> In comparison with other alternatives, Alternative 4-1 has low to moderate potential to impact agricultural lands.	Widening sections impact agricultural land as follows: Class 1 – 10 km Class 2 – 2.54 km The new corridor section potentially impacts the following linear distance of Class 1-3 agricultural land: <b>Class 1 – 27 km</b> <b>Class 2 – 3 km</b> <b>Class 3 – 5.5 km</b> In comparison with other alternatives, Alternative 4-2 has moderate potential to impact agricultural lands.	Widening sections impact agricultural land as follows: Class 1 – 10 km Class 2 – 2.54 km The new corridor section potentially impacts the following linear distance of Class 1-3 agricultural land: <b>Class 1 – 32 km</b> <b>Class 2 – 4 km</b> <b>Class 3 – 9 km</b> In comparison with other alternatives, Alternative 4-3 has moderate potential to impact agricultural lands.	Widening sections impact agricultural land as follows: Class 1 – 10 km Class 2 – 2.54 km The new corridor section potentially impacts the following linear distance of Class 1-3 agricultural land: <b>Class 1 – 38 km</b> <b>Class 2 – 4 km</b> <b>Class 3 – 4.5 km</b> In comparison with other alternatives, Alternative 4-4 has highest potential to impact agricultural lands.	Widening sections impact agricultural land as follows: Class 1 – 10 km Class 2 – 2.54 km The new corridor section potentially impacts the following linear distance of Class 1-3 agricultural land: <b>Class 1 – 31 km</b> <b>Class 2 – 4 km</b> <b>Class 3 – 11 km</b> In comparison with other alternatives, Alternative 4-5 has moderate potential to impact agricultural lands.
	2.5.3 Recreational Lands and Natural Areas of Provincial Significance (e.g. national / provincial parks, conservation areas, major trails) <i>Measure:</i> Number of parks and recreational areas potentially affected.	This alternative has the potential to directly impact the Bruce Trail MNR Trail Segments along Highway 401.	The widening component of this alternative has the potential to directly impact the Bruce Trail MNR Trail Segments along Highway 401. The new corridor section potentially impacts 30 TRCA properties, 1 CVV and 3.5 km of the Credit Valley corridor. It may be possible to avoid some Conservation Areas and trails during route planning / selection / design processes.	The widening component of this alternative has the potential to directly impact the Bruce Trail MNR Trail Segments along Highway 401. The new corridor section potentially impacts 31 TRCA properties, 1 CVV property and 3.6 km of the Credit Valley corridor. It may be possible to avoid some Conservation Areas and trails during route planning / selection / design processes.	The widening component of this alternative has the potential to directly impact the Bruce Trail MNR Trail Segments along Highway 401. The new corridor section potentially impacts 31 TRCA properties, 1 CVV property, 15 Conservation Areas, 10 NEC-Bruce Trail, Hilltop Falls, Side Trail, Sycamore Side Trail, Vanderleek Side Trail, Restoration Side Trail, and Credit Valley Footpath. It may be possible to avoid some Conservation Areas and trails during route planning / selection / design processes.	The widening component of this alternative has the potential to directly impact the Bruce Trail MNR Trail Segments along Highway 401. The new corridor section potentially impacts 31 TRCA properties, 1 CVV property, 15 Conservation Areas, 10 NEC-Bruce Trail, Hilltop Falls, Side Trail, Sycamore Side Trail, Vanderleek Side Trail, Restoration Side Trail, and Credit Valley Footpath. It may be possible to avoid some Conservation Areas and trails during route planning / selection / design processes.	The widening component of this alternative has the potential to directly impact the Bruce Trail MNR Trail Segments along Highway 401. The new corridor section potentially impacts 31 TRCA properties, 1 CVV property, 15 Conservation Areas, 10 NEC-Bruce Trail, Hilltop Falls, Side Trail, Sycamore Side Trail, Vanderleek Side Trail, Restoration Side Trail, and Credit Valley Footpath. It may be possible to avoid some Conservation Areas and trails during route planning / selection / design processes.
	2.5.4 Aggregate and Mines <i>Measure:</i> Number of pits and quarries potentially affected.	No aggregates or mines have the potential to be impacted by this widening alternative.	No aggregates or mines have the potential to be impacted by the widening component of this alternative. There are no aggregates in the new corridor section.	No aggregates or mines have the potential to be impacted by the widening component of this alternative. There are no aggregates in the new corridor section.	No aggregates or mines have the potential to be impacted by the widening component of this alternative. The new corridor section potentially impacts 2 quarries (i.e., Class A Quarry below water). It is possible to avoid these aggregate areas through route planning / selection process.	No aggregates or mines have the potential to be impacted by the widening component of this alternative. The new corridor section potentially impacts 9 areas of authorized aggregate sites, where 5 sites area active (i.e., 3 Class A pits above water, 1 Class A quarry above water), and 1 Class B quarry above water) and 4 sites have been revoked or surrendered. It is possible to avoid these aggregate areas through route planning / selection process.	No aggregates or mines have the potential to be impacted by the widening component of this alternative. The new corridor section potentially impacts 3 Class A Quarries (below water). It is possible to avoid these aggregate areas through route planning / selection process.
2.6 Municipal Services	2.6.1 Major Utility Transmission Corridors <i>Measure:</i> Number of potential major utility transmission corridors that could be potentially impacted.	This alternative has potential to directly impact 8 railway crossings and 20 transmission line crossings. Widest sections along 407 ETR have some potential to impact major hydro corridors running parallel to highway.	The widening component of this alternative has the potential to directly impact 8 railway crossings and 20 transmission line crossings. The new corridor section potentially impacts 1 railway crossing and 3 transmission line crossings.	The widening component of this alternative has the potential to directly impact 8 railway crossings and 20 transmission line crossings. The new corridor section potentially impacts 3 railway crossings and 6 transmission line crossings.	The widening component of this alternative has the potential to directly impact 8 railway crossings and 20 transmission line crossings. The new corridor section potentially impacts 1 railway crossing and 3 transmission line crossings.	The widening component of this alternative has the potential to directly impact 8 railway crossings and 20 transmission line crossings. The new corridor section potentially impacts 4 railway crossings and 4 transmission line crossings.	The widening component of this alternative has the potential to directly impact 8 railway crossings and 20 transmission line crossings. The new corridor section potentially impacts 6 railway crossings and 4 transmission line crossings.

FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
2.7 Contaminated Property Identification and Management	Landfills, Hazardous Waste Sites, Brownfield Areas, etc. <b>Measure:</b> <i>Number and type of contaminated sites potentially affected.</i>	<p>There are no known contaminated properties that would be impacted by this widening alternative.</p> <p>The new corridor section potentially impacts 3 known waste disposal sites.</p> <p>It is possible to avoid these areas through route planning / selection process.</p>	<p>There are no known contaminated properties that would be impacted by the widening component of this alternative.</p> <p>The new corridor section potentially impacts 3 known waste disposal sites and 1 waste treatment plant.</p> <p>It is possible to avoid these areas through route planning / selection process.</p>	<p>There are no known contaminated properties that would be impacted by the widening component of this alternative.</p> <p>The new corridor section potentially impacts 3 known waste disposal sites, 1 waste treatment plant and 1 brownfield site.</p> <p>It is possible to avoid these areas through route planning / selection process.</p>	<p>There are no known contaminated properties that would be impacted by the widening component of this alternative.</p> <p>The new corridor section potentially impacts 5 known waste disposal sites.</p> <p>It is possible to avoid these areas through route planning / selection process.</p>	<p>There are no known contaminated properties that would be impacted by the widening component of this alternative.</p> <p>The new corridor section potentially impacts 1 known waste disposal sites and 1 waste treatment plant.</p> <p>It is possible to avoid these areas through route planning / selection process.</p>	<p>There are no known contaminated properties that would be impacted by the widening component of this alternative.</p> <p>The new corridor section potentially impacts 1 known waste disposal sites and 1 waste treatment plant.</p> <p>It is possible to avoid these areas through route planning / selection process.</p>
<b>SUMMARY</b> <b>LAND USE / SOCIAL ENVIRONMENT</b>		<p><b>LEAST PREFERRED</b> because it has limited ability to support municipal land use plans for future growth and development and does not sufficiently support some growth especially in York and Peel Regions because the widening improvements are too far south to effectively serve future development/growth areas. However, the option best supports intensification of existing employment areas.</p> <p>This alternative has the most number of direct impacts to residential, commercial and industrial properties along existing Highways 401 and 400, and 407 ETR especially in the widest sections. There is also some potential for local air quality impacts in these areas.</p> <p>In addition to property impacts there is a high potential to impact to provincial and municipal infrastructure along 407 ETR, east of Highway 427 - including existing municipal bridges, intersections, servicing and utilities.</p>	<p><b>MODERATELY PREFERRED</b> because it supports future growth in York Region and some parts of Peel Region but not Halton Region - with new corridor section close to future growth areas in York and eastern Peel.</p> <p>In widening sections, this alternative results in fewer impacts to residential, commercial and industrial properties. Potential impacts to properties along the new corridor can be minimized through route planning and selection process.</p> <p>The new corridor impacts 16 km of Class 1 soils.</p> <p>The widening sections have reduced impacts to provincial and municipal infrastructure, especially on 407 ETR, east of Highway 427.</p>	<p><b>MOST PREFERRED</b> because it supports future growth in York, Peel and Halton Regions - with new corridor section close to future growth areas.</p> <p>However, this alternative would impact the existing and future land use in Halton's plans between Georgetown and Milton.</p> <p>In widening sections, this alternative results in fewer impacts to residential, commercial and industrial properties. Potential impacts to properties along the new corridor can be minimized through route planning and selection process.</p> <p>The new corridor impacts 27 km of Class 1 soils.</p> <p>The widening sections have reduced impacts to provincial and municipal infrastructure, especially on 407 ETR, east of Highway 427.</p>	<p><b>MOST PREFERRED</b> because it supports future growth in York, Peel and Halton Regions - with new corridor section close to future growth areas. However, this alternative would impact the existing and future land use in Halton's plans between Georgetown and Milton.</p> <p>In widening sections, this alternative results in fewer impacts to residential, commercial and industrial properties. Potential impacts to properties along the new corridor can be minimized through route planning and selection process.</p> <p>The new corridor impacts 32 km of Class 1 soils.</p> <p>The widening sections have reduced impacts to provincial and municipal infrastructure, especially on 407 ETR, east of Highway 427.</p>	<p><b>LEAST PREFERRED</b> - because although it supports growth in York and Peel, it does not support future planned growth in Halton - with new corridor section extending north to Guelph.</p> <p>In widening sections, this alternative results in fewer impacts to residential, commercial and industrial properties. Potential impacts to properties along the new corridor can be minimized through route planning and selection process.</p> <p>The new corridor impacts 38 km of Class 1 soils - and fragments many viable farming operations in north Halton and Wellington County. Impacts to agricultural soils and operations could be difficult to mitigate. The widening sections have reduced impacts to provincial and municipal infrastructure, especially on 407 ETR, east of Highway 427.</p>	<p><b>LEAST PREFERRED</b> because although it supports growth in York and Peel, it has limited ability to support future land use development in Halton (i.e., Milton) and potentially impacts several aggregate operations west of the escarpment as well.</p> <p>In widening sections, this alternative results in fewer impacts to residential, commercial and industrial properties. Potential impacts to properties along the new corridor can be minimized through route planning and selection process.</p> <p>The new corridor impacts 31 km of Class 1 soils.</p> <p>The widening sections have reduced impacts to provincial and municipal infrastructure, especially on 407 ETR, east of Highway 427.</p>
<b>OVERALL SUMMARY</b>		<p>Although Alternative 3-1 will likely result in the fewest direct impacts on existing land uses, properties and agricultural lands, it is least preferred because it does not serve future growth as well as Group #4 alternatives and has major impacts on provincial and municipal infrastructure. All the Group #4 alternatives result in higher direct impacts to existing land uses, properties and agricultural lands than Alternative 3-1, however, they are more compatible with future growth/land use patterns in York, Peel and Halton Regions. Alternative 4-1 is only moderately preferred as it does not support future growth areas and land use in Peel and Halton Regions as well as 4-2 and 4-3. Although Alternatives 4-4 and 4-5 support future growth they are less desirable as they result in higher direct impacts to on existing land uses, properties and agricultural lands.</p> <p><b>Alternatives 4-2 and 4-3 are most preferred in the land use/socio economic factor</b> because they best satisfy and balance land use planning policies and goals while minimizing impacts to community features, properties and existing infrastructure along existing highways as well as prime agricultural land in the study area. Overall, Alternatives 4-2 and 4-3 are similar and better than Alternatives 3-1, 4-4 or 4-5 in most evaluation criteria in this factor group. They are slightly better than Alternative 4-1 because they both extend to Milton.</p>					

## Noise and Illumination

Nuisance impacts from increased noise and illumination may occur in built-up areas along the existing highways as well as along new corridor sections. Alternative 3-1 has the most widening in built-up areas and therefore has potential to have the largest noise increases along existing corridors. While Group #4 alternatives may result in some increased nuisance from noise and illumination for areas closest to a new facility, impacts could be reduced by avoiding built-up areas through the route planning process.

## Air

An Air Quality Assessment was carried out for the new corridor alternatives, to inform and support the evaluation of alternatives in accordance with the evaluation criteria.

Overall, the Group #3 and Group #4 alternatives are relatively similar. As shown in the table to the right, the following provides a summary of the main air quality and greenhouse gas emission differences between the alternatives.

- Alternative 3-1 has higher traffic volumes on Highways 401 and 400, and 407 ETR with potential for increased local air quality impacts in areas where the most widening is needed;
- New corridor sections west of Highway 410 will likely have no noticeable effect on local air quality in surrounding areas. Minor impacts could occur east of Highway 410, depending on where the route is located;
- The Group #4 alternatives have slightly reduced traffic volumes (compared to Alternative 3-1) on Highways 401 and 400 and 407 ETR, and therefore have potential for slightly reduced local air quality impact;
- Alternative 3-1 has slightly lower overall network emissions of both air pollutants and greenhouse gases than the Group #4 alternatives (year 2031); and

- The Base Case scenario shows the worst air quality results (this scenario was identified as a benchmark for comparing other "improvement" alternatives and is considered the status quo, where improvements to the transportation system would be limited to the implementation of approved provincial, regional and local municipal initiatives).

GROUP #3 AND #4 ALTERNATIVES	BASE CASE	3-1	**3-1	**4-1	**4-2	**4-3	**4-4	**4-5
PEAK HOUR CO <sub>2</sub> e EMISSION (KTONNE) <sup>1</sup>	1.61	1.58	1.57	1.59	1.59	1.59	1.59	1.59
PEAK HOUR NO <sub>x</sub> EMISSION (Tonne) <sup>2</sup>	1.32	1.33	1.33	1.34	1.36	1.36	1.35	1.36
PEAK HOUR CO EMISSION (Tonne) <sup>3</sup>	22.9	23.1	23.0	23.3	23.6	23.5	23.5	23.5
PEAK HOUR THC EMISSION (Tonne) <sup>4</sup>	0.95	0.88	0.88	0.89	0.89	0.89	0.89	0.89
PEAK HOUR PM <sub>10</sub> EMISSION (Tonne) <sup>5</sup>	2.02	1.38	1.37	1.38	1.36	1.36	1.36	1.36

<sup>1</sup>CO<sub>2</sub>e: Greenhouse gas emissions expressed as equivalent amount of carbon monoxide

<sup>2</sup>NO<sub>x</sub>: Oxides of nitrogen (the predicted concentrations were assumed to be entirely in the form of nitrogen dioxide (NO<sub>2</sub>), which is the form of NO<sub>x</sub> that is of greatest concern in terms of potential effects to human health. This was done as a simplifying measure that errs on the safe side. In reality, the concentrations would consist of a mixture of various NO<sub>x</sub> species (primarily NO and NO<sub>2</sub>))

<sup>3</sup>CO: Carbon monoxide

<sup>4</sup>THC: Total hydrocarbons

<sup>5</sup>PM<sub>10</sub>: Particulate matter smaller than 10 microns in diameter

\*\* Niagara to GTA (NGTA) Transportation modeling Alternative 3-1 was combined with GTA West Transportation Modeling. However, the information presented in this table only applies to the GTA West preliminary study area. NGTA Alternative 3-1 includes widening of provincial highways in the NGTA preliminary study area and is discussed in detail in the draft NGTA Transportation Development Strategy reporting.

## Land Use / Resources

The table below provides a summary of the impacts of each corridor alternative on agricultural soils. Overall, Alternative 3-1 has minimal impacts because existing corridors will be widened, and agricultural impacts will occur on the fringes of farming operations. The table shows that Alternatives 4-1, 4-2 and 4-3 have relatively moderate impacts to agricultural soils. Alternatives 4-4 and 4-5 have the highest potential to impact agricultural soils, especially in north Halton and Wellington County. As a result of their locations, these alternatives also have a higher potential to fragment farming operations.

GROUP #4 – NEW CORRIDOR SECTIONS	4-1	4-2	4-3	4-4	4-5
*km on Class 1 Soil Lands (linear distance)	16	27	32	38	31
*km on Class 2 Soil Lands (linear distance)	3	3	3	4	4
*km on Class 3 Soil Lands (linear distance)	1	5.5	9	4.5	11

\* These measurements do not include areas designated for future development in municipal official plans or significant woodlots

Alternative 3-1 will have minimal impacts on recreational lands and natural areas of Provincial Significance. Alternatives 4-1, 4-2 and 4-3 will have moderate impacts to Conservation Authority properties, while Alternatives 4-4 and 4-5 have the potential to impact a number of Conservation Authority properties. It may be possible to avoid some Conservation Areas and trails through route planning, during the next stage of the EA.

Alternatives 4-4 and 4-5 have the greatest potential to impact active and revoked / surrendered quarries. It would be possible to avoid these aggregate areas through the route selection process in new corridor sections.

## Municipal Services

Alternative 3-1 has significant impacts to municipal infrastructure at 407 ETR arterial road and other highway crossings, especially east of Highway 427, where existing municipal bridges, intersections, servicing and utilities would be impacted by extensive highway widening.

**Contaminated Property Identification and Management**

Alternatives 4-3 and 4-4 have the greatest potential to disturb contaminated properties along their new corridor sections. It may be possible to avoid these contaminated areas through the route selection process in new corridor sections, during the next stage of the EA.

A summary of the Social Environment findings is provided in **Section 4.11**.

**4.7. EVALUATION OF ALTERNATIVES – CULTURAL ENVIRONMENT**

**4.7.1. Methodology**

The Study Team used information from secondary sources (i.e. Stage 1 Archaeological Assessment and historic records, mapping, aerial photography, documentation, other studies / reports, websites, etc.) and obtained from agencies (local historical groups), ministries (Ministry of Tourism, Culture and Sport, formerly Ministry of Culture) and municipalities during the study to assess the alternatives in accordance with the factors and criteria under cultural environment. Secondary source information was supplemented by local knowledge obtained through consultation with the public, agencies, municipalities and First Nations. Major features (i.e. clusters of built heritage, etc.) were also confirmed in the field during this stage of the study. Additional field work will be carried out during the next stage of the EA process.

Recognizing that Stage 1 of the EA process identifies wide corridors (new corridors were presented schematically to be about 4 kilometres wide in GTA West preliminary study area), the Study Team understands that every cultural feature in the corridor would not be impacted by future routes, and that some features could be avoided in the next stage of the EA, when route planning and generation will occur. In other instances, it is apparent that the feature is so large that the entire width of the preliminary study area crosses it (i.e. areas with high potential for archaeological resources because they are currently undisturbed). Distinctions about the magnitude of potential impacts and the likelihood of avoidance or mitigation are noted in the evaluation tables shown as **Exhibit 4-12**. Although significant features within the Group #3 and #4 alternatives could be named and in some cases counted or

“measured” to provide a comparison between alternatives, other criteria required a qualitative assessment of potential impacts or benefits at a higher level of detail. Names of the most significant / largest features potentially impacted by each alternative were documented in the evaluation tables. Additional information on cultural resources is provided in the *Existing Environmental Conditions and Constraints Report*, summarized in **Section 2.3**.

**4.7.2. Findings**

**Exhibit 4-12** provides the evaluation of the alternatives for the Cultural Environment Factors, as presented at PIC #4. A summary of the findings is provided below.

**Cultural Heritage- Built Heritage and Cultural Heritage Landscapes**

Overall, Alternative 3-1 has limited potential to impact the cultural environment because most areas are previously disturbed either through highway construction or urbanization. Group #4 alternatives have increased potential to impact cultural environment. The longest new corridors (Alternatives 4-4 and 4-5) have the highest potential to impact cultural heritage landscape and built heritage features. Route selection and design can mitigate impacts, but it may be difficult to avoid some built heritage features because of the length of the corridor.

**Cultural Heritage – Archaeological Sites or Resources**







Overall, Alternative 3-1 has limited potential to impact cultural environment because most areas are previously disturbed either through highway construction or urbanization. Alternatives 4-1, 4-2 and 4-3 have increased potential to impact archaeological sites and resources, and Alternatives 4-4 and 4-5 have the most potential to impact archaeological sites and resources, although some areas through Halton and Wellington County are pre-disturbed by aggregate / quarry operations.

A summary of the Cultural Environment findings is provided in **Section 4.11**.



FACTOR	SUB-FACTOR AND MEASURE	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WEST 407 ETR EAST OF HIGHWAY 401)	4-1 REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
3.1 Cultural Heritage – Built Heritage and Cultural Heritage Landscapes	<p>3.1.1 Buildings (i.e., standing sites of architectural or heritage significance, Ontario Heritage Properties, heritage bridges, cemeteries) and Cultural Heritage Landscapes (i.e., areas of historic 19<sup>th</sup> century settlement).</p> <p><u>Measure:</u> Qualitative assessment of the potential to impact built cultural heritage areas and resources.</p>	<p>Widening sections do not impact any built heritage resources and have minimal impact on cultural heritage landscapes in GTA West study area, in part because of urban / commercial / industrial nature of landscapes along the existing 400 series highways in the study area.</p>	<p>Widening sections have minimal impacts to built heritage or cultural landscape.</p> <p>New corridor section crosses Humber River, a designated Canadian Heritage River and site of Toronto Carrying Place Trail (with historical significance) in King Township. Impacts can be partially mitigated through route selection and design.</p>	<p>Widening sections have minimal impacts to built heritage or cultural landscape.</p> <p>New corridor section crosses Humber River, a designated Canadian Heritage River and site of Toronto Carrying Place Trail (with historical significance) in King Township. Impacts can be partially mitigated through route selection and design.</p> <p>The new corridor section in this alternative has potentially significant impacts to cultural landscapes across the Niagara Escarpment and through Greenbelt areas and further west towards Guelph. It will be difficult to avoid some impacts to built heritage features throughout the length of the new corridor.</p>	<p>Widening sections have minimal impacts to built heritage or cultural landscape.</p> <p>New corridor section crosses Humber River, a designated Canadian Heritage River and site of Toronto Carrying Place Trail (with historical significance) in King Township. Impacts can be partially mitigated through route selection and design.</p> <p>The new corridor section in this alternative has potentially significant impacts to cultural landscapes across the Niagara Escarpment and through Greenbelt areas and further west towards Guelph. It will be difficult to avoid some impacts to built heritage features throughout the length of the new corridor.</p>	<p>Widening sections have minimal impacts to built heritage or cultural landscape.</p> <p>New corridor section crosses Humber River, a designated Canadian Heritage River and site of Toronto Carrying Place Trail (with historical significance) in King Township. Impacts can be partially mitigated through route selection and design.</p> <p>The new corridor section in this alternative has potentially significant impacts to cultural landscapes across the Niagara Escarpment and through Greenbelt areas and further west towards Guelph. It will be difficult to avoid some impacts to built heritage features throughout the length of the new corridor.</p>	<p>Widening sections have minimal impacts to built heritage or cultural landscape.</p> <p>New corridor section crosses Humber River, a designated Canadian Heritage River and site of Toronto Carrying Place Trail (with historical significance) in King Township. Impacts can be partially mitigated through route selection and design.</p> <p>The new corridor section in this alternative has potentially significant impacts to cultural landscapes across the Niagara Escarpment and through Greenbelt areas and further west towards Guelph. It will be difficult to avoid some impacts to built heritage features throughout the length of the new corridor.</p>
3.2 Cultural Heritage – Archaeology	<p>3.1.2 First Nations Burial Sites</p> <p><u>Measure:</u> Qualitative assessment of the potential to impact First Nations Burial Sites.</p> <p>3.2.1 Pre-Historic and Historic First Nations Sites</p> <p><u>Measure:</u> Qualitative assessment of potential to impact archaeological sites of historical significance to First Nations.</p> <p>3.2.2 Archaeological Sites or Resources</p> <p><u>Measure:</u> Qualitative assessment of impacts to archaeological sites or resources using impacts to undisturbed areas as indicator.</p>	<p>The potential to impact First Nation burial sites will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential to impact First Nation burial sites will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential to impact archaeological sites of historical significance to First Nations will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential to impact First Nation burial sites will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential to impact First Nation burial sites will be confirmed through discussions with First Nations as part of the EA process.</p>	<p>The potential to impact archaeological sites of historical significance to First Nations will be confirmed through discussions with First Nations as part of the EA process.</p>

Exhibit 4-12: Cultural Environment Evaluation

FACTOR	SUB-FACTOR AND MEASURE	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST 407 ETR EAST OF HIGHWAY 401)	4-1 REDUCED 407 ETR WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
SUMMARY CULTURAL ENVIRONMENT		<p><b>MOST PREFERRED</b> – Results in the least number of built heritage and cultural landscapes that may be directly impacted. It has the lowest potential of impacting land with archaeological potential.</p> 	<p><b>MODERATELY PREFERRED</b> – Has increased potential to impacts built heritage and cultural landscapes. It has more potential to impact land with archaeological resources.</p> 	<p><b>MODERATELY PREFERRED</b> – Has increased potential to impacts built heritage and cultural landscapes. It has more potential to impact land with archaeological resources.</p> 	<p><b>MODERATELY PREFERRED</b> – Has increased potential to impacts built heritage and cultural landscapes. It has more potential to impact land with archaeological resources.</p> 	<p><b>LEAST / NOT PREFERRED</b> – As one of the longest new corridors, it has highest potential to impact built heritage resources and cultural landscape - especially at new escarpment crossing. It has a high potential to impact land with archaeological resources.</p> 	<p><b>LEAST / NOT PREFERRED</b> – As one of the longest new corridors, it has highest potential to impact built heritage resources and cultural landscape - especially at new escarpment crossing. It has a high potential to impact land with archaeological resources.</p> 
OVERALL SUMMARY		<p>Alternative 3-1 impacts the least number of built heritage resources and has the least impact on cultural landscape because it does not include a new corridor section or a new escarpment crossing. It also has least potential to impact archaeological resources with existing highway rights-of-way, due to previous disturbance of land in footprint area. Alternatives 4-4 and 4-5 have the longest new corridor sections that would be expected to have the largest impacts to potential built heritage features and archaeological resources, as well as the cultural landscape, especially at the new escarpment crossings. Alternatives 4-1, 4-2 and 4-3 have relatively moderate impacts that can be mitigated through route location and design.</p> <p><b>Alternative 3-1 is preferred from a Cultural perspective.</b> Alternatives 4-1, 4-2 and 4-3 are slightly less preferred as they result in relatively similar moderate impacts. Alternatives 4-4 and 4-5 result in significantly higher impacts than the other alternatives.</p>					

#### 4.8. EVALUATION OF ALTERNATIVES – AREA ECONOMY

The purpose of the economic analysis was to provide an assessment of the degree to which each study alternative supported the economy of the GTA West area and of the Greater Golden Horseshoe (GGH) as a whole.

Transportation investments benefit the economy in several ways. Traffic congestion, accidents, pollution and other delays are negative impacts that cost businesses and people money. Commuters and goods are delayed in congested traffic, with time and financial implications. Vehicle emissions damage the natural environment, with costs to society as a whole, including health care costs associated with poor air quality. Further, accidents have terrible human costs, and even minor accidents cause damage to vehicles and further delays. These are all costs to society that cannot be recovered.

When the transportation system works more efficiently, the above costs are reduced, and Ontario is more economically competitive. This brings jobs, increased investment and higher quality of life to the area.

As such, improvements to the transportation network can have the following benefits:

- Travel time savings – people and goods move more efficiently – this improves our competitiveness as a province;
- Accident reduction savings – the costs of personal injuries and property damage is reduced and the delays caused by accidents are reduced;
- Vehicle operating costs – where all vehicles operate more efficiently, and where people or goods can travel by modes other than car or truck, such as by rail, vehicle operating costs are reduced;
- Emissions reductions – the costs to society of emissions, such as health care costs and greenhouse gas emissions, are reduced;
- Land use benefits – increased capacity can “unlock” lands for new development, stimulate revitalization, and permit development at higher densities within urban areas, which reduces costs for other municipal services; and

- Increased mobility – people can access jobs, services, tourist attractions, and other opportunities that they could not access before.

The above is in addition to the jobs and spending directly generated by the construction of new transportation facilities.

The economic analysis of alternative transportation corridors was conducted using two types of analysis: a quantitative economic impact modeling exercise using software called Transportation Economic Development Impact System (TREDIS), and a qualitative analysis of the fit between the transportation options and the location and scale of current and future economic growth areas in the corridor.

##### 4.8.1. Methodology Quantitative Modeling

The expected economic impact of the GTA West alternatives on a regional basis was calculated using the Transportation Economic Development Impact System (TREDIS) multi-modal economic analysis tool. This economic analysis system has been applied in numerous provinces in Canada and states across the United States, but the version applied here was built by separating regions of the GGH into the GTA West and NGTA study areas, and the rest of GGH and analyzing ways in which different GTA West industries depend on transportation for workers, materials and product deliveries from within and outside its borders. It was also designed to use results of the transportation demand modeling conducted by MTO and the Study Team (see Section 4.9).

The TREDIS economic impact model is designed to provide both economic development impact evaluation and benefit-cost analysis for transportation investments and policies. It is applicable for all modes: highway, transit (rail / bus), air and marine projects, as well as multi-modal projects. TREDIS is also applicable for both freight and passenger transportation projects and accounts for rural accessibility as well as urban congestion factors. The system distinguishes between economic growth due to mobility improvements (e.g. faster speeds, more reliability) and economic improvements due to business growth attracted by mobility improvements. This is done using economic geography tools that integrate

Geographic Information System (GIS) with an economic development assessment process that accounts for threshold effects associated with changes in service areas, market access and travel times.

The economic analysis process estimated long-term productivity impacts, which are the continuing effects of improved transportation conditions on economic productivity and competitiveness, and hence economic growth many years after an investment is made. In this case, the impacts were calculated out to the year 2031. Estimates of both types of impact were measured in terms of additional employment, gross domestic product (GDP) and wages due to the proposed mobility improvements. The long-term benefit of capital investment in transportation facilities is the improvement in travel conditions that lead to economic cost savings and productivity enhancement for GTA West residents and businesses. These improvements occur through five types of impacts on transportation system users:

- Cost savings due to reduced user time delay and expense;
- Cost savings due to enhanced safety and reliability;
- Cost savings from enhanced inter-modal capacity and connectivity;
- Cost savings and scale economies from enhanced market access; and
- Added growth enabled by elimination of capacity constraints at gateways.

Those user benefits, in turn, lead to direct, indirect and induced effects on household living costs, business operating costs, productivity and competitiveness. They enable more jobs and business activity to take place in the GTA West study area and the whole GGH, which also reduces the “leakage” of income and savings that might otherwise flow to businesses located outside of the region.

These long-term economic impacts of planned capital investments should be interpreted carefully. It is important to note that these impacts represent the difference between a scenario in which needed investments are made and a scenario in which those capital investments are not made.

So in a very real sense, the capital investments are enabling a continued level of economic growth while the failure to invest would lead to a lower level of economic growth.

TREDIS is comprised of modules that work together to determine the full economic impact of transportation projects. They are listed below and illustrated in **Exhibit 4-13**.

- Travel Cost Module (TC) – The first module translates changes in traffic volumes, travel times and accidents into direct cost savings that accrue to households and businesses. Factors that translate changes in vehicle kilometres travelled, vehicle hours travelled, reliability and safety to economic benefits were developed by research of the Study Team and provided to the MTO.
- Market Access Module (MA) – The second module translates changes in regional accessibility and inter-modal connectivity into effects on productivity and business relocation.

- Economic Adjustment Module (EA) – The third module incorporates a dynamic time series economic impact model to estimate total impacts on growth of regional economies over time. This module was developed by using the Canadian industry by industry purchasing developed by Statistics Canada on behalf of the Organization for Economic Co-operation and Development (OECD), and economic data purchased from Statistics Canada (employment and wages by place of work for GTA West, NCTA and the rest of the GTA).

Information on project costs, travel patterns, traffic conditions, market access and inter-modal connectivity can be input through a series of input forms, or it can be input directly from spreadsheets or from travel demand models. The range of inputs is shown in **Exhibit 4-14**. From those inputs, TREDIS then calculates the economic consequences of changes in travel patterns, speed, safety and reliability. This is illustrated in the report form shown as **Exhibit 4-15**.

The results are then portrayed in terms of a wide range of alternative perspectives, showing regional and GTA-wide benefits in terms of traveller benefit, and impact on the GTA West preliminary study area and overall GTA economy.

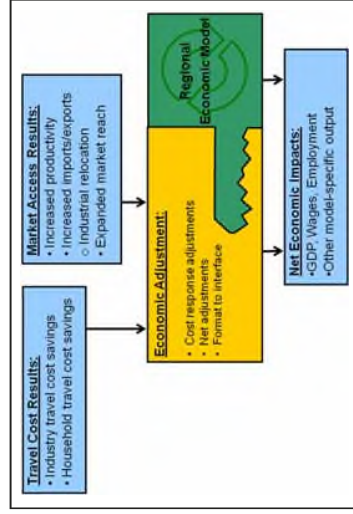


Exhibit 4-13: TREDIS Components

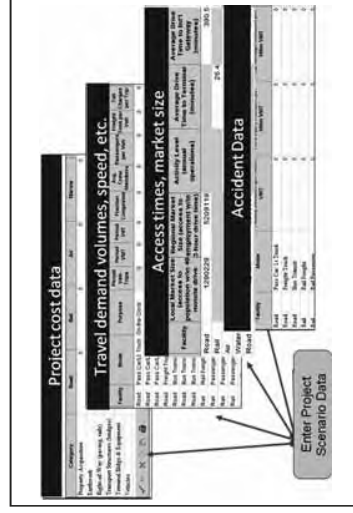


Exhibit 4-14: Example of the Range of Inputs Allowed by the TREDIS Framework

DIRECT IMPACT BY MODE (TARGET YEAR)										
Per-Region/Combination Inputs										
Base Scenario: Base Scenario										
Region: Unshared Region / Period: Annual										
Transportation Measure	Pass Car	Track Freight	Bus Transit	Rail Freight	Rail Transit	Air Trans	Water Trans			
Gross VMT	0	0	0	0	0	0	0			C
Gross VHT	0	0	0	0	0	0	0			C
Gross VMT w/reliability adj	0	0	0	0	0	0	0			C
Passenger Trips	0	0	0	0	0	0	0			C
Passenger Miles	0	0	0	0	0	0	0			C
Freight Ton - Miles	0	0	0	0	0	0	0			C
Facilities	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.0C
Injuries	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.0C
Property Damage	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.0C
Local Gross VMT	0	0	0	0	0	0	0			C
Local Gross VHT	0	0	0	0	0	0	0			C
Local Gross VMT w/reliability adj	0	0	0	0	0	0	0			C
<b>Total Value of Travel Costs:</b>										
Passenger Cost - Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C
Crew Cost - Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C
Freight Cost - Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C
Van Oper Cost - Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C
Toll Cost - Net total	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C
Toll Cost - Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C
Environmental Cost - Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C
Sum of Total Travel Costs	\$0	\$0	\$0	\$0	\$0	\$0	\$0			\$C

Exhibit 4-15: Example Report on Transportation System Changes

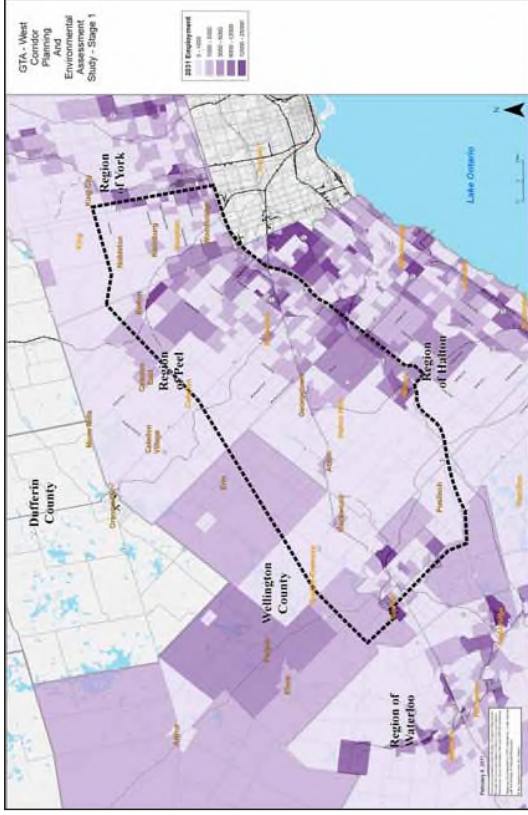


Exhibit 4-16: Total Forecast Employment by Traffic Zone in 2031

**Qualitative Assessment**

The qualitative assessment was designed to assess the degree to which each alternative transportation corridor supported future patterns of employment and growth sectors. A number of secondary sources were used to complete this analysis, including:

- Growth Management Strategies and studies at the municipal level;
- Economic development strategies and studies at the municipal level;
- Traffic zone allocations of population and employment, reflecting these strategies; and
- Economic forecasts completed by the Ontario government.

In order to interpret the relationship between growth patterns and the proposed alternatives, growth areas were mapped using a series of thematic maps at the traffic zone level showing the amount of employment anticipated by 2031 (see Exhibit 4-16).

Direct economic benefits stemming from improvements in the GTA West transportation system are costs saved transportation users due to improvements in the GTA West transportation system. The savings will include both households' reduced costs of travel (including vehicle operating expenditures) and transportation cost savings to area businesses (including reduced highway congestion effects), and the benefits of improved reliability on the improved transportation network. Exhibit 4-17 shows the dollar amount of these direct savings per alternative and Exhibit 4-18 illustrates the composition of the savings averaged among the four alternatives. The former benefit is simply a redirected consumption demand by households away from purchases of transportation products (gas, parking, automotive parts and services) and into other consumer goods / services. The latter reflects improved regional competitiveness for metro-area businesses that now have lower costs of doing businesses, with access to a larger labour market and encountering less congestion because of reduced roadway congestion and improvements of the transit system. The impact of the improved GTA West highway and transit network will be different for each business sector, depending on the level of highway freight dependency of their operations.

Overall, the four alternatives modeled (Alternatives 3-1, 4-3, 4-4 and 4-5) showed similar results across the GGH. The direct value of transportation impacts in the GGH is expected to be between \$2.2 and \$2.3 billion (see Exhibit 4-17). These impacts include savings for passengers' costs, reliability benefits, tolls (407ETR) and adjustments for transit and truck crew costs, vehicle operating costs and tolls based on the bundle of highway and transit changes embedded in each alternative. Note these are annual benefits accruing to the GGH by 2031 due to mobility improvements created by proposed GTA West projects.

GTA West Representative Alternatives	Direct Transportation Benefits (Millions \$CA)
3-1	\$2,258
4-3	\$2,214
4-4	\$2,203
4-5	\$2,241

Analysis assumed NGTA Alternative 3-1 is built and operating

Exhibit 4-17: Direct Transportation Benefits in the GGH by Representative Alternatives in 2031

In addition, the assessment considered local economic development strategies by identifying sectors that municipal partners have targeted for growth, and the degree to which the proposed alternative supported this sector. This was accomplished by comparing the TREDIS economic impact results by sector to the sectors identified for growth in the economic development strategies.

**4.8.2. Findings TREDIS Analysis**

TREDIS was used to analyze regional economic impacts of GTA West Alternatives. Selected alternatives (i.e., alternatives that are significantly different) were used (namely Alternatives 3-1, 4-3, 4-4 and 4-5) in the TREDIS analysis to generate representative results. These alternatives were selected as representative of the proposed transportation corridor options. These analyses all assumed that the NGTA Alternative 3-1 (roadway widenings) had been developed.

Transportation derived benefits are annual benefits that are expected to be achieved by 2031. These transportation savings yields a comprehensive forecast of total economic impacts (direct + indirect) as measured by changes in Gross Domestic Product (GDP), employment, and household income attributable to the proposed transportation investments defined by the alternatives. Benefits are attributable to:

- Existing transit riders who will benefit from faster travel and more convenient service, as well as travellers who switch from auto travel and save money as the new transit alternatives cost them less than they currently spend on car operating costs (tires, fuel, oil and parking), and they can use a portion of those savings to purchase other consumer products and services;
- Travellers who continue to drive or ride in autos, as well as truck drivers and the businesses dependent on freight transported on highways, benefit from reduced peak period traffic congestion, which leads to direct savings in time and vehicle operating costs;
- Household savings are re-directed to the purchase of other consumer products and services as desired (including expenditures associated with more leisure time);
- Business savings attributable to reduced congestion are allocated to increased production associated with expanded market access and greater output associated with increased productivity of freight transportation resources. Insofar as traffic congestion is reduced along the corridor, some businesses can gain productivity from fewer late arrivals due to traffic delay, and a reduced need to pay higher wages or accept shorter work hours to attract workers in those congested areas. The net effect is a reduction in the cost of doing business;

Businesses can also gain productivity as a result of having access to larger labour markets with more diverse and specialized skills. That can allow businesses to draw on a better match between available workers and required skill needs, and it can also allow some industries to achieve greater economies of scale;

Further impacts result as the directly-affected businesses also buy more from suppliers within the region (“indirect economic effects”); and

- Direct effects on business growth occur as greater productivity and changes in consumer spending lead to more business sales and attraction of new business activity. Further impacts result as the directly-affected businesses also buy more from suppliers within the region (“indirect economic effects”).

Exhibit 4-18 illustrates the averaged sources of cost savings for GTA West Alternatives 3-1, 4-3, 4-4 and 4-5, assuming completion of NGTA Alternative 3-1. These cost savings, in turn, are the drivers of economic impact benefits.

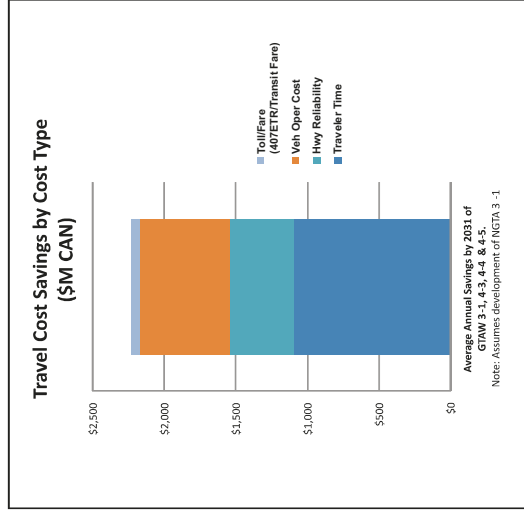


Exhibit 4-18: Total Cost Savings by Cost Type

Transportation user benefits, discussed above and as illustrated in Exhibit 4-18, are the source of economic benefits (GDP, jobs and wages). Therefore, user benefits reviewed above should not be added to economic impact benefits to avoid double counting the same dollars.

By 2031, the economic impacts of operating the four proposed GTA West alternatives are expected to generate approximately

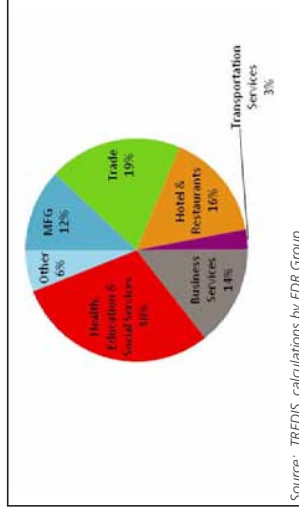
\$1 billion in annual GDP, which will support 11,000-12,000 jobs in the GGH. The projected economic impacts of the four alternatives are shown in Exhibit 4-19 (in 2010 dollars).

GTA WEST ALTERNATIVE	GROSS DOMESTIC PRODUCT (MILLIONS SCAD)	JOBS
3-1	\$ 1,070	12,500
4-3	\$ 990	11,600
4-4	\$ 980	11,500
4-5	\$ 1,000	11,700

Note: GDP is rounded to the nearest \$10 million and jobs are rounded to the nearest 100. Analyses assumed implementation of NGTA Alternative 3-1.

Exhibit 4-19: Total Economic Impacts in the GGH by Selected Alternative in 2031

Impacts of alternatives will vary across sectors. Exhibit 4-20 illustrates the average impacts among major sectors of the initial four alternative bundles of GTA West within the GGH in terms of jobs (Alternatives 3-1, 4-3, 4-4 and 4-5).



Source: TREDIS, calculations by EDR Group.

Exhibit 4-20: Future Job Impacts in GGH by Major Economic Sector (Average among All Alternatives)

Note that these impacts assume implementation of the NGTA Alternative 3-1 (together with Exhibit 4-20).

**Qualitative Analysis**

As noted above, the qualitative analysis considered the location of future employment as outlined in both the *Growth Plan* for the Greater Golden Horseshoe and individual municipal growth management strategies. *Growth Plan* population and employment targets are presented in **Exhibit 4-21**.

In the GTA West preliminary study area, employment growth to 2031 is concentrated in Vaughan, Brampton, and Milton; Guelph will also add jobs, but at a lower overall rate. New employment growth areas exist along the northern and western edges of the existing urban area, most significantly: the Vaughan Enterprise Zone and Brampton Area 47, along Highway 50; northwest Brampton; and the Milton business parks.

**Widening Alternative (Alternative 3-1)**

This alternative consists of a series of widenings of existing highway facilities. It expands capacity to most existing industrial areas in the preliminary study area, and serves the massive employment area surrounding Toronto Pearson International Airport with additional capacity on a number of 400-series highways.

Additional capacity on existing highways will reduce congestion and facilitate goods movement and trade. Due to the significant amount of economic activity within these existing 400-series highway corridors, the evaluation of economic impact identifies the highest level of economic benefits associated with this option. This option will produce the highest potential output and employment gains for the manufacturing sector, although the impact is not much greater than that for other sectors. Additional capacity on existing highways will also reduce congestion and facilitate improved travel for tourism and recreational purposes. The economic impact evaluation shows that this option will produce the highest potential output and employment gains for the hotel and restaurant sector, although again the impact is not much greater than that for other sectors.

Alternative 3-1 has the strongest economic performance and serves existing employment areas and many growth areas well through expansions to existing corridors. Although it

REGION / COUNTY / CITY	POPULATION (THOUSANDS)			EMPLOYMENT (THOUSANDS)		
	2001	2031	% GROWTH	2001	2031	% GROWTH
Region of York	760	1,500	97%	390	780	100%
Region of Peel	1,030	1,640	59%	530	870	64%
Halton Region	390	780	100%	190	390	105%
County of Wellington	85			36	158	60%
City of Guelph	110	321	65%	63		
<b>TOTAL GGH*</b>	<b>7,790</b>	<b>11,500</b>	<b>48%</b>	<b>3,810</b>	<b>5,560</b>	<b>46%</b>

Source: Growth Plan for the Greater Golden Horseshoe  
Note: Geographic areas that are not within the GTA West Preliminary Study Area are excluded from table

**Exhibit 4-21: Growth Plan Population and Employment Targets, GTA-West Upper-Tier Municipalities**

does not serve new employment areas in Caledon, Brampton, or Vaughan as well as some new corridor alternatives, it provides the highest benefit to the manufacturing and tourism sectors.

**New Corridor Alternatives (Alternatives 4-1 to 4-5)**

The new corridor alternatives provide variations on new corridor connections from Highway 400 in the east to Guelph or to Highway 401 near Milton in the west. Alternative 4-1 is a relatively short new corridor, extending only to Highway 410 from Highway 400. As this link would serve only a small fraction of the transportation needs in the preliminary study area, Alternative 4-1 was not evaluated in detail as part of the economic evaluation. Alternative 4-2 and Alternative 4-3 provide a new link from Highway 400 to Highway 401 (at the 407 ETR or west in the Town of Milton, respectively), while Alternatives 4-4 and 4-5 provide a link from Highway 400 to Highway 6 in Guelph (north and south of Guelph, respectively).

All options improve the efficiency of goods movement and potentially benefit trade, through reduction in congestion and improved access to the Canadian Pacific Railways (CPR) inter-modal terminal in Vaughan and Canadian National Railways (CNR) inter-modal terminal in Brampton. All new corridor alternatives would potentially provide improved access to industrial areas in York, Peel and Halton Regions and support new industrial areas in northwestern parts of the

GTA.

Alternatives 4-2 and 4-3 serve industry and trade well by connecting the major existing and emerging nodes that are the focus of the logistics / wholesale trade sectors for growth in Halton (Alternative 4-3 serves the Milton area directly, while Alternative 4-2 would serve the eastern edge of this area via the Halton-Peel Boundary Area Transportation Study (HP BATS) north-south transportation corridor). The nature of the economic activity in these areas is likely to require more road capacity than the areas served by other alternatives and, as such, a new corridor is desirable to support the logistics-oriented economic activity in the area.

Alternative 4-3, used here as an example, directly serves the largest employment areas in the preliminary study area and closely matches the anticipated pattern of employment growth, as shown in **Exhibit 4-22**.

As with the other new corridor alternatives, Alternatives 4-4 and 4-5 would enhance the preliminary study area's economic competitiveness by improving access to existing and planned industrial areas and inter-modal facilities, taking pressure off municipal roads, reducing the cost of congestion, and enhancing transportation system efficiency and reliability / redundancy for growth centres throughout the area. In this case, the connection to Guelph will provide redundancy to Highway 401 west of Milton and to some extent can provide a more reliable goods movement network. However, the

new employment areas in Caledon, Brampton, or Vaughan as well as some new corridor alternatives, it provides the highest benefit to the manufacturing and tourism sectors. Alternative 4-3 best conforms to the location of future employment growth and provides an additional connection to major trade routes through the north part of the GTA. This connection will help support supply chains and distribution nodes that are based in the large hub of logistics businesses operating in the GTA West preliminary study area.

In terms of the impact of the alternatives on various sectors of the economy, the economic analysis found no significant difference in terms of the relative benefit to the manufacturing sector (Alternative 4-1 was not evaluated through modeling). The economic impact for the distribution / logistics sectors is strongest for Alternative 3-1, followed by Alternative 4-3. The economic impact on business / professional services and the public sector is strongest for Alternative 3-1, and the others are roughly equal. Finally, the economic impact on the agricultural sector is highest for Alternative 3-1, and the other sectors roughly equal.

Exhibit 4-23 describes the evaluation of the alternatives for the economic analysis, as presented at Public Information Centre (PIC) #4.

Note that a summary of the Economic analysis findings is provided in Section 4.11.

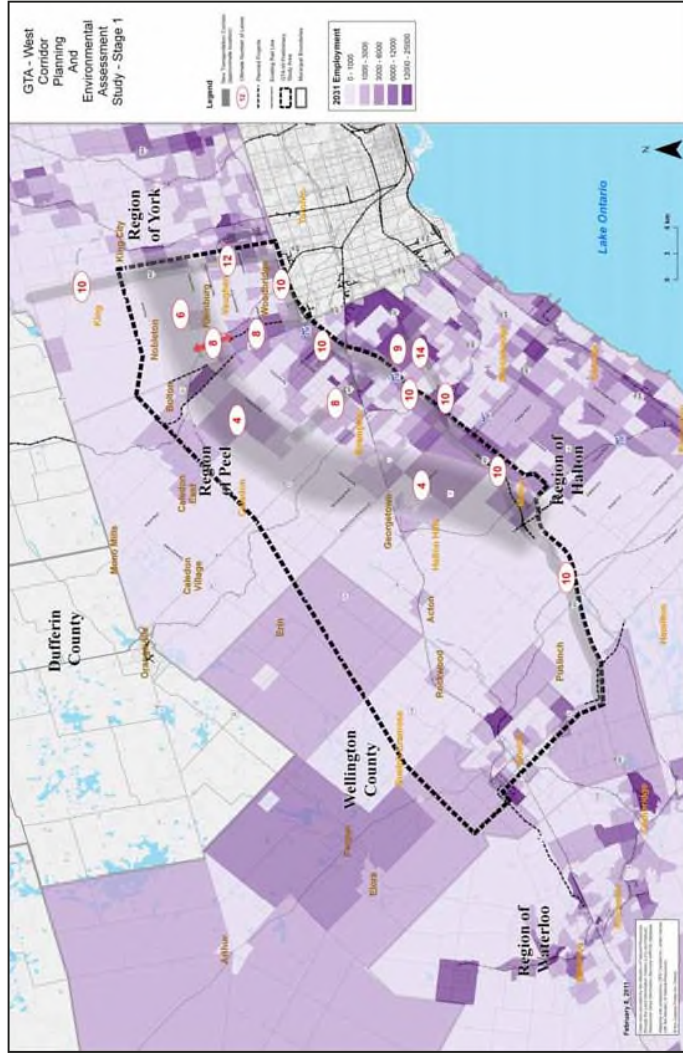


Exhibit: 4-22: Total Forecast Employment by Traffic Zone in 2031

with areas to the south and west. Alternative 4-5 provides significantly improved access to eco-recreational areas (e.g. Forks-of-the-Credit, Palgrave, Albion Hills, Terra Cotta, Elora Gorge), many of which are located along the Niagara Escarpment. However, it does not provide a direct link to the GGH south of the preliminary study area.

**Summary**

The widening alternative, Alternative 3-1, has the strongest economic impact performance and serves existing employment areas and many growth areas well through expansions of existing corridors. Although it does not serve




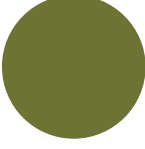


economic impact evaluation shows that these alternatives will produce slightly lower potential output and employment gains for the manufacturing sector compared to Alternative 3-1; their performance is comparable to Alternative 4-3.

A new corridor also supports improved road connection for intra-provincial tourism, including to Highway 400 and northern Ontario ("cottage country") and supports improved road connections for international tourism arriving from the Toronto Pearson International Airport. The new corridor alternatives (except for Alternative 4-1) generally provide additional potential to connect tourist traffic in the north GTA



FACTOR	3-1	4-1	4-2	4-3	4-4	4-5
<b>SUB-FACTOR AND MEASURE</b>	<b>WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)</b>	<b>REDUCED HIGHWAY 407 WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410</b>	<b>REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 401 TO HIGHWAY 401</b>	<b>REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON</b>	<b>NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)</b>	<b>NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)</b>
<b>4.1 First Nations Industry</b>	The potential to support First Nation industry will be confirmed through discussions with First Nations as part of the EA process.	The potential to support First Nation industry will be confirmed through discussions with First Nations as part of the EA process.	The potential to support First Nation industry will be confirmed through discussions with First Nations as part of the EA process.	The potential to support First Nation industry will be confirmed through discussions with First Nations as part of the EA process.	The potential to support First Nation industry will be confirmed through discussions with First Nations as part of the EA process.	The potential to support First Nation industry will be confirmed through discussions with First Nations as part of the EA process.
<b>4.2 Heavy Industry and Trade</b>	<p>Widening existing transportation corridors would service existing and future industry located close to existing provincial highways. Additional capacity on existing highways would reduce congestion and facilitate goods movement and trade.</p> <p>The evaluation of economic impact identifies the highest level of economic benefits associated with this option. When coupled with widenings in the NGTA area (the assumption for economic evaluation of all options), this option would produce:</p> <p>Approx. \$2.3bn in transportation cost savings in the Greater Golden Horseshoe</p> <p>Approx. \$1.1bn in increased GDP in the Greater Golden Horseshoe</p> <p>Approx. 12,500 in increased employment in the Greater Golden Horseshoe</p> <p>The economic impact evaluation shows that this option will produce the highest potential output and employment gains for the manufacturing sector, although the impact is not much greater than for other sectors.</p>	<p>The new corridor would potentially provide improved access to industrial areas in York and Peel Regions and support new industrial areas in the north GTA. It would also improve the efficiency of movement of goods and potentially benefit trade through reduction in congestion and improved access to CP inter-modal terminal in Vaughan and CN inter-modal terminal in Brampton.</p> <p>This corridor was not evaluated separately through the TREDIS model, as the impacts are much lower due to the very limited scale of the corridor.</p>	<p>This new corridor alternative would potentially provide improved access to industrial areas in York, Peel and Halton Regions and support new industrial areas in Northwestern parts of the GTA. It would also improve the efficiency of movement of goods and potentially benefit trade through reduction in congestion and improved access to CP inter-modal terminal in Vaughan and CN inter-modal terminal in Brampton and improved access to the CP inter-modal facility in Milton, on Trafalgar Road. Furthermore, in these areas is likely to require more road capacity than the areas served by other alternatives.</p> <p>This alternative serves industry and trade well because it connects the major existing and emerging nodes that are the focus of the logistics/wholesale trade sectors for growth in Halton, although it does not serve the Milton area directly (as does Alternative 4-3).</p> <p>This corridor was not evaluated separately through the TREDIS model, as the economic impacts are likely to be very similar to Alternative 4.3 (the corridors have a different connection point to Highway 401 but are otherwise similar)</p>	<p>This new corridor alternative would potentially provide improved access to industrial areas in York, Peel and Halton Regions and support new industrial areas north of the GTA. It would also improve the efficiency of movement of goods and potentially benefit trade through reduction in congestion and improved access to CP inter-modal terminal in Vaughan and CN inter-modal terminal in Brampton.</p> <p>The evaluation of economic impact identifies that the level of economic benefits associated with this option are comparable, but slightly lower than other options. When coupled with widenings in the NGTA area (the assumption for economic evaluation of all options), this option would produce:</p> <p>Approx. \$2.2bn in transportation cost savings in the Greater Golden Horseshoe</p> <p>Approx. \$1.0bn in increased GDP in the Greater Golden Horseshoe</p> <p>Approx. 11,500 in increased employment in the Greater Golden Horseshoe</p> <p>The economic impact evaluation shows that this option will produce slightly lower potential output and employment gains for the manufacturing sector compared to Alternatives 4-3 and 4-5.</p>	<p>This new corridor alternative would enhance the area's economic competitiveness by improving access to existing and planned facilities in areas and inter-modal facilities in the north GTA, reducing the cost of municipal roads, reducing the cost of congestion, and enhancing transportation system efficiency and reliability/redundancy for growth centres throughout the study area, from Vaughan to Guelph and on to Kitchener-Waterloo.</p> <p>It would also improve the efficiency of movement of goods and potentially benefit trade. Furthermore, the nature of the economic activity in these areas is likely to require more road capacity than the areas served by other alternatives.</p> <p>This alternative serves industry and trade well because it connects the major existing and emerging nodes that are the focus of the logistics/wholesale trade sectors for growth in Halton. It also supports improved access to these areas for the labour force (i.e., 200,000 between 2001 and 2031). Furthermore, the nature of the economic activity in these areas is likely to require more road capacity than the areas served by other alternatives.</p> <p>The evaluation of economic impact shows that this option will produce slightly lower potential output and employment gains for the manufacturing sector compared to Alternatives 4-3 and 4-5.</p>	<p>This new corridor alternative would enhance the area's economic competitiveness by improving access to existing and planned facilities in areas and inter-modal facilities in the north GTA, reducing the cost of municipal roads, reducing the cost of congestion, and enhancing transportation system efficiency and reliability/redundancy for growth centres throughout the study area, from Vaughan to Guelph and on to Kitchener-Waterloo.</p> <p>It would also improve the efficiency of movement of goods and potentially benefit trade. Furthermore, the nature of the economic activity in these areas is likely to require more road capacity than the areas served by other alternatives.</p> <p>This alternative serves industry and trade well because it connects the major existing and emerging nodes that are the focus of the logistics/wholesale trade sectors for growth in Halton. It also supports improved access to these areas for the labour force (i.e., 200,000 between 2001 and 2031). Furthermore, the nature of the economic activity in these areas is likely to require more road capacity than the areas served by other alternatives.</p> <p>The evaluation of economic impact shows that this option will produce slightly lower potential output and employment gains for the manufacturing sector compared to Alternatives 4-3 and 4-5.</p>

FACTOR	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)	4-1 REDUCED HIGHWAY 407 WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
4.3 Tourism and Recreation Industry	Widening existing transportation corridors would service existing tourism operations currently accessible by existing provincial highways. Additional capacity on existing highways would reduce congestion and facilitate improved travel for tourism and recreational purposes. The economic impact evaluation shows that this option will produce the highest potential output and employment gains for the hotel and restaurant sector, although the impact is not much greater than for other sectors. TREDIS economic impact evaluation of hotel/restaurant sector	Widening existing transportation corridors would service existing tourism operations currently accessible by existing provincial highways. The new corridor supports improved road connection for intra-provincial tourism, including to Highway 400 and "cottage country" and supports improved road connections for international tourism arriving from Lester B. Pearson International Airport. Some existing tourist/recreational attractions may be impacted although impacts can be minimized through the route selection process.	Widening existing transportation corridors would service existing tourism operations currently accessible by existing provincial highways. A new corridor supports improved road connection for intra-provincial tourism, including to Highway 400 and "cottage country" and supports improved road connections for international tourism arriving from Lester B. Pearson International Airport. Some existing tourist/recreational attractions may be impacted although impacts can be minimized through the route selection process. This alternative provides additional potential to connect the tourist traffic in north GTA with areas to the south via the Highway 401/407 connection.	Widening existing transportation corridors would service existing tourism operations currently accessible by existing provincial highways. A new corridor supports improved road connection for intra-provincial tourism, including to Highway 400 and "cottage country". Some attractions may be impacted although impacts can be minimized through the route selection process. This alternative provides significantly improved access to recreational areas (i.e., Forks of the Credit, Palgrave, Albion Hills, Terra Cotta, Elora Gorge etc.) many of which are located along the Niagara Escarpment. However, this alternative does not provide a direct link to the Greater Golden Horseshoe south of the study area. The economic impact evaluation shows that this option will produce lower potential output and employment gains for the hotel and restaurant sector compared to Alternative 3-1, but similar levels to Alternatives 4-4 and 4-5.	Widening existing transportation corridors would service existing tourism operations currently accessible by existing provincial highways. A new corridor supports improved road connection for intra-provincial tourism, including to Highway 400 and "cottage country" and supports improved road connections for international tourism arriving from Lester B. Pearson International Airport. Some existing tourist/recreational attractions may be impacted although impacts can be minimized through the route selection process. This alternative provides significantly improved access to recreational areas (i.e., Forks of the Credit, Palgrave, Albion Hills, Terra Cotta, Elora Gorge etc.) many of which are located along the Niagara Escarpment. However, this alternative does not provide a direct link to the Greater Golden Horseshoe south of the study area. The economic impact evaluation shows that this option will produce lower potential output and employment gains for the hotel and restaurant sector compared to Alternatives 3-1, but similar levels to Alternatives 4-4 and 4-5.	Widening existing transportation corridors would service existing tourism operations currently accessible by existing provincial highways. A new corridor supports improved road connection for intra-provincial tourism, including to Highway 400 and "cottage country" and supports improved road connections for international tourism arriving from Lester B. Pearson International Airport. Some existing tourist/recreational attractions may be impacted although impacts can be minimized through the route selection process. This alternative provides significantly improved access to recreational areas (i.e., Forks of the Credit, Palgrave, Albion Hills, Terra Cotta, Elora Gorge etc.) many of which are located along the Niagara Escarpment. However, this alternative does not provide a direct link to the Greater Golden Horseshoe south of the study area. The economic impact evaluation shows that this option will produce lower potential output and employment gains for the hotel and restaurant sector compared to Alternatives 3-1, but similar levels to Alternatives 4-4 and 4-5.
4.4 Agriculture Industry	This alternative has low potential to fragment agricultural operations because improvements are at existing highway corridors and result in fringe impacts. The new corridor section has minor potential to impact or fragment agricultural operations because it is relatively short (in length) and because most lands are designated as future urban areas at the corridor.	The widening sections of this alternative have low potential to fragment agricultural operations because improvements are at existing highway corridors and result in fringe impacts. The new corridor section has moderate potential to impact or fragment agricultural operations because some lands are designated as future urban areas along this corridor, although there are also farming operations in non-urban areas.	The widening sections of this alternative have low potential to fragment agricultural operations because improvements are at existing highway corridors and result in fringe impacts. The new corridor section has moderate potential to impact or fragment agricultural operations because some lands are designated as future urban areas along this corridor, although there are also farming operations in non-urban areas. This new corridor section runs diagonally across lots and concessions in Halton Region, which could also result in fragmentation of agricultural operations.	The widening sections of this alternative have low potential to fragment agricultural operations because improvements are at existing highway corridors and result in fringe impacts. The new corridor section has moderate potential to impact or fragment agricultural operations because some lands are designated as future urban areas along this corridor, although there are also farming operations in non-urban areas. This new corridor section runs diagonally across lots and concessions in Halton Region, which could also result in fragmentation of agricultural operations.	The widening sections of this alternative have low potential to fragment agricultural operations because improvements are at existing highway corridors and result in fringe impacts. The new corridor section of this alternative has moderate/high potential to impact agricultural operations through fragmentation especially in north Halton and Wellington County, where many farming operations are currently located in areas designated for future rural land uses.	The widening sections of this alternative have low potential to fragment agricultural operations because improvements are at existing highway corridors and result in fringe impacts. The new corridor section of this alternative has moderate/high potential to impact agricultural operations through fragmentation especially in north Halton and Wellington County, where many farming operations are currently located in areas designated for future rural land uses.

FACTOR	3-1	4-1	4-2	4-3	4-4	4-5
SUB-FACTOR AND MEASURE	WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)	REDUCED HIGHWAY 407 WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
SUMMARY	<b>MOST PREFERRED</b> - This alternative has the strongest economic impact performance and serves existing employment areas and many growth areas well through expansions to existing corridors. Although it does not serve new employment areas in Caledon, Brampton, or Vaughan as well as some new corridor alternatives, it provides the highest benefit to the manufacturing and tourism sectors.	<b>LEAST PREFERRED</b> -This alternative has the least economic impact due to its short length and does not serve most of the future employment growth areas.	<b>MODERATELY PREFERRED</b> -This alternative has a strong economic impact/benefit, although slightly lower than Alternative 3-1. It serves many employment growth areas but does not serve the significant growth area of Milton directly with a new corridor.	<b>MOST PREFERRED</b> -This alternative has a strong economic impact / benefit. It serves many employment growth areas including more directly serving the future employment growth in Milton. While it scores slightly lower than Alternative 3-1 in economic impact, it better services future growth areas than other options.	<b>MODERATELY PREFERRED</b> -This alternative has a strong economic impact / benefit, although lower than Alternative 3-1. It serves many employment growth areas and provides a connection to the Highway 7 corridor from Kitchener / Waterloo to Guelph, but does not serve the significant growth area of Milton and does not connect directly to Highway 401.	<b>MODERATELY PREFERRED</b> -This alternative has a strong economic impact / benefit, comparable to Alternative 3-1. It serves many employment growth areas but does not serve the significant growth area of Milton and does not connect directly to Highway 401.
ECONOMIC ENVIRONMENT						
OVERALL SUMMARY	From an economic perspective, Alternative 4-1 is least desirable due to its short length, not serving most future employment growth areas, or providing connections to trade routes. Other new corridor alternatives provide similar economic benefits. However, Alternatives 4-4 and 4-5 are less desirable than Alternatives 3-1 and 4-3 as they do not serve future growth areas as well. Alternative 4-2 is moderately preferred because the new corridor section does not extend far enough west to directly service Milton as well as Alternative 4-3. <b>Overall, Alternatives 3-1 and 4-3 are most preferred from an economic perspective because they have the highest economic benefit and / or serve the economic growth areas most effectively.</b>					

#### 4.9. EVALUATION OF ALTERNATIVES – TRANSPORTATION ANALYSIS

The transportation analysis work to aid in the evaluation of GTA West corridor alternatives included the following: detailed modeling of various transit and road network improvement alternatives; development of transportation criteria to measure how well each alternative would perform in addressing transportation objectives; and assessment of each alternative using both qualitative and quantitative evaluation methodologies.

The results from the transportation modeling and forecasting also provided key inputs to support the economic analysis, and air quality and noise assessments documented as part of the overall evaluation (see Section 4.5 and Section 4.7).

##### 4.9.1. Modeling Methodology

###### Greater Golden Horseshoe Model

The Study Team used the Ontario Ministry of Transportation (MTO) Greater Golden Horseshoe Model (GGH Model) to forecast future travel demands for the transportation analysis. The GGH Model as developed and validated was used by Metrolinx in the development of the Draft Regional Transportation Plan (RTP), and is also being used by MTO in major planning studies throughout the GGH area. The model utilizes a detailed transportation network including both transit and roadway and forecasts trip-making by all modes of travel based on forecasts of population and employment growth, land use densities, socio-economic and demographic information, current and future transportation costs (representing fuel costs, tolls, parking costs, transit fares, vehicle operating costs, etc.), and transportation network performance for all travel modes.

An updated version of the GGH Model (version 2.2) was used for the modeling and analysis undertaken for assessment and evaluation of transportation alternatives to support the Transportation Development Strategy (Strategy). This version includes some of the improvements implemented as part of MTO's ongoing efforts to improve and update their travel demand forecasting model, and reflects updated information collected by the Study Team and incorporated into the model, as discussed in this section.

###### Land Use Assumptions

The land use patterns developed for the Metrolinx RTP were used as the starting point for the GTA West study. Population and employment forecasts used in the RTP were developed prior to each municipality completing updates to their Official Plan to conform to the new policy directions outlined in the *Growth Plan*. The allocation of future growth within each municipality was estimated using a top down approach, based on the policies outlined in the *Growth Plan*.

Since the completion of the RTP, all of the municipalities have embarked upon their *Growth Plan* conformance reviews, and many have completed their own assessments of future population and employment growth. These forecasts, developed from the bottom-up, represent the most recent land use forecasts available and were therefore incorporated into the detailed travel demand forecasting work. The population and employment estimates for the remainder of the GGH were retained from the RTP model.

Exhibit 4 -24 summarizes the 2031 population and employment forecasts and lower tier allocations for the municipalities within the GTA West preliminary study area, encompassing the regions of York, Peel, Halton and the County of Wellington. Growth forecasts for the remaining communities in the GGH are summarized in the *Transportation Model Technical Background Report* (February 2011), available on the study web site ([www.gta-west.com](http://www.gta-west.com)).

###### Base Case Transportation Network

The Base Case scenario was identified as a benchmark for comparing other "improvement" alternatives. The Base Case is considered the status quo, where improvements to the transportation system would be limited to the implementation of approved provincial, regional and local municipal initiatives. This includes the broad range of planned infrastructure improvements to be implemented by 2031:

- The Metrolinx Regional Transportation Plan (Metrolinx RTP);
- GO Transit's Strategic Plan, GO 2020;
- MTO's planned and committed improvements including projects identified in the Southern Ontario Highway Program (2006-2010) and the High Occupancy Vehicle

(HOV) Lanes Plan (2007). Other planned improvements to the provincial highway network, beyond those noted above were not included for consideration in the Base Case;

- Road, transit and active transportation programs identified through approved Transportation Master Plans, Official Plans or Development Charge Background Studies completed by regional / lower tier municipalities. Local and regional roads in the RTP model were updated based on information provided by the following regions: Halton, Durham, Peel, York, Wellington, Niagara and the City of Hamilton.

For detailed local and regional road network updates included in the 2031 Base Case Network, please refer to the *Transportation Model Technical Background Report* (February 2011).

REGION	LOWER-TIER MUNICIPALITY	2031 POPULATION	2031 EMPLOYMENT
Peel	Brampton	741,850	317,574
	Caledon	109,790	47,439
	Mississauga	788,356	504,993
Halton	Burlington	196,653	105,576
	Halton Hills	93,952	42,547
	Milton	232,508	114,533
	Oakville	256,895	127,348
	Guelph	168,691	98,425
Wellington	Rest of Wellington	152,307	59,574
	Aurora	70,095	34,190
York	East Gwillimbury	87,557	34,401
	Georgina	70,347	21,237
	King	34,981	11,952
	Markham	428,441	240,886
	Newmarket	96,860	49,429
	Richmond Hill	241,523	99,321
	Vaughan	409,702	265,583
	Whitchurch-Stouffville	60,489	23,027

Exhibit 4-24: 2031 GTA West Population and Employment Forecasts

### Commercial Vehicle Forecasting

In the updated version of the GGH Model, MTO has provided a separate model to forecast commercial vehicle demand in the GGH area. MTO's Commercial Vehicle (CV) model generates, distributes and assigns commercial vehicle trips by truck type for the 12.5 - hour daytime period and distributes trips to the AM and PM peak periods using time of day factors from available traffic counts data.

This model forecasts the growth in commercial vehicle travel based on forecasts of increased goods movement activity in various industrial and manufacturing sectors of the economy. For example, the higher the anticipated growth in a sector that relies on trucking to transport raw materials or finished goods, the higher the tonnage of goods that are moved and the more trucks that are required to move those goods. The MTO commercial vehicle model uses the Commercial Vehicle Survey (CVS), undertaken by MTO every five years, to provide data on the types of goods being moved by truck and the origin-destination patterns of these truck trips.

For the purpose of this study, the commercial vehicle demand estimates developed in the GGH Model origin-destination zone format are assigned to the transportation roadway network and analyzed along with the auto and transit demands.

### Modeling Group #1 and Group #2 Initiatives

Following the "building block" approach used in the GTA West study, modeling for the Group #3 and #4 alternatives has assumed that the implementation of Group #1 and #2 initiatives would proceed. These include Transportation Systems Management (TSM) and Transportation Demand Management (TDM) measures aimed at improving the efficiency of existing infrastructure and reducing auto demand.

The GGH Model already incorporates a series of demographic and socio-economic assumptions (such as higher vehicle operating costs in 2031) that result in increased auto occupancies and higher transit mode splits. The Metrolinx RTP also included a number of post-model adjustments to

account for some of its policy initiatives, including:

- Increase auto occupancy by 0.05 over modeled result;
- Work at home increase from 5.3% to 8%;
- Transit mode split – add 2.0% to modeled mode split; and
- Active Transportation – add 5% to active transportation modes for trips under 10 kilometres.

These assumptions are internal to the GGH Model. According to the MTO, these assumptions capture the anticipated behavioural trends that are likely to occur in trip-making independent of TDM policy measures introduced through the GTA West or Niagara to GTA (NGTA) studies.

The draft *Area Transportation System Alternatives Report* (April 2010) applied additional post GGH Model reductions to the auto demand to account for the TDM / TSM measures incorporated into the Group #1 and #2 initiatives. These include:

- A global 4% reduction in auto demand to account for TDM and other transit initiatives.
- A 10% reduction in long distance truck demand to account for diversion to other travel modes, predominantly freight rail.

These adjustments were retained for the detailed evaluation of GTA West and NGTA alternatives, although the global 4% reduction in auto demand was applied in a more targeted manner. Higher reductions were applied in urban areas where TDM and transit measures can have a larger impact on auto demands, and lower reductions were used in suburban or rural areas where opportunities are more limited. A trip reduction matrix was developed with higher reduction in trips internal to regions and lower reduction in long distance trips, and in regions with lower potential for TDM.

Of the 4% reduction in auto demand:

- 2.5% of trips were assumed to shift from auto driver to transit;
- 1% of trips were assumed to shift from auto driver to auto passenger (carpooling); and
- 0.5% of trips no longer travel during peak periods (or at all).

**Exhibit 4-25** illustrates the distribution of the auto trip reduction assumptions used in the updated modeling work. The detailed trip reduction matrix is presented in the *Transportation Model Technical Background Report* (February 2011).

The 10% reduction in long distance truck demand was applied to the 2031 heavy truck demand. The rationale for reduction of longer distance truck demand was that some of it will shift to rail with improvements to rail freight. Based on the "407 East Alternatives to the Undertaking" report, 10% of all tractor-trailer demand was reduced to account for the longer distance trips shifting to rail. These reductions were applied to the demand matrices produced by the Commercial Vehicle model and were implemented in the GGH model runs prior to the traffic assignment stage, to forecast resulting traffic volumes on the roadway network.

### Accounting for Improvements in the NGTA Study Area

The travel demand forecasting for both GTA West and NGTA studies was performed simultaneously using an integrated travel demand forecasting model and common transportation evaluation criteria. The need for transportation improvements within each study area was previously identified in the draft *Area Transportation System Problems and Opportunities Report* (July 2009, Updated December 2010) for each project. Given that the study areas share a boundary along the Highway 401 corridor, it was recognized that capacity improvements in one study area might affect travel demands and, more importantly, the routing of trips through the adjacent study area. Therefore, the modeling to support the evaluation process has assumed that "something" would be done to address the problems and opportunities in the other study area.

For this reason, the modeling of various transportation improvement alternatives for each study required considering the potential improvements that might occur in the other study area. Rather than trying to model every permutation and combination of the various alternatives identified in each study, the modeling approach identified a series of combinations of improvements that the Study Team

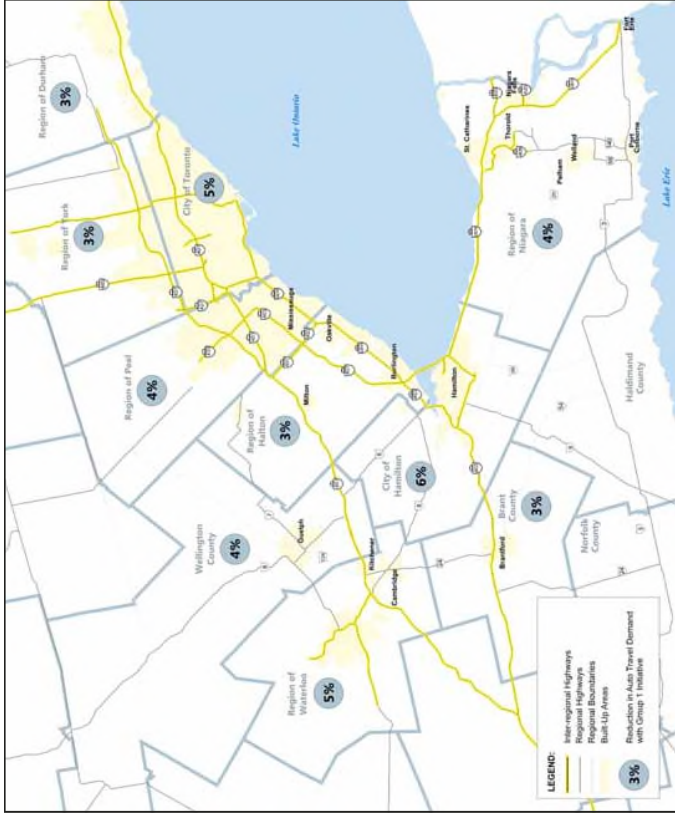


Exhibit 4-25: 2031 Auto Trip Reduction – Group #1 and #2 Alternatives

considered would have the potential to alter the regional trip distribution patterns, transit mode shares and resulting auto demand patterns. Each study contained several Group #3 alternatives that focused on increasing capacity on existing corridors and several Group #4 alternatives that include various configurations for new transportation corridors.

Therefore, the following three basic alternatives could occur in the GTA West preliminary study area:

1. Group #3 alternatives (widening) are implemented in each preliminary study area;
2. A Group# 4 alternative (new corridor) is implemented

in the GTA West preliminary study area and a Group #3 alternative is implemented in the NGTA preliminary study area; or

3. A Group #4 alternative (new corridor) is implemented in both preliminary study areas.

While it is important that the evaluation of transportation network performance consider improvements beyond the preliminary study area boundary to properly assess how well the overall network would perform, the economic analysis component of the study required a different approach. It required the transportation benefits associated with each alternative to be considered independently of the transportation benefits associated with improvements

in the other preliminary study area. To accommodate this, two additional model runs were required to identify the basic transportation benefits associated with the Group #3 alternatives in each study area on their own.

Exhibit 4-26 summarizes the various NGTA and GTA West combinations that were used for the initial GGH model runs. For the Group #4 alternatives, GTA West Alternative 4-3 was used in the first set of runs in each preliminary study area since this alternative provided an extensive length of new corridor in each preliminary study area that connected to Highway 401 in the Milton area. It was assumed that this combination (NGTA Alternative 4-3 and GTA West Alternative 4-3) would represent the most integrated network of new corridors between the two preliminary study areas that would have the highest potential to alter regional trip distribution patterns in both study areas. For each of the various combination alternatives the regional travel demand patterns and transit mode shares were reviewed to determine the degree to which the different combinations of improvement alternatives influenced regional travel demand patterns.

GGH MODEL RUN	NGTA	GTA WEST
1	Base Case	
2	NGTA Alternative 3-1	
3	GTA West Alternative 3-1	
4	NGTA Alternative 4-3	GTA West Alternative 3-1
5	NGTA Alternative 3-1	GTA West Alternative 4-3
6	NGTA Alternative 4-3	GTA West Alternative 4-3
7	NGTA Alternative 3-1	GTA West Alternative 4-4

Exhibit 4-26: GGH Model Run Scenarios for NGTA and GTA West Transportation Modelling

These GGH Model runs established the transit mode share component of travel and the zone to zone auto travel demand for each of the above scenarios. Exhibit 4-27 summarizes the resulting total person trips by mode of travel for each respective scenario for the AM and PM peak periods.

As summarized above, the PM peak hour has a higher number of auto trips on the roadway network compared to the AM peak hour. As a result, the PM peak hour was selected as the time period used in the assessment and evaluation of the various network alternatives.

The number of auto trips is forecast to decrease for all of the Group #3 and #4 alternatives compared to the Base Case, due to the benefits of the Group #1 and #2 initiatives. Transit mode shares are expected to increase under all the alternatives compared to the Base Case, from 20.2% to 21.9% in the AM peak and from 16.7% to 18.4% in the PM peak hour. Although transit ridership is generally anticipated to decrease with provision of additional roadway capacity (widening or new corridor), the implementation of the Group #1 and Group #2 initiatives results in a net increase in transit mode share in the GGH area compared to the Base Case. The new corridor alternatives, while impacting transit use to a degree, do not significantly impact the transit mode shares compared to the GTA West Alternative 3-1.

Similar to transit mode share, average auto (passenger car) occupancy would increase under all the alternatives compared to the Base Case, from 1.20 to 1.22 in the AM peak and from 1.27 to 1.29 in the PM peak hour. This can also be attributed to the Group #1 and Group #2 initiatives. Details of transit mode share and regional self-containment are provided in the *Transportation Model Technical Background Report* (February 2011).

#### 4.9.2. Alternatives Evaluation Methodology and Findings

In addition to "triple bottom line" considerations, as well as engineering, the alternatives must reasonably address the key problem statements identified for the GTA West study. Therefore, a series of qualitative and quantitative transportation criteria were included to assess the ability of each of the alternatives to:

- Address traffic operations;
- Support efficient movement of people and goods;
- Provide multi-modal integration;
- Support future inter-regional transit opportunities;
- Provide transportation system reliability, redundancy and safety; and
- Accommodate recreational and tourism travel.

Some of these criteria, such as ability to provide capacity and reduce travel delays, are quantitative, while others, such as potential for multi-modal integration and impacts on safety, are addressed through qualitative evaluation approaches. These criteria are described in detail in Section 4.2.

#### Updated Base Case

Each GTA West alternative was evaluated by comparing its performance against other GTA West alternatives and also against the Base Case; the Base Case was the benchmark for comparing the improvement alternatives. Hence, it was necessary to establish Base Case conditions for 2031 using

	PERSON TRIPS	BASE CASE	GTA WEST ALTERNATIVE 3-1	GTA WEST ALTERNATIVE 4-3/NGTA ALTERNATIVE 3-1	GTA WEST ALTERNATIVE 4-3/NGTA ALTERNATIVE 4-3	GTA WEST ALTERNATIVE 4-3/NGTA ALTERNATIVE 3-1
AM	Auto Driver	1,402,750	1,348,030	1,349,650	1,350,070	1,349,520
	Auto Passenger	283,460	297,820	297,920	298,030	297,940
	Transit Person	451,000	484,290	482,840	482,500	482,920
	Total Person	2,235,150	2,210,530	2,210,370	2,210,370	2,210,360
	Transit Mode Share	20.2%	21.9%	21.8%	21.8%	21.8%
	Auto Occupancy	1.20	1.22	1.22	1.22	1.22
PM	Auto Driver	1,493,570	1,434,510	1,435,860	1,436,290	1,435,730
	Auto Passenger	403,470	419,050	419,260	419,440	419,220
	Transit Person	396,510	432,410	431,060	430,610	431,200
	Total Person	2,367,970	2,350,440	2,350,340	2,350,340	2,350,330
	Transit Mode Share	16.7%	18.4%	18.3%	18.3%	18.3%
	Auto Occupancy	1.27	1.29	1.29	1.29	1.29

Exhibit 4-27: 2031 GGH Model Person Trips by Mode (Including Group #1 and Group #2 Initiatives)

the updated modeling approach adopted for the detailed evaluation of alternatives, including the use of the new model version, updates to land use, roadway network and approach to forecasting commercial goods movement demands. Note that levels of congestion are classified into three categories as shown below:

DESCRIPTION OF CONGESTION TYPE, LEVEL OF SERVICE (LOS) AND VOLUME/CAPACITY (V/C) RATIO			
Congestion Type	Approx. LOS	Approx. V/C	Description
Minor	LOS C or better	Less than 0.80	Non-recurring congestion*
Moderate	LOS D	0.80 to 0.90	Approaching Unstable Conditions
Major	LOS E or F	0.90 and above	Unstable Conditions (Stop-and-Go)

\* Congestion may result from non-recurring incidents such as inclement weather, accidents, road maintenance, etc.

Note that the lower the Volume / Capacity (V/C) ratio, the more capacity that is available and the better the traffic flows on the corridor. As the V/C ratio approaches 0.9 (meaning that the volume demand is about 90% of the available capacity) the speed deteriorates and the traffic flow becomes unstable and/or congested as the traffic volumes reach the link capacity. This is referred to as congested traffic conditions on the link. Congestion plots were reviewed to assess future congestion levels under the Base Case. Discussion of 2031 Base Case peak hour congestion on the key inter-regional facilities in the study area can be found in the *Transportation Model Technical Background Report* (February 2011).

In addition to plotting alternatives to assess congestion, the transportation network was analyzed for its capacity to accommodate travel demands at critical screenlines in 2031. The Study Team assessed roadway system capacity in the preliminary study area by comparing estimated traffic flows on selected corridors and at selected screenlines against available capacity. This is measured in units of Volume / Capacity ratio (V/C).

A screenline is a real or imaginary boundary that defines a broad corridor across which traffic flows, and may represent one or several road links. Each roadway link has limited capacity, which is its maximum ability to accommodate vehicular traffic. Screenlines are used to examine travel demands within a broader area to determine the ability of the overall network to accommodate travel demands. Some roadways crossing a screenline may be congested, but there may be available capacity on other under-utilized roads. This would suggest that improvements aimed at balancing the flow across the available roads would address the problem before looking at adding new capacity. When the majority of the roads crossing the screenline are operating at or close to capacity, this would tend to suggest the need for new capacity, either as new lanes or a new roadway.

The selection of screenlines in the GTA West preliminary study area for alternatives evaluation is presented in **Exhibit 4-28**. For each screenline, V/C ratios were computed for the peak direction only, which is westbound (WB) for the links under the north-south screenlines and northbound (NB)

for the east-west screenlines. The screenline locations are as follows:

- 8002 East of Guelph – WB
- 8001 West of Milton (East of Eramosa Townline and Tremaine Road) – WB
- 4002 East of Winston Churchill Boulevard – WB
- 4001 East of Highway 10 (Huronario Street) – WB
- 3002 East of Highway 50 – WB
- 3001 West of Highway 400 – WB
- 4007 North of Queen Street – NB



**Exhibit 4-28: GTA West Preliminary Study Area Screenlines**

**Exhibit 4-29** shows the screenline V/C ratios for the 2031 PM peak hour. Since one of the primary objectives of the GTA West study is to address inter-regional transportation needs, inter-regional facilities within each of these screenlines were examined for their performance separate from other roadways. As summarized below, on most screenlines the inter-regional facilities are forecast to perform worse in terms of V/C ratio compared to the overall screenline results with all roadways included. The two exceptions to this include the screenlines east of Guelph and east of Highway 50. At the provincial highway but is considered as a regional facility for the purpose of this assessment) would operate with significant congestion along with Highway 401. At the east of Highway 50 screenline, 407 ETR is the only inter-regional facility. Since it is a tolled corridor, it will tend to operate at lower congestion levels than the other free facilities.

SCREENLINE	ALL FACILITIES WEEKDAY PM PEAK	INTER-REGIONAL FACILITIES WEEKDAY PM PEAK
East of Guelph WB	1.04	1.02
West of Milton (East of Eramosa Townline and Tremaine Road) WB	0.95	1.10
East of Winston Churchill Boulevard WB	0.75	0.79
East of Highway 10 (Huronario Street) WB	0.82	0.97
East of Highway 50 WB	0.85	0.76
West of Highway 400 WB	0.98	1.02
North of Queen Street (407 ETR) NB	1.02	1.14

**Exhibit 4-29: 2031 Base Case Screenline Evaluation**

Based on the deficiencies identified for the updated Base Case model run, it is clear that significant inter-regional transportation solutions are required, even with the updated land use and transportation network improvements incorporated into the model. This confirms the original assessment completed as part of the draft *GTA West Area Transportation System Problems and Opportunities Report* (July 2009, Updated December 2010).

The updated Base Case modeling results for each of the evaluation criteria and measures were compared to the results for the GTA West improvement alternatives. A summary of the evaluation finding is discussed in the sections below.

**Assessment of Commuter Travel Characteristics for GTA West Alternatives**

The new capacity provided by roadway widening and / or new corridors included within the Group #3 and Group #4 alternatives has the potential to improve travel times between municipalities. This, in turn, may encourage additional longer distance auto travel and reduce transit use and municipal self-containment to some degree. To address this concern, the evaluation process has considered the implications on



regional travel patterns for each of the alternatives using the GGH Transportation Model. The Group #1 and #2 initiatives would also reduce auto travel and encourage additional transit use compared to the Base Case conditions. Therefore, this assessment includes the benefits of the Group #1 and Group #2 initiatives, which introduce new or enhanced TDM /TSM and inter-regional transit services into the preliminary study area in addition to adding new road capacity. The net cumulative effects included consideration of the expected benefits of the Group #1 and Group #2 initiatives compared to the Base Case scenario.

The GGH Model calculates 2031 AM and PM peak period total person, transit person and auto trip tables at a detailed traffic zone level. To assess the changes to regional travel patterns, the GGH Model travel demand tables were aggregated to regional and municipal planning districts in order to assess:

- Self-containment (trips staying within each regional municipality);
- Inter-regional travel across municipal boundaries; and
- Regional transit mode shares (percent of trips made using transit).

A summary of the 2031 PM peak hour cross-boundary trips without trips external to GGH is presented in **Exhibit 4-30**. The trip distribution and mode split patterns from the GGH Model run for Alternative 3-1 were also used to represent the patterns that would occur for Alternative 4-1. The GGH Model run for Alternative 4-3 was used to represent the patterns for Alternatives 4-2, 4-3, 4-4 and 4-5. Total person trips include auto person, transit, and other modes such as walking and cycling. Truck trip forecasts derived from the CV Module of the GGH Model are not included in the summary of passenger demand forecasts here.

**Exhibit 4-31** and **Exhibit 4-32** show changes in automobile and transit trips with the alternative scenarios from the Base Case. Truck demand was assumed constant under Base Case and the alternative scenarios, with the exception of a 10% reduction in long-distance trucks in the alternatives scenarios to account for the Group #1 and #2 initiatives. Note that the base maps of Alternatives 3-1 and #2 initiatives. Note that used to illustrate representative corridor conditions for Alternatives 3-1 and 4-1, and for Alternatives 4-2, 4-3, 4-4 and 4-5, respectively.

	BASE CASE		GTA WEST ALTERNATIVE 3-1*		GTA WEST ALTERNATIVE 4-3*	
	EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
WATERLOO-WELLINGTON						
Auto Person	12,200	10,200	12,000	10,200	12,100	10,300
Transit Person	260	70	190	210	190	220
Truck	1,900	1,800	1,800	1,800	1,800	1,800
<b>Total Person</b>	<b>12,400</b>	<b>10,300</b>	<b>12,200</b>	<b>10,400</b>	<b>12,300</b>	<b>10,500</b>
<b>Auto Occupancy</b>	<b>1.22</b>	<b>1.20</b>	<b>1.23</b>	<b>1.21</b>	<b>1.23</b>	<b>1.21</b>
WELLINGTON-HALTON						
Auto Person	9,100	9,500	9,300	9,800	9,400	9,800
Transit Person	580	260	180	310	190	350
Truck	1,200	1,400	1,100	1,300	1,100	1,300
<b>Total Person</b>	<b>9,600</b>	<b>9,800</b>	<b>9,500</b>	<b>10,100</b>	<b>9,800</b>	<b>10,100</b>
<b>Auto Occupancy</b>	<b>1.29</b>	<b>1.25</b>	<b>1.30</b>	<b>1.26</b>	<b>1.30</b>	<b>1.26</b>
HALTON-PEEL						
Auto Person	39,300	45,500	39,100	45,400	39,900	46,400
Transit Person	7,900	13,200	8,100	13,600	8,000	13,400
Truck	5,100	6,900	4,900	6,800	4,900	6,800
<b>Total Person</b>	<b>47,300</b>	<b>58,700</b>	<b>47,300</b>	<b>59,000</b>	<b>47,900</b>	<b>59,800</b>
<b>Auto Occupancy</b>	<b>1.23</b>	<b>1.20</b>	<b>1.24</b>	<b>1.21</b>	<b>1.24</b>	<b>1.21</b>
PEEL-YORK/TORONTO						
Auto Person	54,800	62,500	53,800	61,500	54,100	62,200
Transit Person	24,000	36,700	24,700	37,700	24,500	37,300
Truck	7,700	8,500	7,500	8,300	7,500	8,300
<b>Total Person</b>	<b>78,900</b>	<b>99,300</b>	<b>78,600</b>	<b>99,300</b>	<b>78,700</b>	<b>99,600</b>
<b>Auto Occupancy</b>	<b>1.24</b>	<b>1.24</b>	<b>1.26</b>	<b>1.26</b>	<b>1.26</b>	<b>1.26</b>

Note: Total person trips may be less than the sum of auto and transit person trips due to rounding.  
 \* GGH Model run for Alternative 3-1 was used to represent the patterns for Alternative 4-1, and Alternative 4-3 was used to represent the patterns for Alternatives 4-2, 4-3, 4-4, and 4-5.

**Exhibit 4-30: 2031 PM Peak Hour Cross-boundary trips (excluding externals)**

Alternatives 3-1 and 4-1 both rely on significant widening of existing facilities to accommodate inter-regional travel demands. In Alternative 4-1, a new corridor is provided between Highway 410 in Brampton and Highway 400 in Vaughan. Alternatives 4-2, 4-3, 4-4 and 4-5 provide similar levels of new road capacity as Alternative 3-1 and 4-1, except a greater share of this capacity is provided as a new corridor rather than as widening of existing roads.

As a result of this additional road capacity, cross-boundary transit trips for all alternatives decrease for Waterloo-

Wellington and Wellington-Halton, but increase modestly at other boundaries due to the influence of the Group #1 and Group #2 initiatives, which offset the effect of additional roadway capacity. For Alternatives 3-1 and 4-1, cross-boundary auto trips increase by 3% for Wellington-Halton, but decrease by 1%-2% at other boundaries. For Alternatives 4-2 to 4-5, cross boundary auto trips also increase by 3% for Wellington-Halton, but the Peel-Halton boundary also experiences a 2% increase and the Peel-York / Toronto boundary experiences a 1% reduction due to increased transit use.

Exhibit 4-31: Alternatives 3-1 and 4-1 – Cross boundary Trips, Transit Mode Share and Self-Containment

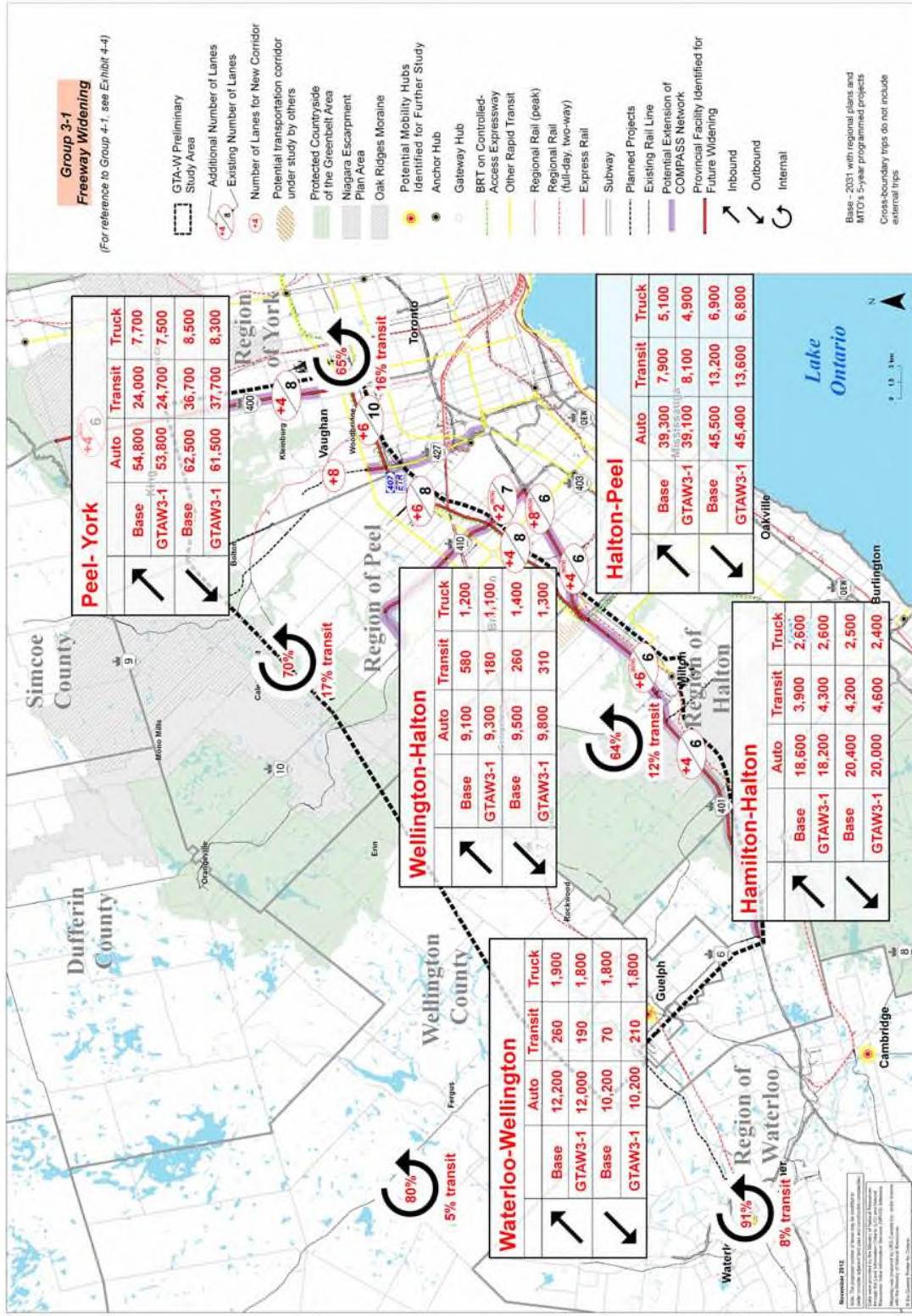
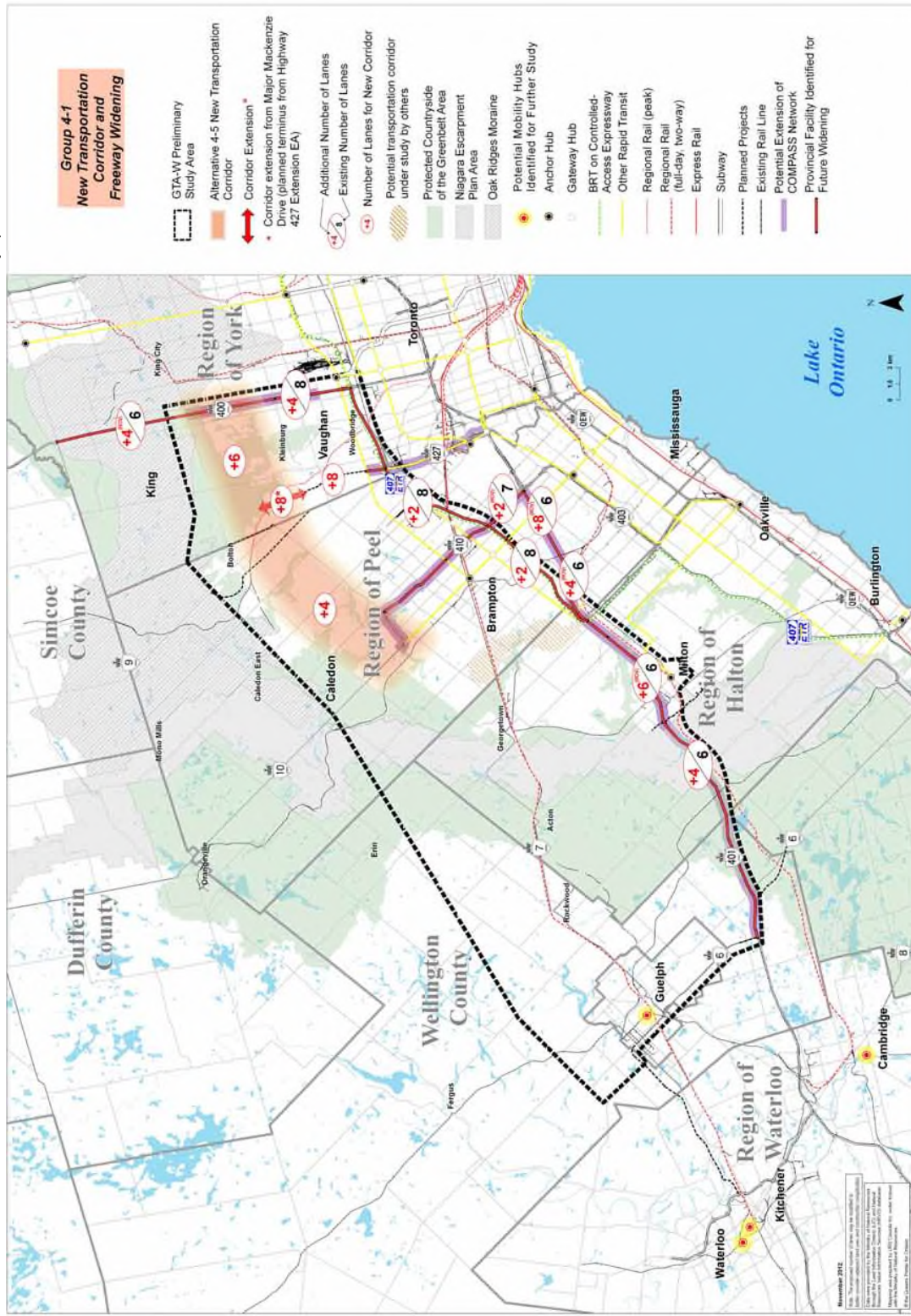


Exhibit 4-32: Alternatives 4-2, 4-3, 4-4 and 4-5 – Cross Boundary Trips, Transit Mode Share and Self-Containment



There is no change to the share of intra-regional trip-making (self-containment) as a result of Alternatives 3-1 and 4-1; however, the longer extent of new corridor in Alternatives 4-2 to 4-5 results in a 1% drop in municipal self-containment in Peel and Halton Regions. As a result, the average automobile trip length does not change from 20 kilometres in the Base Case to Alternatives 3-1 and 4-1, and it increases to 20.4 kilometres in Alternatives 4-2, 4-3, 4-4 and 4-5.

The increase in auto person trips observed at most of the boundaries with all of the GTA West alternatives suggests that the new road capacity is diverting some trips from transit; however, these shifts are being offset by the increase in transit ridership resulting from the Group #1 and Group #2 transit initiatives. As a result, all of the GTA West alternatives result in a 1%-2% increase in transit mode shares in Toronto, York, Peel and Halton. A 2% increase in mode share is anticipated in Wellington, Waterloo and Hamilton. The Group #1 and Group #2 TDM initiatives also offset the effect of highway widening, resulting in a modest increase in average passenger car occupancy.

The addition of new capacity to the transportation network can also play an important role in supporting existing and new inter-regional transit services. A new corridor can be used to provide bus-based transit services (similar to the popular 407 ETR GO Bus service) or a new transitway within the corridor that can be used for bus or rail based services. For Alternative 3-1, the potential to support transit opportunities is limited to improving the performance of current inter-regional transit services operating on existing corridors. For the new corridor alternatives, the potential person demand for inter-regional transit services was estimated as the forecasted commute trips during the three hour AM peak period.

In Alternative 4-1, there is an opportunity to introduce new inter-regional transit services on the new corridor between Brampton and Vaughan; forecasts suggest a potential market of 34,290 person trips (for a three hour peak period) between these municipalities by 2031. Alternative 4-2 provides a longer corridor that can be used to support new inter-regional transit services, effectively linking Vaughan and Brampton to Georgetown and to the 407 ETR transitway at the 407 ETR / Highway 401 interchange. This alternative serves

a similar demand between these municipalities, although it is recognized that this alternative has additional market potential due to the proximity of Georgetown and the Bram-West development areas to the new corridor.

Alternative 4-3 provides a new corridor that directly links Brampton and Vaughan to Milton, increasing the potential market served to 48,800 person trips by 2031. Alternatives 4-4 and 4-5 both provide a new corridor that links Vaughan, Brampton and Guelph, with a forecast person demand of 36,300 trips by 2031. These peak period demands are summarized in Exhibit 4-33.

ALTERNATIVE	2031 PEAK PERIOD PERSON TRIP DEMAND	COMMENTS
GTAW 3-1	N/A	No new inter-regional transit corridor opportunities
GTAW 4-1	34,290	Demand between Brampton and Vaughan
GTAW 4-2	35,000	Demand between Brampton and Vaughan
GTAW 4-3	48,800	Demand between Brampton, Vaughan and Milton
GTAW 4-4	36,300	Demand between Brampton, Vaughan and Guelph
GTAW 4-5	36,300	Demand between Brampton, Vaughan and Guelph

Exhibit 4-33: 2031 PM Peak Period Demand between Municipalities, by Alternative

Based on the above analysis, the GTA West corridor alternatives will have a very modest impact on regional commuting patterns between communities, although there is slight increase in automobile person travel compared to Base Case conditions. The resulting impacts to transit use are mitigated by the proposed transit and TDM measures contained within the Group #1 and #2 initiatives, which result in higher overall transit mode shares in all regions compared to Base Case conditions. Since the main differences in commuting patterns that were observed occur in all of the alternatives, it can be concluded that these changes are caused by the addition of new road capacity, and are less influenced by how that new capacity is added.

Alternative 4-3 provides the best support for new inter-regional transit services by providing a significant length of new corridor (that can also be used for new transit services)

combined with the highest potential demand between Urban Growth Centres directly served by the corridor.

### Assessment of Traffic Operations Performance - Screenline Analysis

Model runs for each of the GTA West alternatives were completed to develop forecasts of future traffic volumes on the road links in the preliminary study area. PM peak hour travel demand forecasts for the key inter-regional facilities were assessed to determine the screenline performance and how well each of the alternatives address 2031 roadway capacity issues. Future volume forecasts for the key inter-regional facilities in the preliminary study area were converted to AADT using current patterns of AADT compared to peak hour volumes. Exhibit 4-34 through Exhibit 4-39 illustrate the forecasted AADT and V/C ratios for the key segments of the preliminary study area's major inter-regional facilities for each alternative.

For Alternative 3-1, Highway 401 would be less congested to the west of Milton relative to Base Case conditions due to the proposed widening from six to 10 lanes. Highway 401 through Milton (near the 407 ETR interchange) would still operate at capacity with 12 lanes, and would also be at capacity with 10 lanes between the 407 ETR and Mavis Road. The widening of 407 ETR to 14 lanes between Highways 410 and 427, and to 16 lanes between Highways 427 and 400 would significantly improve the operation on this facility with V/C ratios below 0.80 (LOS D). Note that the modeling undertaken for this alternative did not include any additional widening of 407 ETR to the east of Highway 400; beyond the 10 lane cross section currently planned. For this alternative to successfully work, additional improvements on 407 ETR west of Highway 400 would need to be examined to transition from the 16 lane cross section west of Highway 400 down to the planned 10 lanes to the east. The improved operation of 407 ETR does provide some modest level of congestion relief to Highway 400 south of 407 ETR, although, due to the influence of tolling on the 407 ETR, this benefit is primarily oriented to passenger cars and does not accrue to commercial traffic to the same degree. Highway 410 would continue to operate at capacity even with the planned widening to eight lanes.

Exhibit 4-34: Alternatives 3-1 2031 Inter-Regional AADT and PM Peak Hour VIC Ratios

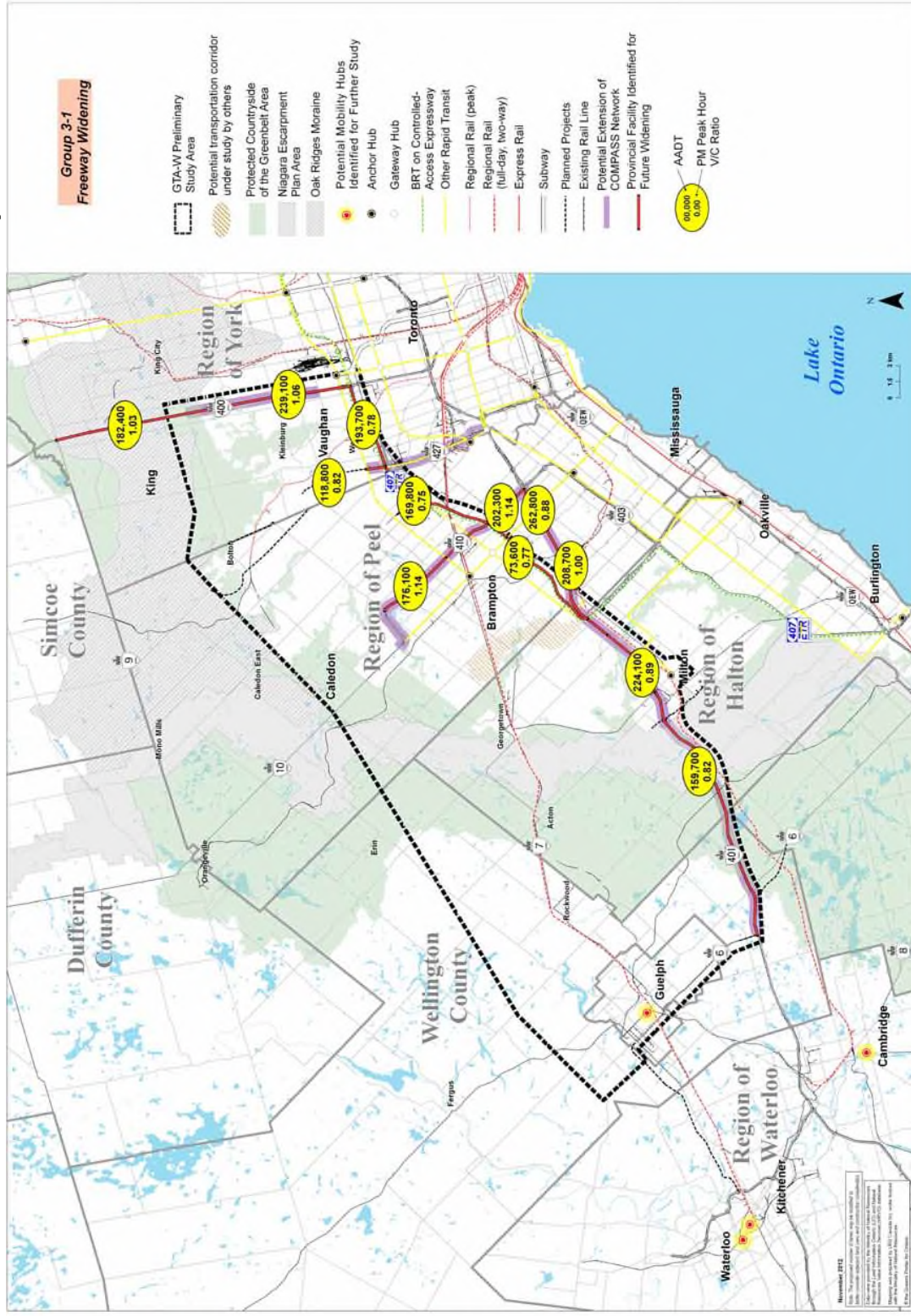


Exhibit 4-35: Alternative 4-1 2031 Inter-Regional AADT and PM Peak Hour V/C Ratios

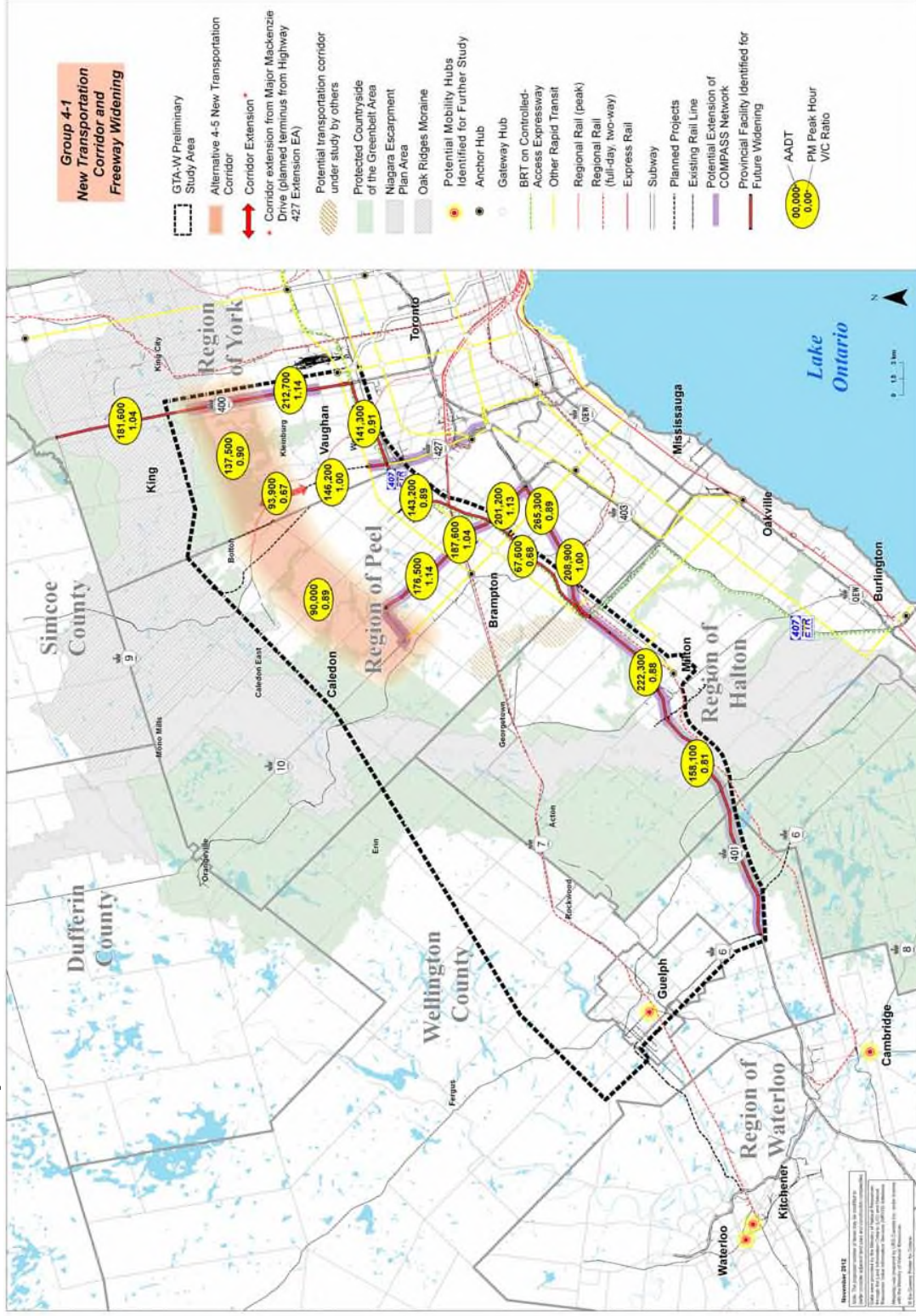


Exhibit 4-36: Alternative 4-2 2031 Inter-Regional AADT and PM Peak Hour V/C Ratios

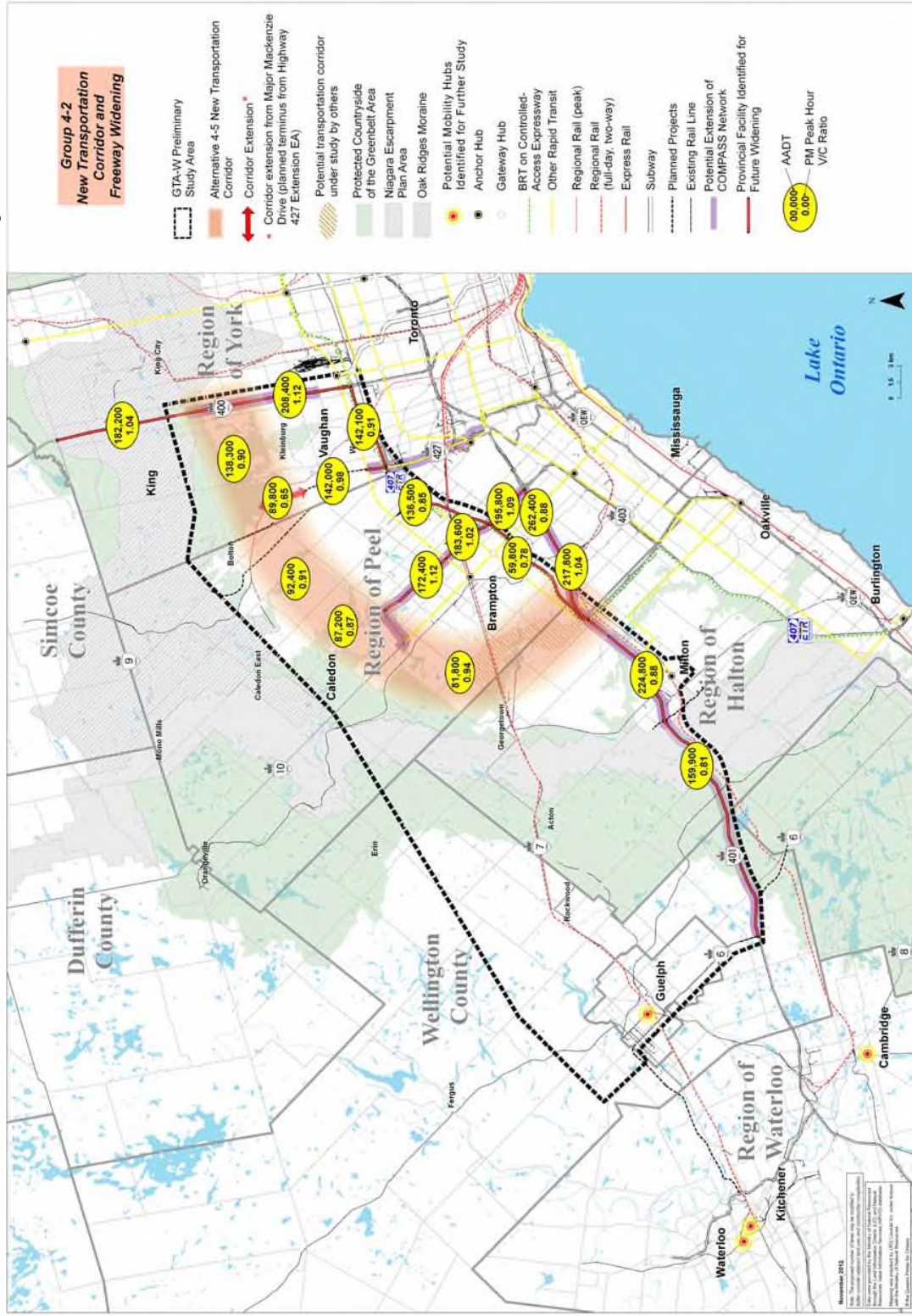


Exhibit 4-37: Alternative 4-3 2031 Inter-Regional AADT and PM Peak Hour V/C Ratios

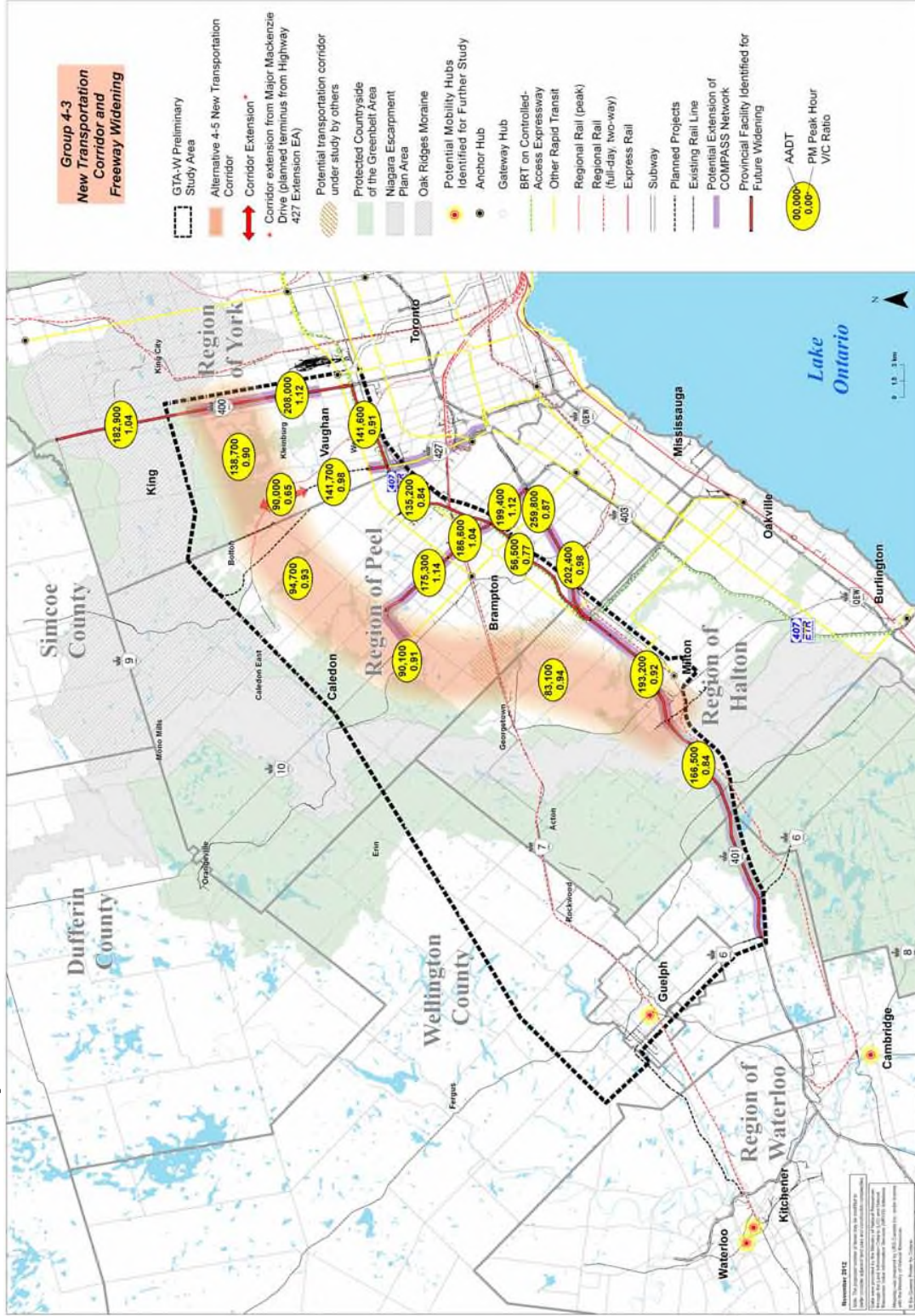




Exhibit 4-38: Alternative 4-4 2031 Inter-Regional AADT and PM Peak Hour V/C Ratios

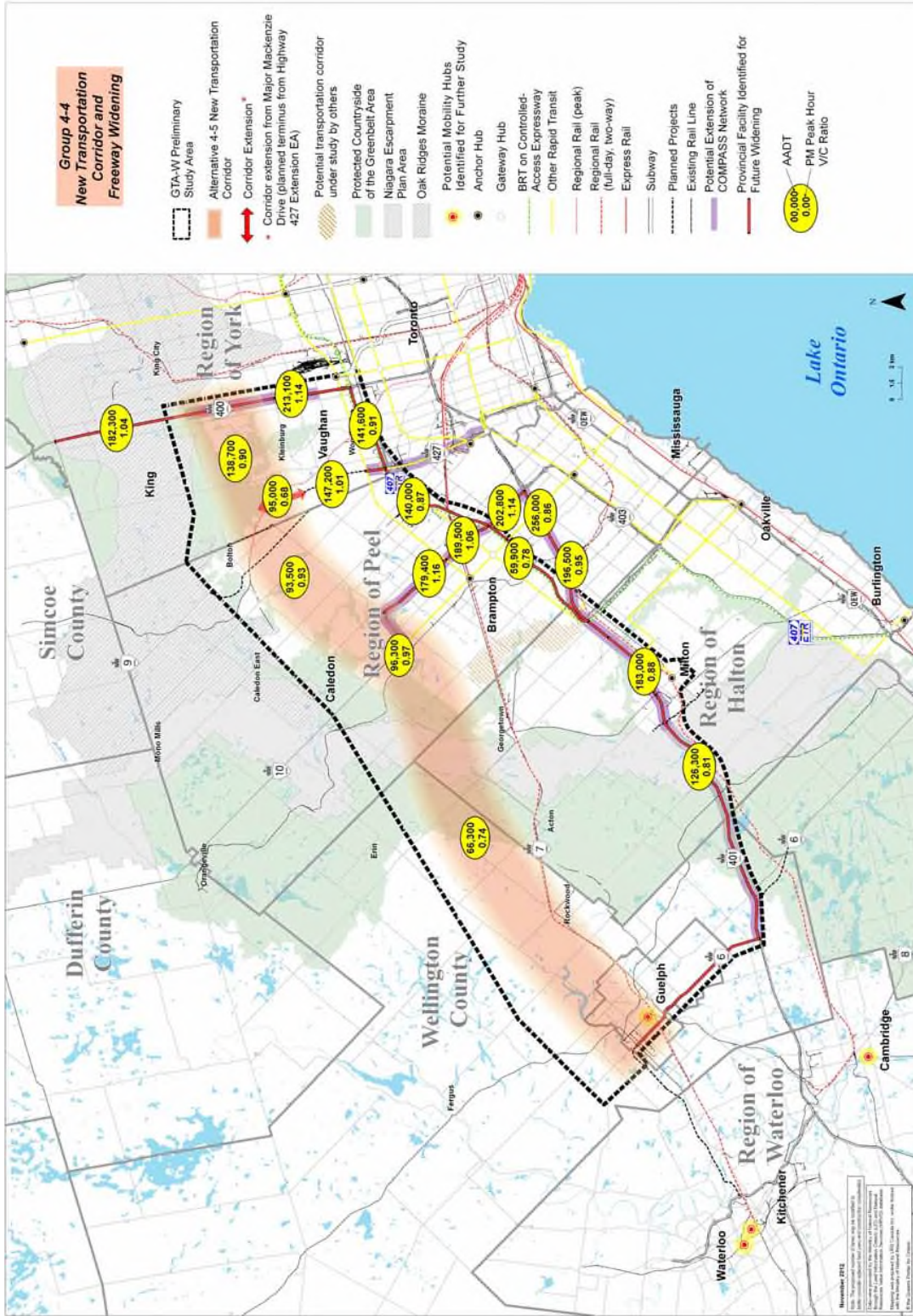
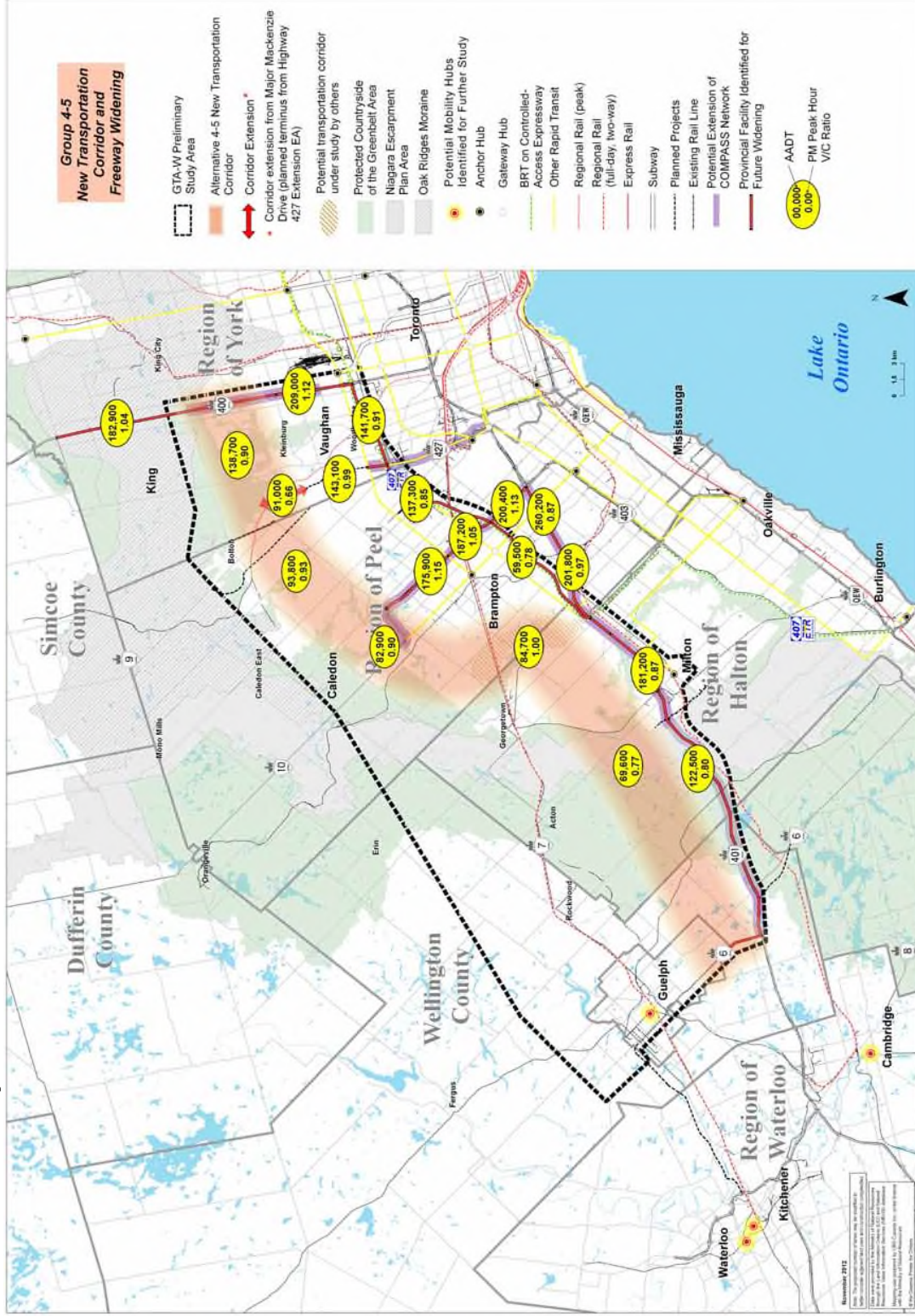


Exhibit 4-39: Alternative 4-5 2031 Inter-Regional AADT and PM Peak Hour V/C Ratios



SCREENLINE	BASE CASE	GTA WEST ALTERNATIVE					
		3-1	4-1	4-2	4-3	4-4	4-5
East of Guelph WB	1.04	0.82	0.82	0.82	0.84	0.80	0.75
West of Milton (East of Eramosa Townline and Tremaine Road) WB	0.95	0.82	0.82	0.82	0.76	0.77	0.77
East of Winston Churchill Boulevard WB	0.75	0.74	0.78	0.78	0.75	0.75	0.72
East of Highway 10 (Huronario Street) WB	0.82	0.76	0.78	0.76	0.76	0.77	0.76
East of Highway 50 WB	0.85	0.75	0.75	0.77	0.79	0.78	0.78
West of Highway 400 WB	0.98	0.82	0.87	0.87	0.87	0.87	0.87
North of Queen St NB	1.02	0.98	0.96	0.91	0.95	0.97	0.98

xxx - indicates V/C ratio greater than 0.9 (LOS E or F)

Exhibit 4-40: 2031 PM Peak Hour Screenline Evaluation – All Facilities

SCREENLINE	BASE CASE	GTA WEST ALTERNATIVE					
		3-1	4-1	4-2	4-3	4-4	4-5
East of Guelph WB	1.02	0.82	0.81	0.81	0.84	0.80	0.775
West of Milton (East of Eramosa Townline and Tremaine Road) WB	1.10	0.97	0.96	0.96	0.86	0.89	0.90
East of Winston Churchill Boulevard WB	0.79	0.80	0.86	0.83	0.82	0.82	0.82
East of Highway 10 (Huronario Street) WB	0.97	0.87	0.91	0.88	0.87	0.88	0.87
East of Highway 50 WB	0.76	0.65	0.76	0.79	0.80	0.79	0.80
West of Highway 400 WB	1.02	0.74	0.89	0.89	0.89	0.90	0.89
North of Queen St NB	1.14	1.14	1.14	1.12	1.14	1.16	1.15

xxx - indicates V/C ratio greater than 0.9 (LOS E or F)

Exhibit 4-41: 2031 PM Peak Hour Screenline Evaluation – Inter-Regional Facilities Only

Considering Alternative 4-1, the inter-regional highway system to the west of the Highway 401 / 407 ETR interchange is forecast to operate at similar levels as in Alternative 3-1. The 407 ETR between Highways 427 and 400 would operate at a worse level of service than in Alternative 3-1, as the extent of widening is not as great. This suggests that the limited extent of the new corridor in Alternative 4-1 does not draw enough inter-regional traffic off of the 407 ETR to provide a comparable level of congestion relief as does Alternative 3-1; however, its conditions are improved compared to the Base Case. The section of the new corridor between Highways 400 and 410 would operate at moderate levels of congestion and is forecast to carry between 90,000 and 138,000 vehicles per day. As a result, there is modest improvement in congestion on Highway 400 south of the 407 ETR. Highway 410 would continue to operate at capacity even with widening to eight lanes.

In addition to the congestion relief provided by Alternative 4-1, Alternative 4-2 reduces the demand and improves the level of congestion on Highway 401 between Highway 427 and the 407 ETR, and on Highway 401 through the Milton area. The new GTA West corridor would operate at moderate to major congestion through most of its extent, indicating significant usage and the possible need to widen this facility beyond the four to six lane cross section used in the model runs. This is due to a mix of traffic diverting from Highway 401, 407 ETR and from regional / local roads. The north-south portion of the GTA West corridor would operate with minor to moderate levels of congestion near the Highway 401 / 407 ETR interchange, indicating the need to provide additional capacity beyond the four lanes assumed in the initial model runs. This is consistent with the findings of the Halton Peel Boundary Area Transportation Study (HP BATS), which recommended a six to eight lane cross section for this section of the HP BATS corridor. The provision of a continuous new corridor between Highways 400 and 401 in the Milton area reduces traffic demands and congestion levels on Highway 400 to the south of 407 ETR for both automobiles and commercial vehicles.

Alternative 4-3 further builds upon these benefits by reducing traffic volumes through the Highway 401 / 407 ETR interchange, and reducing demands on Highway 401

through Milton, since the Alternative 4-3 corridor would connect to Highway 401 near the Tremaine Road interchange. Highway 401 through Milton would continue to approach capacity in this scenario, although it features 10 lanes on Highway 401 compared to the 12 lanes (requiring an express collector system) assumed for Alternative 4-2.

Alternative 4-4 features many similar congestion benefits as Alternative 4-3 to the east of Georgetown. This alternative assumes completion of the HP BATS corridor to connect with the new GTA West corridor, although this is not quite as effective in drawing traffic off of the other inter-regional facilities in the eastern portion of the preliminary study area, since the connection to Highway 401 is not as direct. For example, Highway 400, 407 ETR and Highway 410 all have higher volumes and worse v/c ratios in this scenario compared to Alternatives 4-2 or 4-3. The segment of the new GTA West corridor to the west of Georgetown would carry an estimated 66,000 vehicles per day and operate at good levels of service, reducing daily traffic volumes on Highway 401 between Guelph and Milton by about 24%, although the level of traffic reduction through Milton is reduced by only 5%. About 40% of the traffic using this new facility is being drawn from the local road network and Highway 7.

Alternative 4-5 operates very similarly to Alternative 4-4, although the more southerly alignment allows this route to provide more relief to the Highway 401 corridor through Milton and to the west of Milton. The segment to the west of Milton is forecast to carry about 70,000 vehicles per day and will operate at an acceptable level of service. This alternative also performs similarly to Alternative 4-3 in terms of providing relief to congested highways in the eastern part of the preliminary study area, including Highway 400, 407 ETR and Highway 410.

Based on forecasted traffic, comparisons of the PM peak hour screenline V/C ratios for all facilities and for inter-regional facilities are presented in Exhibit 4-40 and Exhibit 4-41. These results are presented for the peak direction of travel (typically westbound / northbound in the PM peak).

As shown, based on the screenline analysis results, Alternative 3-1 provides the best performance at three of the

seven key screenlines, and four of the seven screenlines when the performance of inter-regional facilities is considered alone. Alternative 3-1 tends to perform better in the east end of the preliminary study area due to the significant widening of the 407 ETR of up to 16 lanes, which provides significant capacity relief through the screenlines within Brampton and Vaughan. Alternatives 4-2 and 4-3 provide the best screenline performance on two of the screenlines, with Alternative 4-3 also providing the second best performance on two additional screenlines. Alternative 4-3 also provides the best performance for inter-regional facilities on two of the seven screenlines and ranks second on another screenline.

Alternatives 4-4 and 4-5 both rank the best on one of the seven screenlines and ranked second best on three to four of the other screenlines. These two alternatives tend to perform better in the west end of the preliminary study area than the other alternatives. Alternative 4-4 also ranks best on the east of Guelph screenline for inter-regional facilities due to the reduction in traffic on Highway 401. This alternative also ranks second best for inter-regional facilities on three other screenlines in the west portion of the preliminary study area. Alternative 4-5 does not perform as well on the inter-regional facilities, failing to rank best on any of the screenlines.

In summary, all of the alternatives would provide congestion relief compared to the Base Case. All of the east-west screenlines are forecast to operate at LOS D or better. In general, Alternative 3-1 would provide better screenline performance in the east end of the preliminary study area by widening existing facilities, while Alternative 4-3 or Alternative 4-4 would provide better relief in the west end. The north-south screenline would only experience marginal congestion relief under the alternatives but not on the inter-regional facilities. The inter-regional facilities were also assessed for congestion during the summer peak; results are presented in the *Transportation Model Technical Background Report* (February 2011).

**People Movement**

One of the primary objectives of the GTA West study is to develop a solution to improve the movement of people in the

preliminary study area. To achieve this, a series of criteria and performance measures were used, including:

- percentage of inter-regional and local road travel performing at LOS D or better;
- percentage of inter-regional trips using local roads;
- auto delays on the inter-regional and local road networks (Delay is measured as the time taken to travel a certain distance over and above the free flow travel time for that distance, i.e. forecast travel time minus free flow travel time. It is measured in vehicle-hours (vehicular volume \* hours of delay); and
- average vehicle occupancy on the road network.

For the purpose of this assessment, an inter-regional trip is defined as trip that is longer than the average commuting distance within the preliminary study area, which was estimated at 20 kilometres based on 2006 Census results.

**Exhibit 4-42** summarizes the modeling results and quantitative measures used to evaluate how well the GTA West alternatives perform in terms of people movement relative to the Base Case scenario. Alternative 3-1 provides the best performance

in terms of the share of inter-regional road network operating at LOS D or better. With Alternative 3-1, approximately 43% of travel on the inter-regional road network (measured in terms of auto kilometres of travel) is forecast to operate at better than LOS D. This is approximately twice that achieved for the Base Case, which forecasts 22% of the inter-regional road network travelling at LOS D or better. These results are primarily due to the extensive widening proposed for existing inter-regional facilities in the preliminary study area, which already carry a significant amount of traffic in the network. Alternatives 4-4 and 4-5 are the next best performing alternatives in terms of share of inter-regional road network operating at LOS D or better, with 36% and 35% respectively. These two alternatives add a significant amount of inter-regional capacity to the overall system, and the western end of this network would operate at good levels of service as a result of demands. Alternatives 4-1, 4-2, and 4-3 all result in 32% of the travel on the inter-regional network performing at LOS D or better, which is about 30% better than the Base Case conditions. Although these alternatives vary in the length of the new corridor that is provided, modeling results indicate that the new facilities would be well utilized, with volumes approaching the capacity of the new facilities.

CRITERIA	BASE CASE	GTA WEST ALTERNATIVE				
		3-1	4-1	4-2	4-3	4-4
% of inter-regional roadway auto network better than LOS D (auto veh-km)	22%	43%	32%	32%	32%	35%
% of local roadway auto network better than LOS D (auto veh-km)	54%	66%	72%	70%	70%	70%
Auto delay on inter-regional roadway network (auto veh-hr)	24,266	18,245 (6,021)	19,944 (4,321)	21,102 (3,164)	21,001 (3,265)	20,582 (3,684)
Auto delay on local roadway network (auto veh-hr)	41,737	27,385 (14,351)	24,862 (16,875)	22,349 (19,387)	23,523 (18,214)	23,931 (17,806)
% of inter-regional auto travel using local roads	61%	52%	49%	47%	47%	47%

(XXX) indicates reduction from the Base Case

**Exhibit 4-42: 2031 PM Peak Hour Alternatives Evaluation - People Movement**

The performance of the local road network is better served by Alternative 4-2, with approximately 72% of the auto travel on the local road network operating at LOS D or better. Alternative 4-2 includes a new corridor that attracts east-west demand from the busy regional road network in Brampton and Vaughan plus north-south demand from the Georgetown and West Brampton growth areas. This alternative represents a 33% improvement compared to the Base Case scenario, which results in 54% of the travel on the local road network operating at LOS D or better. Alternatives 4-3, 4-4, and 4-5 all result in about 70% of the local network travelling at LOS D or better, while Alternatives 3-1 and 4-1 result in 66% and 68% respectively.

Auto delays on the transportation network represent a significant drain on our economy and place the GGH at a competitive disadvantage to other regions in terms of attracting new investment and maintaining our current transportation dependent industries. As shown in **Exhibit 4-43**, the combined auto delay savings on the local and inter-regional road network within the GTA West preliminary study area is estimated at 22,550 veh-hours for Alternative 4-2. Alternatives 4-3 and 4-4 result in overall delay savings of about 21,500 veh-hours, followed by Alternative 4-5 and 4-1, which result in overall delay savings of about 21,200 veh-hours. Alternative 3-1, while performing the best for inter-regional facilities, results in the lowest overall delay savings of the GTA West alternatives.

ALTERNATIVE	INTER-REGIONAL ROAD SAVINGS	LOCAL ROAD SAVINGS	TOTAL SAVINGS
3-1	6,021	14,352	20,373
4-1	4,321	16,875	21,196
4-2	3,164	19,388	22,552
4-3	3,265	18,214	21,479
4-4	3,684	17,806	21,490
4-5	3,751	17,427	21,178

**Exhibit 4-43: 2031 PM Peak Hour Delay Savings by Alternative (auto veh-hours)**

The share of inter-regional trips using the local road network is an important measure of how well the transportation network is serving the different travel demand markets in an area. For the Base Case scenario, approximately 61% of the

inter-regional auto trips in the preliminary study area will use the local road network. Alternatives 4-2, 4-3, 4-4 and 4-5 reduce this use to about 47%, as the new corridors pass through the growth areas of Brampton and Vaughan and draw longer distance traffic off of the local road network. These alternatives do a better job of shifting longer distance traffic to the inter-regional road network than Alternatives 3-1 and 4-1, which place a greater emphasis on widening of existing facilities, which tend to be located to the south of the emerging growth areas.

System reliability and redundancy are also important considerations in the evaluation of how well a transportation network supports person movement. Reliability of the transportation network affects the lives of commuters and business travellers alike and in networks with high levels of congestion, incidents that reduce the capacity (e.g. accidents, weather conditions, and construction) can have dramatic impacts on users. Adding new capacity can increase the level of reliability of existing corridors, as the stop-and-go conditions will occur more readily when demand approaches the physical capacity of the facility. A new route can also improve reliability by improving system-wide capacity and providing an alternate route that can be used during incidents that affect another route.

Alternative 3-1 does not provide any new alternate routes for inter-regional transportation, beyond new transit corridors recommended in the Metrolinx RTP. This alternative provides increased inter-regional road capacity on the existing freeway system, which can support improved transportation system reliability. Alternative 4-1 provides potential to improve transportation system reliability with a new inter-regional corridor over a portion of the preliminary study area. Alternatives 4-2 and 4-3 improve upon this by increasing the length of the new alternate corridor. This alternate route has an enhanced potential to improve transportation system reliability. Both Alternatives 4-4 and 4-5 provide a new alternate corridor between Highways 400 and 6 in Guelph, encompassing the entire GTA West preliminary study area. Although the Highway 6 connection to Highway 401 is not as efficient as a direct connection to Highway 401, the new east-west corridor provides route choice to both commuter and long distance traffic and creates the potential to improve

transportation system reliability throughout the preliminary study area.

**Goods Movement**

Similar to people movement, improved goods movement is one of the critical objectives of the GTA West study. To assess how well the various alternatives improve goods movement in the preliminary study area, a series of criteria and performance measures were used including:

- percentage of inter-regional road network performing at LOS D or better;
- percentage of inter-regional truck trips using local roads; and
- truck delays on the inter-regional road networks.

Commercial vehicle demands for the 2031 horizon year were obtained from MTO's commercial vehicle model. The commercial vehicle demand from the MTO model was adjusted to reflect the anticipated benefits of the Group #1 and Group #2 initiatives that are designed to encourage longer distance truck traffic to shift to rail-based travel. Based on a review of the commodities being shipped by truck at the various CVS stations, it was estimated that these policy initiatives could result in a 10% reduction in longer distance truck trips that are over 500 kilometres in length. This reduction was applied to the truck travel demands prior to running the model to assess the GTA West alternatives. **Exhibit 4-44** summarizes the quantitative measures used to evaluate the alternatives in terms of goods movement.

For the Base Case scenario, only 13% of the PM Peak Hour truck travel on the inter-regional road network is forecast to operate at LOS D or better by 2031. This represents a significant amount of delay to commercial goods movement in the region, which could significantly impact the competitiveness of industries and the costs of the goods. All of the alternatives improve upon this to some degree, with Alternatives 3-1, 4-4 and 4-5 all ranking the best in terms of improving the share of truck travel operating at LOS D or better. Alternative 3-1 provides significant new capacity on the existing freeway network in the preliminary study area, which improves operation of these corridors that are heavily

CRITERIA	BASE CASE	ALTERNATIVE					
		3-1	4-1	4-2	4-3	4-4	4-5
% of inter-regional truck roadway network better than LOS D (truck-km)	13%	37%	32%	32%	30%	37%	36%
Truck delay on inter-regional roadway network (truck-hr)	5,857	2,884 (2,973)	3,020 (2,837)	3,069 (2,788)	3,075 (2,783)	2,957 (2,900)	2,954 (2,903)
% of inter-regional truck travel using local roads	30%	28%	28%	25%	25%	24%	25%

(XXX) Indicator reduction from the Base Case

Exhibit 4-44: 2031 PM Peak Hour Alternatives Evaluation - Goods Movement

used by trucks. Alternatives 4-4 and 4-5 provide a similar level of improvement due to the influence of the new corridor that provides an alternate route for longer distance trucks to by-pass the congested areas in Milton and Mississauga to access Highway 400 and the industrial nodes in northern Brampton and Vaughan. Alternatives 4-1, 4-2 and 4-3 also provide a significant improvement compared to the Base Case, although they do not perform as well as the other alternatives.

Alternatives 3-1, 4-4, and 4-5 would all reduce the amount of truck delays on the inter-regional road network by around 50% compared to the Base Case scenario, representing a reduction of about 3,000 vehicle-hours during the afternoon peak hour. Alternative 4-1 would reduce the amount of auto delays on inter-regional facilities by about 2,800 vehicle-hours and Alternatives 4-2 and 4-3 reduce truck delays by just less than 2,800 veh-hours. All of these alternatives represent considerable improvements to commercial vehicle travel times during peak periods, which helps shippers and manufacturers maintain the efficiency of their just-in-time manufacturing processes.

Improving access to areas or facilities that support or rely on goods movement is also an important consideration. Alternative 3-1 provides improved inter-regional accessibility to inter-modal facilities and employment centres that are oriented in close proximity to the existing freeway network, although connections to new industrial areas are not served as

well. Alternative 4-1 provides improved inter-regional goods movement between Brampton and Vaughan through the new corridor between Highways 410 and 400 and connectivity to the Highway 427 extension. Alternatives 4-2 and 4-3 improve upon this by providing improved inter-regional goods movement connectivity between Highways 400 and 401. This new corridor will link the Highway 400 corridor, the Canadian National (CN) inter-modal yard (via the Highway 427 extension), and the inter-modal facilities in Milton, along with enhanced accessibility to new industrial growth areas in Brampton and Halton Hills. Alternatives 4-4 and 4-5 also provide improved inter-regional goods movement with a new corridor between Highway 400 and Highway 6 in the Guelph area.

One of the key issues for truck movements in the GTA West preliminary study area is the congestion in the Highway 400 / Highway 401 interchange area. For truck movements to and from Simcoe County (and points north along Highway 400 and Highway 11), this congestion represents significant amounts of delay added to these trips. The cost of truck tolls on the 407 ETR make this route less attractive to trucks, although this is expected to change over time as congestion levels continue to grow. As a result, there are a number of truck trips that utilize the local and county road network to the north of the GTA West preliminary study area to travel between Simcoe County and the Highway 401 corridor to the west of the GTA. This pattern was also identified in the Area Transportation System Problems and Opportunities Report

(July 2009). Updated December 2010) and was raised by a number of industry and local stakeholders.

Based on the modeling results, the Alternative 4-3 corridor would support truck traffic demands to / from Simcoe County and points to the north. As a result, the number of commercial vehicle tips taking these northern routes is reduced by about 25% compared to the Base Case, or the equivalent of about 100 trucks per hour in the PM peak hour. A similar level of diversion would also be anticipated for Alternative 4-2. For Alternatives 4-4 and 4-5, which provide a new corridor connection to Highway 6 in the Guelph area, the truck traffic using the northern routes is forecast to be about 46% lower than the Base Case, amounting to a reduction of about 200 trucks in the PM peak hour.

**Modal Integration and Linking Population and Growth Centres**

As the movement of people is a critical objective of the GTA West study, the Study Team evaluated the alternatives for their potential to improve modal integration, balance and choice for movement of people between activity centres.

The evaluation findings for all transportation criteria are shown in Exhibit 4-45.

FACTOR	MEASURE	3-1	4-1	4-2	4-3	4-4	4-5	
TRAFFIC OPERATIONS Potential impact on traffic operations due to factors such as design features and transportation network connections	Peak period performance of key corridors – forecast volume/capacity ratio at critical screenlines	East of Guelph – 0.82 West of Milton – 0.82 East of Winston Churchill (WC Blvd) – 0.74 East of Highway 10 – 0.76 East of Highway 50 – 0.75 West of Highway 400 – 0.82 North of Highway 407 – 0.98	East of Guelph – 0.82 West of Milton – 0.82 East of Winston Churchill (WC Blvd) – 0.78 East of Highway 10 – 0.78 East of Highway 50 – 0.75 West of Highway 400 – 0.87 North of Highway 407 – 0.96	East of Guelph – 0.82 West of Milton – 0.82 East of Winston Churchill (WC Blvd) – 0.78 East of Highway 10 – 0.76 East of Highway 50 – 0.77 West of Highway 400 – 0.87 North of Highway 407 – 0.91	East of Guelph – 0.84 West of Milton – 0.76 East of Winston Churchill (WC Blvd) – 0.75 East of Highway 10 – 0.76 East of Highway 50 – 0.79 West of Highway 400 – 0.87 North of Highway 407 – 0.95	East of Guelph – 0.80 West of Milton – 0.77 East of Winston Churchill (WC Blvd) – 0.75 East of Highway 10 – 0.77 East of Highway 50 – 0.78 West of Highway 400 – 0.87 North of Highway 407 – 0.97	East of Guelph – 0.77 West of Milton – 0.77 East of Winston Churchill (WC Blvd) – 0.72 East of Highway 10 – 0.76 East of Highway 50 – 0.78 West of Highway 400 – 0.87 North of Highway 407 – 0.98	East of Guelph – 0.75 West of Milton – 0.77 East of Winston Churchill (WC Blvd) – 0.72 East of Highway 10 – 0.76 East of Highway 50 – 0.78 West of Highway 400 – 0.87 North of Highway 407 – 0.98
	Peak period performance of key inter-regional corridors – forecast volume/capacity ratio at critical screenlines	East of Guelph – 0.82 West of Milton – 0.97 East of Winston Churchill (WC Blvd) – 0.80 East of Highway 10 – 0.87 East of Highway 50 – 0.65 West of Highway 400 – 0.74 North of Highway 407 – 1.14	East of Guelph – 0.81 West of Milton – 0.96 East of Winston Churchill (WC Blvd) – 0.86 East of Highway 10 – 0.91 East of Highway 50 – 0.76 West of Highway 400 – 0.89 North of Highway 407 – 1.14	East of Guelph – 0.81 West of Milton – 0.96 East of Winston Churchill (WC Blvd) – 0.83 East of Highway 10 – 0.88 East of Highway 50 – 0.79 West of Highway 400 – 0.89 North of Highway 407 – 1.12	East of Guelph – 0.84 West of Milton – 0.86 East of Winston Churchill (WC Blvd) – 0.82 East of Highway 10 – 0.87 East of Highway 50 – 0.80 West of Highway 400 – 0.89 North of Highway 407 – 1.14	East of Guelph – 0.80 West of Milton – 0.89 East of Winston Churchill (WC Blvd) – 0.82 East of Highway 10 – 0.88 East of Highway 50 – 0.79 West of Highway 400 – 0.90 North of Highway 407 – 1.16	East of Guelph – 0.77 West of Milton – 0.90 East of Winston Churchill (WC Blvd) – 0.82 East of Highway 10 – 0.87 East of Highway 50 – 0.80 West of Highway 400 – 0.89 North of Highway 407 – 1.15	East of Guelph – 0.77 West of Milton – 0.90 East of Winston Churchill (WC Blvd) – 0.82 East of Highway 10 – 0.87 East of Highway 50 – 0.80 West of Highway 400 – 0.89 North of Highway 407 – 1.15
Potential to provide for higher order inter-regional transportation corridors (qualitative)	Percentage of inter-regional trips* on key inter-regional corridors at critical screenlines	East of Guelph – 82% West of Milton – 78% East of Winston Churchill (WC Blvd) – 85% East of Highway 10 – 73% East of Highway 50 – 67% West of Highway 400 – 63% North of Highway 407 – 58%	East of Guelph – 82% West of Milton – 78% East of Winston Churchill (WC Blvd) – 85% East of Highway 10 – 71% East of Highway 50 – 74% West of Highway 400 – 71% North of Highway 407 – 59%	East of Guelph – 81% West of Milton – 78% East of Winston Churchill (WC Blvd) – 84% East of Highway 10 – 76% East of Highway 50 – 74% West of Highway 400 – 70% North of Highway 407 – 63%	East of Guelph – 83% West of Milton – 84% East of Winston Churchill (WC Blvd) – 87% East of Highway 10 – 76% East of Highway 50 – 73% West of Highway 400 – 70% North of Highway 407 – 60%	East of Guelph – 85% West of Milton – 82% East of Winston Churchill (WC Blvd) – 87% East of Highway 10 – 75% East of Highway 50 – 73% West of Highway 400 – 70% North of Highway 407 – 60%	East of Guelph – 87% West of Milton – 84% East of Winston Churchill (WC Blvd) – 90% East of Highway 10 – 75% East of Highway 50 – 73% West of Highway 400 – 70% North of Highway 407 – 59%	East of Guelph – 87% West of Milton – 84% East of Winston Churchill (WC Blvd) – 90% East of Highway 10 – 75% East of Highway 50 – 73% West of Highway 400 – 70% North of Highway 407 – 59%
	Potential to provide for higher order inter-regional transportation corridors (qualitative)	No new inter-regional transportation corridors beyond new transit corridors.	Provides new higher order inter-regional transportation corridor over a short distance.	Provides new higher order inter-regional transportation corridor over approximately half of the study area.	Provides new higher order inter-regional transportation corridor over a long distance east of the Niagara Escarpment areas.	Provides new higher order inter-regional transportation corridor over the full study area.	Provides new higher order inter-regional transportation corridor over the full study area.	Provides new higher order inter-regional transportation corridor over the full study area.

Exhibit 4-45: Transportation Evaluation

FACTOR	MEASURE	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)	4-1 REDUCED HIGHWAY 407 WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
COMMUTER TRAVEL CHARACTERISTICS  Potential impact on commuter trip distribution and trip length	Percentage of peak period self-trips with the municipality/region	York – 65% Toronto – 69% Peel – 70% Halton – 64% Wellington – 80% Waterloo – 91% Hamilton – 80% Brant – 88%	York – 65% Toronto – 69% Peel – 70% Halton – 64% Wellington – 80% Waterloo – 91% Hamilton – 80% Brant – 88%	York – 65% Toronto – 69% Peel – 69% Halton – 63% Wellington – 80% Waterloo – 91% Hamilton – 80% Brant – 88%	York – 65% Toronto – 69% Peel – 69% Halton – 63% Wellington – 80% Waterloo – 91% Hamilton – 80% Brant – 88%	York – 65% Toronto – 69% Peel – 69% Halton – 63% Wellington – 80% Waterloo – 91% Hamilton – 80% Brant – 88%	York – 65% Toronto – 69% Peel – 69% Halton – 63% Wellington – 80% Waterloo – 91% Hamilton – 80% Brant – 88%
	Average automobile trip length	20.0	20.0	20.4	20.4	20.4	20.4
EFFICIENT MOVEMENT OF PEOPLE  Potential to support the efficient movement of people between communities and regions by road	Potential to support transit opportunities on a new corridor*	Does not provide opportunities for new transit linkages on a new corridor; road widenings may provide for improved transit services on existing corridors	Provides opportunities for new transit linkages between Urban Growth Centres of Vaughan and Brampton; total demand between these points is approximately 34,290 persons	Provides opportunities for new transit linkages between Urban Growth Centres of Vaughan and Brampton; total demand between these points is approximately 35,000 persons	Provides opportunities for new transit linkages between Urban Growth Centres of Vaughan, Brampton and Milton; total demand between these points is approximately 48,800 persons	Provides opportunities for new transit linkages between Urban Growth Centres of Vaughan, Brampton and Guelph; total demand between these points is approximately 36,300 persons	Provides opportunities for new transit linkages between Urban Growth Centres of Vaughan, Brampton and Guelph; total demand between these points is approximately 36,300 persons
	Percentage of inter-regional network operating better than LOS D (automobile km)	43%	32%	32%	32%	35%	35%
EFFICIENT MOVEMENT OF PEOPLE  Potential to support the efficient movement of people between communities and regions by road	Percentage of local road network operating better than LOS D (automobile km)	66%	68%	72%	70%	70%	70%
	Percentage inter-regional automobile trips* using the local road network	52%	49%	47%	47%	47%	47%
EFFICIENT MOVEMENT OF PEOPLE  Potential to support the efficient movement of people between communities and regions by road	Automobile hours of delay on the inter-regional transportation network* (automobile hours)	18,245 (-6,021 from base)	19,944 (-4,321 from base)	21,102 (-3,164 from base)	21,001 (-3,265 from base)	20,582 (-3,684 from base)	20,515 (-3,751 from base)
	Automobile hours of delay on the local transportation network* (automobile hours)	27,385 (-1,4351 from base)	24,862 (-16,875 from base)	22,349 (-19,387 from base)	23,523 (-18,214 from base)	23,931 (-17,806 from base)	24,310 (-17,427 from base)



FACTOR	MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
	WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)	1.30 Wellington-Halton: 19,600 Halton-Peel: 106,500 Peel-York: 178,400	1.30 Wellington-Halton: 19,600 Halton-Peel: 106,500 Peel-York: 178,400	1.30 Wellington-Halton: 19,800 Halton-Peel: 107,900 Peel-York: 178,800	1.30 Wellington-Halton: 19,800 Halton-Peel: 107,900 Peel-York: 178,800	1.30 Wellington-Halton: 19,800 Halton-Peel: 107,900 Peel-York: 178,800	1.30 Wellington-Halton: 19,800 Halton-Peel: 107,900 Peel-York: 178,800
<b>EFFICIENT MOVEMENT OF GOODS</b>	Average automobile vehicle occupancy Total persons moved in study area	37%	32%	32%	30%	37%	36%
Potential to support the efficient movement of goods between communities and regions by road	Percentage of inter-regional system operating better than LOS D (truck km) Percentage inter-regional truck trips* using the local road network Truck hours of delay on the inter-regional transportation network	28% 28% 2,884 (-2,973 from base)	28% 28% 3,020 (-2,837 from base)	25% 25% 3,069 (-2,788 from base)	25% 25% 3,075 (-2,783 from base)	24% 24% 2,957 (-2,900 from base)	25% 25% 2,954 (-2,903 from base)
<b>SYSTEM RELIABILITY/ REDUNDANCY</b>	Availability of alternate routes/ facilities for inter-regional transportation between regions, communities and terminals (qualitative) Potential to support system reliability and redundancy for travel (people and goods) between regions and communities during adverse conditions	No new alternate routes for inter-regional transportation beyond new transit corridors; provides increased inter-regional capacity on freeway system. Potential to improve transportation system reliability with increased inter-regional road and transit capacity.	New alternate corridor between Hwy 400 and 410, plus new transit corridors and increased roadway capacity throughout the study area. Potential to improve transportation system reliability with new inter-regional corridor over a short distance and increased road and transit capacity.	New alternate corridor between Hwy 400 and 401/407 ETR, plus new transit corridors and increased roadway capacity throughout the study area. Potential to improve transportation system reliability with new inter-regional corridor over a moderate distance and increased road and transit capacity.	New alternate corridor between Hwy 400 and 401 east of the Niagara Escarpment areas, plus new transit corridors and increased roadway capacity throughout the study area; direct connection to Hwy 401 provides ease of route choice. Potential to improve transportation system reliability with new inter-regional corridor east of the Niagara Escarpment areas and increased road and transit capacity.	New alternate corridor between Hwy 400 and Highway 6 north of Hwy 401, plus new transit corridors and increased roadway capacity throughout the study area; connection to Hwy 401 via Hwy 6 through Guelph, opportunity to connect to New Hwy 7 corridor between Guelph and Kitchener-Waterloo provides new route choice. Potential to improve transportation system reliability with new inter-regional corridor across the entire study area and increased road and transit capacity.	New alternate corridor between Hwy 400 and Highway 6 north of Hwy 401, plus new transit corridors and increased roadway capacity throughout the study area; connection to Hwy 401 via short section of Hwy 6 provides route choice. Potential to improve transportation system reliability with new inter-regional corridor across the entire study area and increased road and transit capacity.
<b>SAFETY</b>	Potential to improve response times for emergency service providers due to reduced congestion on the inter-regional road network (refer to LOS in Traffic Operations) Potential to reduce collisions due to improved network (refer to LOS in Traffic Operations)	Provides safety and response time benefits due to improvement in transportation system congestion from increased road capacity. No system alternatives to accommodate traffic during closures. Major potential to reduce collisions due to improved network performance.	Provides some safety and response time benefits due to improvement in transportation system congestion from new corridor between Hwy 400 and 410 and increased road capacity. Limited length of new corridor does not provide significant benefits for routing traffic during closures. Major potential to reduce collisions due to improved network performance.	Provides safety and response time benefits due to improvement in transportation system congestion from new corridor between Hwy 400 and 401/407 ETR and increased road capacity. New route connection to Hwy 401 provides alternate to accommodate traffic during closures. Major potential to reduce collisions due to improved network performance.	Provides safety and response time benefits due to improvement in transportation system congestion from new corridor between Hwy 400 and 401 east of the Niagara Escarpment areas and increased road capacity. New route connection to Hwy 401 provides alternate to accommodate traffic during closures. Major potential to reduce collisions due to improved network performance.	Provides safety and response time benefits due to improvement in transportation system congestion from new corridor between Hwy 400 and Hwy 6 north of Hwy 401 and increased road capacity. New route provides alternate to accommodate traffic during closures. Major potential to reduce collisions due to improved network performance.	Provides safety and response time benefits due to improvement in transportation system congestion from new corridor between Hwy 400 and Hwy 6 north of Hwy 401 and increased road capacity. New route provides alternate to accommodate traffic during closures. Major potential to reduce collisions due to improved network performance.

FACTOR	MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
MODAL INTEGRATION, BALANCE AND CHOICE FOR MOVEMENT OF PEOPLE (COMMUTERS, RECREATION/TOURIST)	Potential to increase attractiveness/ effectiveness of existing, new and improved transit services (qualitative)	Potential to improve attractiveness / effectiveness of inter-regional transit on existing corridors due to widened freeways.	Moderate potential to increase attractiveness / effectiveness of inter-regional transit on existing corridors due to widened freeways. Opportunity to introduce new services on a new corridor over a short distance (Hwy 410 to Hwy 400).	Moderate potential to increase attractiveness / effectiveness of inter-regional transit on existing corridors. Opportunity to introduce new services on a new corridor (Hwy 401/407 ETR to Hwy 400).	Significant potential to increase attractiveness / effectiveness of inter-regional transit by introducing new services on a new corridor over a moderate distance (West of Milton – Hwy 400).	Significant potential to increase attractiveness / effectiveness of inter-regional transit by introducing new services on a new corridor over the entire study area.	Significant potential to increase attractiveness / effectiveness of inter-regional transit by introducing new services on a new corridor over the entire study area.
Potential to improve modal integration, balance and choice for person trips between communities, employment centers and major transit hubs	Peak period transit mode share (by destination)	York = 36% Toronto = 36% Peel = 16% Halton = 10% Wellington = 3% Waterloo = 9% Hamilton = 9%	York = 36% Toronto = 36% Peel = 16% Halton = 10% Wellington = 3% Waterloo = 9% Hamilton = 9%	York = 36% Toronto = 36% Peel = 16% Halton = 10% Wellington = 3% Waterloo = 9% Hamilton = 9%	York = 36% Toronto = 36% Peel = 16% Halton = 10% Wellington = 3% Waterloo = 9% Hamilton = 9%	York = 36% Toronto = 36% Peel = 16% Halton = 10% Wellington = 3% Waterloo = 9% Hamilton = 9%	York = 36% Toronto = 36% Peel = 16% Halton = 10% Wellington = 3% Waterloo = 9% Hamilton = 9%
	Provision of higher order inter-regional transit services (Qualitative)	Higher order inter-regional transit services limited to existing / widened inter-regional freeways.	Limited potential for new higher order inter-regional transit on new corridor over a short distance.	Potential for new higher order inter-regional transit on new corridor over approximately half of the study area.	Potential for new higher order inter-regional transit on new corridor east of Niagara Escarpment areas.	Potential for new higher order inter-regional transit on new corridor over the entire study area.	Potential for new higher order inter-regional transit on new corridor over the entire study area.
	Provision of linkages between inter-regional and regional/ community (local) transit systems (Qualitative)	Minor potential to improve linkages between inter-regional and local transit with improved service integration and new opportunities for station locations and service connections on widened inter-regional corridors and new corridor linking Vaughan and Brampton systems.	Linkages between inter-regional and local transit with improved service integration and new opportunities for station locations and service connections on widened inter-regional corridors and new corridor linking Vaughan and Brampton systems.	Moderate potential to improve linkages between inter-regional and local transit with improved service integration and new opportunities for station locations and service connections on widened inter-regional corridors and new corridor linking Vaughan and Brampton systems.	Major potential to improve linkages between inter-regional and local transit with improved service integration and new opportunities for station locations and service connections on widened inter-regional corridors and new corridor linking Vaughan, Brampton and Milton systems.	Major potential to improve linkages between inter-regional and local transit with improved service integration and new opportunities for station locations and service connections on widened inter-regional corridors and new corridor linking Vaughan, Brampton and Guelph systems.	Major potential to improve linkages between inter-regional and local transit with improved service integration and new opportunities for station locations and service connections on widened inter-regional corridors and new corridor linking Vaughan, Brampton and Guelph systems.
	Bus operational performance on inter-regional road network (refer to LOS in Traffic Operations)	Improves bus operational performance on existing facilities with improved road network operations.	Improves bus operational performance with improved road network operations and potential for bus rapid transit (BRT) on new corridor.	Improves bus operational performance with improved road network operations and potential for bus rapid transit (BRT) on new corridor.	Improves bus operational performance with improved road network operations and potential for bus rapid transit (BRT) on new corridor.	Improves bus operational performance with improved road network operations and potential for bus rapid transit (BRT) on new corridor.	Improves bus operational performance with improved road network operations and potential for bus rapid transit (BRT) on new corridor.
	Availability/provision of alternate travel modes for tourism/ recreational travel (Qualitative)	Potential to provide alternate travel modes for tourism / recreational travel on new bus and rail services.	Potential to provide alternate travel modes for tourism / recreational travel on new transit services, with transit opportunities on new corridor over a short distance.	Potential to provide alternate travel modes for tourism / recreational travel on new transit services, with transit opportunities on new corridor over a short distance.	Potential to provide alternate travel modes for tourism / recreational travel on new transit services, with transit opportunities on new corridor over a longer distance and potentially toward NGTA corridor.	Potential to provide alternate travel modes for tourism / recreational travel on new transit services, with transit opportunities on new corridor across the northern portion of the study area.	Potential to provide alternate travel modes for tourism / recreational travel on new transit services, with transit opportunities on new corridor over the study area.
	Provision of/ allowance for active transportation measures (e.g., bike lanes, bike racks on buses/ trains) (Qualitative)	Results in highest use of local roads for inter-regional trips impacting safety / security for active transportation.	Results in high use of local roads for inter-regional trips impacting safety / security for active transportation. New corridor creates barrier affect to movement by active modes across new facility over a short distance (Hwy 410 to Hwy 400) although this can be mitigated by providing sidewalks / bike lanes on new structures.	Results in lowest use of local roads for inter-regional trips impacting safety / security for active transportation. New corridor creates barrier affect to movement by active modes across new facility over a moderate distance (Hwy 401/407 ETR to Hwy 400) although this can be mitigated by providing sidewalks / bike lanes on new structures.	Results in lowest use of local roads for inter-regional trips impacting safety / security for active transportation. New corridor creates barrier affect to movement by active modes across new facility over a moderate distance (Milton to Hwy 400) although this can be mitigated by providing sidewalks / bike lanes on new structures.	Results in lowest use of local roads for inter-regional trips impacting safety / security for active transportation. New corridor creates barrier affect to movement by active modes across new facility over the entire study area, although this can be mitigated by providing sidewalks / bike lanes on new structures.	Results in lowest use of local roads for inter-regional trips impacting safety / security for active transportation. New corridor creates barrier affect to movement by active modes across new facility over the entire study area, although this can be mitigated by providing sidewalks / bike lanes on new structures.

FACTOR	MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
<b>WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)</b>	Potential to improve accessibility of inter-modal centres, ports and terminals (qualitative)	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.
<b>MODAL INTEGRATION, BALANCE AND CHOICE FOR MOVEMENT OF GOODS</b>	Potential to improve modal integration, balance and choice for goods movement between ports and terminals, and communities and employment centres.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.	Improved inter-regional goods network operations with increased capacity improve accessibility of inter-modal facilities.
<b>LINKAGES TO POPULATION AND EMPLOYMENT CENTERS</b>	Availability/provision of higher order linkages between Urban Growth Centres, Gateway Economic Zones and Gateway Economic Zones (qualitative)	No new higher order roadway linkages between Urban Growth Centres beyond base improvements.	New transit linkages and services possible on new higher order transportation corridor between Urban Growth Centres of Vaughan and Brampton.	New transit linkages and services possible on new higher order transportation corridor between Urban Growth Centres of Vaughan and Brampton toward Milton.	New transit linkages and services possible on new higher order transportation corridor between Urban Growth Centres of Vaughan, Brampton and Milton.	New transit linkages and services possible on new higher order transportation corridor between Urban Growth Centres of Vaughan, Brampton and Milton toward Guelph.	New transit linkages and services possible on new higher order transportation corridor between Urban Growth Centres of Vaughan, Brampton and Milton toward Guelph.
Potential to improve accessibility to Urban Growth Centres, Gateway Economic Zones and Gateway Economic Zones for people and goods movement based on higher order network continuity and connectivity	Percentage change in peak hour travel times between Urban Growth Centres	Improves accessibility to Urban Growth Centres and the GTA with additional inter-regional road capacity and transportation network operation improvements to roadway linkages to Guelph.	Improves accessibility to Urban Growth Centres and the GTA with new corridor between Hwy 400 and Hwy 410, additional inter-regional road capacity and transportation network operation improvements; limited roadway linkage improvements to Guelph.	Improves accessibility to Urban Growth Centres and the GTA with new corridor between Hwy 400 and Hwy 407/407 ETR, additional inter-regional road capacity and transportation network operation improvements; limited roadway linkage improvements to Guelph.	Improves accessibility to Urban Growth Centres and the GTA with new corridor between Hwy 400 and Hwy 401 at Milton, additional inter-regional road capacity and transportation network operation improvements; limited roadway linkage improvements to Milton.	Improves accessibility to Urban Growth Centres and the GTA with new corridor between Hwy 400 and Hwy 6 at Guelph, additional inter-regional road capacity and transportation network operation improvements; limited roadway linkage improvements to Milton.	Improves accessibility to Urban Growth Centres and the GTA with new corridor between Hwy 400 and Hwy 6 north of Hwy 401, additional inter-regional road capacity and transportation network operation improvements; moderate roadway linkage improvements to Milton and Guelph.
		auto improvement = 19.2% transit improvement = no significant change	auto improvement = 19.5% transit improvement = similar to auto improvement for road based transit services	auto improvement = 19.1% transit improvement = similar to auto improvement for road based transit services	auto improvement = 19.6% transit improvement = similar to auto improvement for road based transit services	auto improvement = 20.52% transit improvement = similar to auto improvement for road based transit services	auto improvement = 19.96% transit improvement = similar to auto improvement for road based transit services

Exhibit 4-45: Transportation Evaluation

FACTOR	MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
RECREATION AND TOURISM TRAVEL	Directness of routes between population centers, international gateways and tourists/recreation destinations (qualitative)	No improvement to directness of routes to tourist destinations within and outside of the study area, including the GTA and toward northern Ontario. Relies on increased road capacity on existing routes and new / expanded transit services.	Provides limited potential to improve directness of routes to tourist destinations within and outside of the study area, including the GTA and toward northern Ontario, with a new transportation corridor over a short distance. Increased road capacity on existing routes and new / expanded transit services.	Provides moderate potential to improve directness of routes to tourist destinations within and outside of the study area, including the GTA and toward northern Ontario, with a new transportation corridor that links to Hwy 401 to Hwy 400 over a moderate distance. Some increased road capacity on existing routes and new / expanded transit services.	Provides significant potential to improve directness of routes to tourist destinations within and outside of the study area, including the GTA and toward northern Ontario, with a new transportation corridor over a long distance east of the Niagara Escarpment areas. Minimal increase in road capacity on existing routes and new / expanded transit services. Potential for improved directness to Niagara Region and U.S. border if combined with a connection to NGTA corridor.	Provides significant potential to improve directness of routes to tourist destinations within and outside of the study area, including the GTA and toward northern Ontario, with a new transportation corridor over the entire study area. Minimal increase in road capacity on existing routes and new / expanded transit services. Improved connection via New Hwy 7 to Kitchener-Waterloo enhances directness of travel to southwest Ontario.	Provides significant potential to improve directness of routes to tourist destinations within and outside of the study area, including the GTA and toward northern Ontario, with a new transportation corridor over the entire study area. Minimal increase in road capacity on existing routes and new / expanded transit services. Potential for improved directness to Niagara Region and U.S. border if combined with a connection to NGTA corridor.
Potential to support recreation and tourism travel within and to/from the study area	Peak period (summer/weekend) transportation system performance on key inter-regional corridors – forecast volume/capacity issues at critical screenlines	East of Guelph – 0.91 West of Milton – 1.07 East of Winston Churchill (WC Blvd) – 0.87 East of Highway 10 – 0.95 East of Highway 50 – 0.69 West of Highway 400 – 0.78 North of Highway 407 – 1.27	East of Guelph – 0.90 West of Milton – 1.07 East of Winston Churchill (WC Blvd) – 0.95 East of Highway 10 – 0.99 East of Highway 50 – 0.82 West of Highway 400 – 0.94 North of Highway 407 – 1.27	East of Guelph – 0.90 West of Milton – 1.07 East of Winston Churchill (WC Blvd) – 0.92 East of Highway 10 – 0.96 East of Highway 50 – 0.86 West of Highway 400 – 0.94 North of Highway 407 – 1.24	East of Guelph – 0.93 West of Milton – 0.96 East of Winston Churchill (WC Blvd) – 0.90 East of Highway 10 – 0.96 East of Highway 50 – 0.87 West of Highway 400 – 0.94 North of Highway 407 – 1.26	East of Guelph – 0.89 West of Milton – 0.99 East of Winston Churchill (WC Blvd) – 0.90 East of Highway 10 – 0.97 East of Highway 50 – 0.85 West of Highway 400 – 0.95 North of Highway 407 – 1.29	East of Guelph – 0.86 West of Milton – 1.00 East of Winston Churchill (WC Blvd) – 0.90 East of Highway 10 – 0.96 East of Highway 50 – 0.86 West of Highway 400 – 0.94 North of Highway 407 – 1.27
	Diversion of summer recreational trips from local and regional roadways. (qualitative)	Potential to divert summer / recreational trips from local / regional roads in close proximity to existing corridors due to increased freeway capacity on alternate routes.	Potential to divert summer / recreational trips from local / regional roads to new corridor between Hwy 400 and Hwy 410 and from roads in close proximity to widened freeways.	Potential to divert summer / recreational trips from local / regional roads to new corridor over a moderate distance between Hwy 400 and Hwy 401/407 ETR.	Potential to divert summer / recreational trips from local / regional roads to new corridor over a long distance between Hwy 400 and Hwy 401 east of the Niagara Escarpment areas.	Potential to divert summer / recreational trips from local / regional roads to new corridor over the entire study area between Hwy 400 and Hwy 6 at Guelph.	Potential to divert summer / recreational trips from local / regional roads to new corridor over the entire study area between Hwy 400 and Hwy 6 north of Hwy 401.

FACTOR	MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
<b>SUMMARY</b> TRANSPORTATION		<p><b>WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)</b></p> <p><b>PREFERRED</b></p> <ul style="list-style-type: none"> <li>Addresses future capacity needs more to the east end of the study area</li> <li>Provides significantly improved traffic operations and results in greater delays on the inter-regional network for autos and trucks, though does the least to improve operations on local roads</li> <li>Does not provide opportunities for new transit linkages through new corridor</li> <li>Does not provide significant redundancy benefits and results in higher use of local road network for inter-regional auto and truck trips</li> <li>Provides least opportunities for modal integration of people and goods movement (between Urban Growth Centres, transit hubs, employment centres)</li> </ul>	<p><b>REDUCED HIGHWAY 407 WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410</b></p> <p><b>PREFERRED</b></p> <ul style="list-style-type: none"> <li>Addresses future capacity needs</li> <li>Provides least improvement to traffic operations and results in greater delays on the inter-regional network</li> <li>Provides modest opportunities for transit linkages on new corridor due to limited length of new corridor</li> <li>Provides limited redundancy benefits and results in higher use of local road network for inter-regional auto and truck trips</li> <li>Provides limited opportunities for modal integration of people and goods movement (between Urban Growth Centres, transit hubs, employment centres)</li> </ul>	<p><b>REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401</b></p> <p><b>MODERATELY PREFERRED</b></p> <ul style="list-style-type: none"> <li>Addresses future capacity needs</li> <li>Provides significantly improved traffic operations and is second best at reducing delays on the inter-regional network for autos and trucks</li> <li>Provides moderate opportunities for transit linkages on new corridor</li> <li>Provides moderate redundancy benefits and is best at reducing use of local road network for inter-regional auto and truck trips</li> <li>Provides limited opportunities for modal integration of people and goods movement (between Urban Growth Centres, transit hubs, employment centres)</li> </ul>	<p><b>REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO WEST OF MILTON</b></p> <p><b>MOST PREFERRED</b></p> <ul style="list-style-type: none"> <li>Is second best at addressing future capacity needs</li> <li>Provides significantly improved traffic operations and is the best at reducing delays on the inter-regional network for autos and trucks</li> <li>Provides greatest opportunities for transit linkages on new corridor, with highest potential transit demand in Milton area</li> <li>Provides significant redundancy benefits and is second best at reducing use of local road network for inter-regional auto and truck trips</li> <li>Provides greatest opportunities for modal integration of people and goods movement (between Urban Growth Centres, transit hubs, employment centres)</li> </ul>	<p><b>NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)</b></p> <p><b>MOST PREFERRED</b></p> <ul style="list-style-type: none"> <li>Is second best at addressing future capacity needs</li> <li>Provides significantly improved traffic operations and reduced delays on the inter-regional network for autos and trucks</li> <li>Provides opportunities for transit linkages on new corridor</li> <li>Provides significant redundancy benefits and reduces use of local road network for inter-regional auto and truck trips</li> <li>Provides moderate opportunities for modal integration of people and goods movement (between Urban Growth Centres, transit hubs, employment centres)</li> </ul>	<p><b>NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)</b></p> <p><b>MOST PREFERRED</b></p> <ul style="list-style-type: none"> <li>Best addresses future capacity needs</li> <li>Provides significantly improved traffic operations and is second best at reducing delays on the inter-regional network for autos and trucks</li> <li>Provides opportunities for transit linkages on new corridor</li> <li>Provides significant redundancy benefits and reduces use of local road network for inter-regional auto and truck trips</li> <li>Provides moderate opportunities for modal integration of people and goods movement (between Urban Growth Centres, transit hubs, employment centres)</li> </ul>
<b>OVERALL SUMMARY</b>		<p>Alternatives 4-3, 4-4 and 4-5 perform best in terms of overall traffic operations (e.g., v/c ratios at critical screenlines, percentage of inter-regional trips on inter-regional facilities) and result in reduced delays on both the inter-regional and local road network for auto and truck trips. Alternative 4-3 provides the greatest opportunity for new linkages, including transit connections to Milton where there is potential to serve a substantial growth in future demand. Alternative 4-2 performs second best in terms of overall traffic operations, but it does not provide significant opportunities for modal integration and new linkages.</p> <p>Alternatives 3-1 and 4-1 address future capacity needs but provide only moderate potential for transit linkages, limited redundancy benefits, and result in much higher use of local roads by longer distance inter-regional traffic.</p>					

\* "Inter-regional trip" defined as trips with a length greater than average commuting distance within study area (>20km)

^ Total person demand between Urban Growth Centres, 3-hour AM peak period

+ "Inter-regional network" defined as provincial freeways and "relevant" highway systems – i.e., where a local highway is planned to be improved as part of a transportation alternatives (e.g., County Road 124).

4.9.3. Sensitivity Analysis  
**Dedicated Truck Facility**

Currently, Highway 401 experiences significant truck volumes during the day and even throughout the evening off-peak periods. These demands are forecast to grow significantly by 2031 as described in the GTA West Area *Transportation System Problems and Opportunities Report* (July 2009, Updated December 2010). Since one of the key objectives for the GTA West study is to improve goods movement in the region, the Study Team also considered the feasibility of a new GTA West corridor operating as a dedicated truck only facility. In addition to linking manufacturing and distribution related employment areas with a dedicated facility, this option would permit longer distance truck trips to avoid congested road segments during peak periods. If enough truck traffic could be diverted from existing highway facilities, this could also reduce congestion and provide travel time savings benefits to automobile and transit travel using these corridors during peak periods.

An integrated GTA West and NGTA network was used for this test to examine the feasibility of truck-only corridors in both preliminary study areas simultaneously. The network combination of the GTA West Alternative 4-3 and NGTA Alternative 4-3, which both connect to Highway 401 in the Milton area, was chosen for this test since this option was considered to provide the most integrated goods movement corridor. In addition to traversing through the majority of the preliminary study areas, these two alternatives provide connectivity between Highways 400 and 401 and south to the border crossings in Niagara, making this an attractive route for long-distance truck trips.

The Study Team also reviewed the GTA West Alternative 4-3 as a truck only facility without the NGTA corridor connection. The GTA West Alternative 3-1 GGH Model run was selected to test the truck only facility since the new corridor would not be used by cars and the trip distribution and transit mode shares would be similar to those under the Group #3 alternative. The existing highways were assumed at similar configuration as under GTA West Alternative 4-3 with mixed traffic. In the results discussed below, "truck only facility"

refers to both NGTA and GTA West corridors as dedicated truck facilities, unless specified as a GTA West dedicated truck corridor.

**Exhibit 4-46** summarizes the 2031 PM peak hour truck volume demands and passenger car equivalencies using the dedicated truck facility in the GTA West preliminary study area. Forecasts suggest that the truck demands would be equivalent to two freeway lanes in each direction. Truck traffic using the facility would be higher in the off peak hours as expected from an average truck traffic profile over the course of a day.

CORRIDOR SEGMENT	TRAFFIC VOLUME (CAR EQUIVALENTS)	
	EASTBOUND	WESTBOUND
Highway 401 (west of Milton) to HP BATS Corridor	1,660 (3,320)	1,580 (3,160)
HP BATS Corridor to Highway 410	1,765 (3,530)	1,985 (3,970)
Highway 410 to Highway 427	1,700 (3,400)	1,875 (3,750)
Highway 427 to Highway 400	2,215 (4,430)	1,690 (3,380)

**Exhibit 4-46: 2031 PM Peak Hour Truck Volumes between Highway 401 and Highway 400**

Screenline evaluation results are presented in **Exhibit 4-47**, and show that the option of providing a truck only facility on the GTA West corridor will provide sufficient screenline capacity to accommodate the projected demands at a similar or better level than the scenario with a mixed use facility. The dedicated truck facility frees up capacity on existing inter-regional facilities by diverting considerable truck demand. Since one truck is equivalent to more than one passenger car, even a smaller traffic volume on the truck only facility than on a mixed traffic facility could result in comparable congestion relief. Truck traffic diversion plots, from existing facilities to the GTA West truck only corridor, indicate that most of the truck traffic is diverted from inter-regional facilities such as Highway 401, 407 ETR, and parts of Highways 403 and 400.

The demands on the truck only facility suggest that the section between Highway 427 and Highway 400 may not require six lanes as would be required under GTA West Alternative 4-3 with mixed traffic. With GTA West Alternative 4-3 as a mixed traffic or dedicated truck facility, the section of Highway 401 between 407 ETR and Milton would operate over capacity with similar V/C ratios. With the mixed use facility there is flexibility to widen the new corridor to six lanes to provide additional capacity to relieve the over capacity situation on Highway 401. In the truckway scenario, a widening might attract a few additional trucks from Highway 401, but this

SCREENLINE	GTA WEST ALTERNATIVE 4-3 (MIXED TRAFFIC)		GTA WEST ALTERNATIVE 4-3 AND NGTA ALTERNATIVE 4-3 (DEDICATED TRUCK FACILITY)		GTA WEST ALTERNATIVE 4-3 (DEDICATED TRUCK FACILITY)	
	Lanes on GTA West Corridor	Screenline V/C	Lanes on GTA/West Corridor	Screenline V/C	Lanes on GTA West Corridor	Screenline V/C
East of Guelph	-	0.84	-	0.88	-	0.82
West of Milton	4	0.86	4	0.73	4	0.71
East of Winston Churchill Blvd	4	0.75	4	0.74	4	0.73
East of Highway 10	4	0.76	4	0.76	4	0.76
East of Highway 50	4	0.79	4	0.78	4	0.78
West of Highway 400	6	0.87	6	0.82	6	0.82

**Exhibit 4-47: 2031 PM Peak Hour Screenline Evaluation for GTA West 4-3 Alternative Scenarios**

would not necessarily provide sufficient auto capacity on Highway 401, and may necessitate the need for additional widening to 12 lanes, resulting in the need to protect for a core-collector system through Milton.

With the truckway alternatives, the share of the auto and truck travel operating at LOS D or better on the inter-regional road network is improved compared to the Base Case and compared to Alternative 4-3 operating as a mixed use facility. This results in a noticeable delay savings for truck and auto traffic using all inter-regional facilities. One drawback of the truck only facility is that some auto traffic would be diverted to local road network, most of it within the northern portions of Brampton and Vaughan, and to the north of the new corridor.

Based on the results of the sensitivity test, there appears to be a combination of benefits and drawbacks that may accrue if the GTA West new transportation corridor was to be operated as a truck only facility. Before a definitive conclusion on the viability of this alternative can be reached, additional work would need to be completed to better understand the benefits, the design and operational issues that may need to be addressed and the local implications and potential mitigation measures that could be implemented. As such, the Study Team believes that the truck only facility should be carried forward to Stage 2 of the EA Study for consideration.

#### **Connection to the NGTA Corridor**

As the GTA West and NGTA studies are being conducted simultaneously, they are being coordinated in terms of the assessment and development of recommended alternatives. To a large degree, traffic patterns between the two preliminary study areas are different and distinct, as were the problems and opportunities that were highlighted in previous reports; however, it is also recognized there are considerable longer distance trips which may benefit from a connection between the two facilities.

To assist in understanding how a road connection between the two corridors would influence the network performance, the Study Team tested one of the GTA West alternatives modeled in combination with one of the NGTA alternatives.

Since both NGTA Alternative 4-3 and GTA West Alternative 4-3 connect to Highway 401 in Halton, the combination of these two corridors was considered to likely have the most interaction between the two study alternatives.

The modeling results suggest that the introduction of NGTA Alternative 4-3 would worsen conditions at the screenline east of Guelph from moderate to major congestion levels. This can be attributed to higher traffic volumes and greater congestion on Highway 401. The screenline west of Regional Road 25 in Milton would also experience slightly higher congestion. The screenlines east of the Highway 401 / 407 ETR interchange would not experience any operational differences due to the NGTA Alternative 4-3. The analysis suggests that capacity impact of an NGTA connection to Highway 401 would be concentrated around the Milton area.

In terms of people and goods movement measures, the combination of GTA West Alternative 4-3 and NGTA Alternative 4-3 makes very little difference in terms of the network-evaluation statistics within the GTA West preliminary study area. In some categories, such as percentage of inter-regional road network operating at LOS D and total delays, the combined alternative would perform marginally worse than GTA West Alternative 4-3 combined with NGTA Alternative 3-1. This is due to the additional travel demand on Highway 401 from the NGTA corridor connection as the difference to the local network is insignificant.

#### **4.9.4. Guelph to Cambridge Improvement Needs**

As noted in the GTA West Area *Transportation System Problems and Opportunities Report* (July 2009, Updated December 2010), in 1998 MTO transferred jurisdiction for the 64 kilometres section of Highway 24, from Highway 401 in Cambridge to Highway 9, to the County of Wellington, Region of Waterloo, and Region of Peel, respectively. For the 11 kilometres section of former Highway 24 between the City of Cambridge and the City of Guelph, now referred to as County Road 24 and County Road 124 (CR24 / CR124), MTO completed an Environmental Study Report in 1996 that concluded that there was justification for this section of road to be widened to a four lane facility.

The County of Wellington completed a Role and Function Study for this facility in 2007 and concluded that this section

of road functions as an integral part of a significantly longer economic corridor that serves as a by-pass for the congested GTA highway system for travel between Highway 401 west of Waterloo Region and location north of the GTA.

The *Area Transportation System Problems and Opportunities Report* (July 2009, Updated December 2010) reviewed 2007 volumes on this section of CR 24 / CR124 and observed that the current two-lane roadway is operating at capacity during typical PM peak periods with peak directional volumes exceeding 1,000 vehicles per hour on the section between Maple Grove Road and Wellington County Road 32. Preliminary forecasts for 2031 (using an assumed truck percentage of 10%) concluded that growth in travel demand in this corridor would continue, with PM peak hour conditions reaching LOS E-F for the entire two-lane section of this facility. On the existing four-lane section, between Highway 401 and Maple Grove Road, the 2031 forecasts indicate a LOS C condition during peak hours.

Updated forecasts were developed for this section of CR 24 / CR124 as part of the updated modeling work completed for the GTA West study. Based on forecasts of future travel demands with GTA West Alternative 4-3 in place, approximately 50% of the trips forecast to use this section of CR 124 are traveling between the cities of Cambridge and Guelph. Most of the remaining trips are between Guelph and other destinations within Waterloo Region. The number of trips using CR 124 for longer distance travel is inconsequential.

The analysis of forecast travel patterns for CR24 / CR 124 suggest that although traffic demands are expected to continue to grow on the CR 24 / CR 124 corridor, much of this growth is related to continued growth in population and employment within the Region of Waterloo and County of Wellington. Updated forecasts developed for this study suggest that the introduction of GTA West Alternative 4-3 will help to reduce long distance traffic using the CR 24 / CR 124 corridor as a by-pass around the GTA.

A summary of the Transportation analysis findings is provided in **Section 4.11**.

## 4.10. EVALUATION OF ALTERNATIVES – COST AND CONSTRUCTABILITY

### 4.10.1. Methodology

The Study Team used the 2031 lane requirements for the preliminary study area's highway facilities as the primary input to evaluate constructability and cost. These lane requirements were developed as part of the travel demand forecasting work for the Group #3 and #4 transportation alternatives.

In order to assess and compare the alternatives, it was necessary to first complete sufficient conceptual design work to determine the 'footprint' of the improvement scenarios. In general, the footprint includes property required for additional lanes, new interchanges, new structures, improved shoulders (where necessary), high occupancy vehicle (HOV) facilities, realigned interchange ramps, realigned local / service roads and roadside drainage. These footprints were also important inputs in determining potential natural environment, socio-economic, transportation, and other impacts.

The majority of the work discussed below (regarding footprint identification, constructability and staging assessment and cost estimation) has been prepared to a conceptual level of design only, sufficient for the relative assessment and comparison of transportation alternatives.

#### Constructability and Staging Methodology

The Group #3 and Group #4 alternatives involve improvements to a large and complex network of highways, including a number of interchanges, structures and other related facilities. As mentioned above, in order to assess the potential impacts of the alternatives, it was necessary to identify a 'footprint' for each. The footprint reflects the required right-of-way (ROW) to accommodate the proposed improvements identified for each alternative.

Given the scale of the improvements, a generalized approach was taken for identifying the footprints of most of the mainline highway sections and interchanges. In simple terms, the footprints for these mainline sections were identified by applying a linear template along the highway centreline, which reflects the ROW width required for an improvement scenario (i.e., widening).

It is understood that there are some elements of the transportation network under consideration that are highly complex and / or constrained, and that these require a greater level of detail in their evaluation. These 'special areas' include major freeway-to-freeway interchanges, major structures, and other complex construction elements. For these areas, improvements were typically developed to the level of functional design. This approach yielded footprints that reflected the ROW required for the final design, and also for staging strategies. Furthermore, it addressed the major constraints of each special area that may require special design and / or construction techniques.

The five special areas identified as having particular challenges are the connections between a new GTA West transportation corridor and the following locations:

- Highway 401 in west Halton Region (i.e., in the proximity of the Town of Milton);
- Highway 401 / 407 ETR in Peel Region;
- Highway 410 extension in Peel Region;
- Highway 427 extension west of Kleinburg in City of Vaughan; and
- Highway 400 in City of Vaughan.

Wherever possible, improvements to the special areas were designed such that construction could be staged with minimal traffic disruption. This approach often involved identifying ramp, mainline and local road relocations. Where road or ramp closures were unavoidable, this was noted as an impact in the assessment of alternatives.

Assumptions regarding lane width, drainage offset, etc. were applied where appropriate for each of the special areas in order to generate the required cross-sections. Typically, the special area footprints were developed by applying these cross-sections to widened and / or relocated elements of the facility in order to identify the required ROW, with relocations generally resulting in the greatest footprint impacts.

To develop the footprint of new freeway sections, it was necessary to first generate conceptual horizontal alignments. While route planning is not within the scope of this stage of the study, these conceptual alignments were important

in determining an approximate number of interchanges, structures, and other freeway elements. This information was in turn used to identify a new freeway footprint by applying ROW and interchange templates along the conceptual alignment. In this case, a 170 m ROW for the proposed GTA West transportation corridor (including 110 m ROW for freeway and 60 m for transitway) was applied per the MTO *Draft Safety Standards Manual for New Rural Freeways*.

#### Cost Estimation Methodology

Given the large scale of the improvement alternatives and the high-level nature of the current stage of study, it was necessary to categorize the range of work into major items in cost estimation. This high level approach was based on several assumptions that are discussed in the *GTA West Constructability and Cost Summary Technical Memorandum* (February 2011).

In addition to the major items described above, costs for each of the special areas were identified for which individual cost estimates were required due to their high complexity.

The MTO *Parametric Estimating Guide, 2007 (PEG)* was initially used for the development of unit costs. The PEG provides unit costs for several items including road reconstruction, major widening, new roadway construction, and various structure types.

For certain items such as structures, the PEG costs could be applied and adjusted for contingencies, staging, complexity, etc. Once the cost was adjusted for inflation, as appropriate, the unit cost was applied to the current study. Where appropriate, factors were applied to account for unique contingencies, complex staging, major utilities relocations / impacts, economy-of-scale efficiencies, construction locale (i.e. urban, rural, Greenfield) or other issues that could be expected for a given location.

A limitation of the PEG is that for some major items, such as interchanges, little specific guidance is provided. In order to supplement the PEG, MTO's Highway Costing (HiCo) System was employed: HiCo is a database of relatively recent contract bids that typically provides users with the tender award, as well as the average of the three low bids.



In order to derive major item costs for the current assignment, several examples of recent projects were identified, of sufficient similarity to the Group #3 and Group #4 alternatives. Contracts were limited to those on 400-series highways in MTO's Central, Eastern and Southwestern Regions. Once relevant contracts had been selected, the value of each was adjusted to a base year of 2010. Average unit costs were then derived for each item on the basis of per-kilometre (widening), per-square-metre (structures), per-interchange, etc.

For costing of the five special areas, where specific sites had been the subject of recent improvement/feasibility studies, this more detailed information was used as the primary source for developing costs, as appropriate. Where specific studies were unavailable or did not provide suitable guidance, the PEG served as the primary input for costs. While the PEG has limitations for this application, as noted above, it was the best source for an objective, high-level cost estimate of this nature, and provided an indication of relative cost. Costs were adjusted to the 2010 base year.

To overcome the limitations of the PEG for the special items, input was sought from the MTO Contracts Office and other professionals, as appropriate. The PEG estimate was revised by applying a variety of adjustments for items such as staging, complexity, etc. In this way, the resulting cost estimates included more subjectivity than those of the other major items.

As noted, costs for the new freeway components of the Group #4 alternatives were calculated on per-kilometre, per-interchange, per-structure, etc., basis, where possible; however, there were some locations that required special attention to develop costs given their complexity. At major watercourse crossings such as the Humber River and Credit River, floodline and contour mapping was reviewed to identify potential bridge crossing requirements.

Costs for engineering, project management, construction administration, and other relevant items were applied to the PEG- and HiCo-based estimates. The initial sources for these costs were recent planning projects; as with the other estimates, these values were adjusted based on professional judgment in consultation with MTO and others.

To account for inflation, costs obtained from the PEG and HiCo were adjusted to 2010 dollars by direct application of MTO's Tender Price Index (TPI).

#### 4.10.2. Findings

**Exhibit 4-48** describes the evaluation of the alternatives for Cost and Constructability, as presented at PIC #4. The evaluation is summarized below.

#### Cost Estimation Findings

Overall, Alternative 3-1 was the least preferred in terms of the constructability and staging, and had the highest cost. Based on a high-level analysis of construction costs, Alternative 3-1 is between 4% and 14% more expensive than the Group #4 alternatives. Group #4 alternatives differ by up to 9%.

GROUP ALTERNATIVE	GROUP #3	GROUP #4				
		3-1	4-1	4-2	4-3	4-4
Cost Range (\$B)	4.9 - 5.4	4.3 - 4.8	4.7 - 5.2	4.6 - 5.1	4.4 - 4.9	4.3 - 4.8

A range of construction costs was assumed for each alternative because of the high level nature of the analysis. The range of construction costs included the following items:

- cost of new freeways including interchanges and bridges (Group # 4 alternatives);
- cost of new bridges at major watercourse crossings (Group # 4 alternatives);
- cost of new lanes on existing freeways, including any modifications / replacements to existing bridges and interchange ramps (all alternatives);
- cost of new freeway to freeway interchanges (all alternatives);
- cost of property requirements based on agricultural, residential, industrial or commercial land use (all alternatives); and
- cost of contingencies to cover all other items including utilities, Engineering, etc.

#### Constructability and Staging Findings

Amongst all alternatives, improvements to typical mainline highway sections and arterial interchanges were of similar complexity in terms of constructability and staging. Conversely, several of the special areas described above exhibited substantial differences in constructability and staging challenges across the transportation alternatives; thus, these special areas were the primary input to the evaluation and comparison of alternatives.

Alternative 3-1 would involve the most significant construction and staging issues for the 407 ETR and potential impacts to the future 407 transitway. This alternative would require major reconstruction and reconfiguration of the existing freeway-to-freeway interchanges to accommodate an express-collector system, with numerous structural replacements, ramp relocations, and possible major utilities impacts. Staging impacts were also much greater with Alternative 3-1, requiring the closure of directional ramps for extended periods during construction (i.e., entire season). There may be difficulty in widening the 407 ETR through connections with existing highways (Highways 400, 427 410 and 401) due to the complex layout of ramps and structures (including bridge piers). In addition, duration of construction, risk, disruption to the 407 ETR and adjacent roadway, major utilities, technical challenges and other impacts represent potential issues during construction. Detailed analysis is required to confirm the feasibility of retaining the existing structures.

A dedicated transitway is proposed by MTO along the 407 ETR corridor, which will initially include a separate and grade-separated two-lane roadway and stations with commuter parking. The widening of the 407 ETR and interchange improvements for Alternative 3-1 may have significant impacts to the transit infrastructure. There may be impacts to transit stations, commuter lots and transitway infrastructure, including stormwater management, due to tight property limits and access. Key challenges include potential changes in road profile, limited flexibility in modifying the location of 407 ETR transitway stations and the close proximity to the existing hydro corridor. Potential impacts to the transitway include: horizontal and vertical alignments, ramps and

structures, grade separations, adjacent arterial roads, and access to stations and parking areas.

Additional right-of-way requirements could significantly impact properties adjacent to freeways through built up areas. Alternatives 4-1 and 4-2 require additional lanes along Highway 401 between 407 ETR and Regional Road 25 which will require conversion to a collector-distributor system. Additional costs and staging requirements will come with widening Highway 401 in this area. Traffic staging issues will include the potential for increased delays during the construction period along each widened facility. In addition, the interchange of Alternative 4-2 with Highway 401 and 407 ETR requires complex staging. In general, Alternative 3-1 exhibited more challenging constructability and staging issues than Group #4 alternatives, primarily due to impacts to the 407 ETR.

The Group #4 alternatives (i.e. Alternatives 4-1, 4-2, 4-3, 4-4 and 4-5) assume that capacity improvements are achieved by new freeway construction in addition to some existing highway widening. The Group #4 alternatives differ from one another in the length and location of freeway segment(s). Consequently, Group #4 alternatives that have a larger footprint have the potential to result in more substantial natural and socio-environmental impacts. By comparison, less property is required for Alternative 3-1; however, the property that is required is along existing freeways through developed areas, which would impact existing built-up commercial, industrial and institutional lands.

Alternatives 4-4 and 4-5 will require the longest length of new construction through rural lands. These alternatives will have additional constructability challenges associated with crossing the Niagara Escarpment and greater number of watercourse crossings. Alternative 4-3 will require a moderate length of new construction with minimal widening of existing freeways.

A summary of the Cost and Constructability analysis findings is provided in **Section 4.11**.

#### 4.11. SUMMARY OF EVALUATION FINDINGS

Following the analysis outlined in **Section 4.1**, the Study Team members across the factor-specific specialties collectively participated in the reasoned argument evaluation. This was completed using both the quantitative and qualitative measures of potential effects discussed in **Section 4.5** through **Section 4.10** to highlight the advantages and disadvantages associated with the short-listed Group #3 and Group #4 alternatives. **Exhibit 4-49** provides a summary of the overall assessment of the preliminary planning alternatives. Note that the circles only represent comparisons within each criterion across the alternatives, and do not compare the relative importance of each criterion.

The following summarizes the rationale for carrying forward Alternatives 4-2 and 4-3 for further consideration and consultation with agencies, municipalities, First Nations and the public.

##### Natural Environment Summary

Alternative 3-1 results in the fewest impacts in most criteria in the natural environment factor. Impacts are on the fringe of sensitive areas that have already been disturbed and most can be mitigated with standard mitigation measures.

Alternatives 4-1, 4-2 and 4-3 result in more potential impacts than Alternative 3-1, because of new footprints in new corridor sections. These alternatives are considered relatively moderate and impacts can be mitigated through route location and design. Alternative 4-1 is the shortest of the new corridor sections and therefore has slightly fewer impacts than Alternatives 4-2 and 4-3. Alternatives 4-4 and 4-5 result in significantly higher impacts to the natural environment because they cross many sensitive aquatic and terrestrial features and designated areas at the edge and west of the Niagara Escarpment. These sensitive features include evaluated wetland complexes, wildlife SAR, ESAs and ANSIs that are quite large and in many cases will be difficult (or impractical) to avoid. Therefore, mitigation of the impacts to natural environment for Alternatives 4-4 and 4-5 is difficult and impacts of new footprints in sensitive areas are expected to require compensation for loss of habitat (e.g. replacement of habitat), etc.

**Alternative 3-1 is the most preferred from a natural environment perspective.** Alternatives 4-1, 4-2 and 4-3 all result in relatively similar moderate impacts. Alternatives 4-4 and 4-5 result in significantly higher impacts than the other alternatives.

##### Land Use / Social Environment Summary

Although Alternative 3-1 will likely result in the fewest direct impacts on existing land uses, properties and agricultural lands, it is least preferred because it does not serve future growth as well as the Group #4 alternatives and has major impacts on provincial and municipal infrastructure. All the Group #4 alternatives result in higher direct impacts to existing land uses, properties and agricultural lands than Alternative 3-1; however, they are more compatible with future growth / land use patterns in York, Peel and Halton Regions. Alternative 4-1 is only moderately preferred as it does not support future growth areas and land use in Peel and Halton Regions, due to the shorter length of the new transportation corridor, as are Alternatives 4-2 and 4-3. Although Alternatives 4-4 and 4-5 support future growth, they are less desirable as they result in higher direct impacts to existing land uses, properties and agricultural lands.

**Alternatives 4-2 and 4-3 are the most preferred in the land use / socio economic factor** because they best satisfy and balance land use planning policies and goals while minimizing impacts to community features, properties and existing infrastructure along existing highways as well as prime agricultural land in the preliminary study area. Alternatives 4-2 and 4-3 are either similar or more preferred than Alternatives 3-1, 4-4 or 4-5 in most evaluation criteria in this factor group. Alternatives 4-2 and 4-3 are slightly better than Alternative 4-1 because they both extend to Milton.

##### Cultural Environment Summary

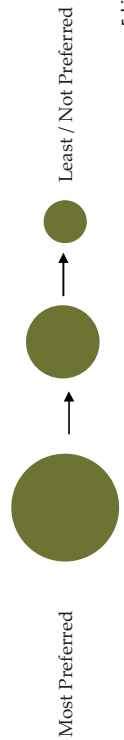
Alternative 3-1 impacts the least number of built heritage resources and has the least impact on cultural landscape because it does not include a new corridor section or a new escarpment crossing. It also has least potential to impact archaeological resources within existing highway rights-of-way, due to previous disturbance of land in footprint area.

FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
6.1 Potential to ease implementation cost, relative property impacts, feasibility / difficulty and requirements for environmental mitigation.	6.1.1 Cost (range, \$B)  6.1.2 Feasibility of implementing interchange reconstruction requirements, impacts (existing schemes, etc.)	4.9 - 5.4  Less property is required for Alternative 3-1; however, property required is along existing roadways through developed areas, in commercial, industrial and institutional lands.  Property constraints in many locations by urban development for widening beyond 10 lanes. Existing six, eight and 10 lane sections will be severely affected by conversion to express / collector system.  Rail bridge crossing may require major detour of rail lines.  407 ETR Connections with Existing Highways 400, 427, 410 and 401: <ul style="list-style-type: none"> <li>Difficulty in widening the 407 ETR through freeway- to- freeway interchanges due to the complex layout of ramps and structures (including bridge piers).</li> <li>The freeway-to-freeway interchanges may need to be rebuilt to accommodate a core-collector system; however, a detailed analysis is required to confirm the feasibility of keeping the existing structures.</li> <li>Requires replacement of all bridges crossing existing 407 ETR, and realignment of arterial crossings for new bridge(s) to maintain traffic.</li> </ul>	4.3 - 4.8  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately seven watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Conflicts with proposed development plans along the Highway 400 corridor.</li> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.7 - 5.2  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately nine watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.6 - 5.1  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately 10 watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.4 - 4.9  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately 14 watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.3 - 4.8  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately 12 watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>
		4.9 - 5.4  Less property is required for Alternative 3-1; however, property required is along existing roadways through developed areas, in commercial, industrial and institutional lands.  Property constraints in many locations by urban development for widening beyond 10 lanes. Existing six, eight and 10 lane sections will be severely affected by conversion to express / collector system.  Rail bridge crossing may require major detour of rail lines.  407 ETR Connections with Existing Highways 400, 427, 410 and 401: <ul style="list-style-type: none"> <li>Difficulty in widening the 407 ETR through freeway- to- freeway interchanges due to the complex layout of ramps and structures (including bridge piers).</li> <li>The freeway-to-freeway interchanges may need to be rebuilt to accommodate a core-collector system; however, a detailed analysis is required to confirm the feasibility of keeping the existing structures.</li> <li>Requires replacement of all bridges crossing existing 407 ETR, and realignment of arterial crossings for new bridge(s) to maintain traffic.</li> </ul>	4.3 - 4.8  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately seven watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Conflicts with proposed development plans along the Highway 400 corridor.</li> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.7 - 5.2  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately nine watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.6 - 5.1  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately 10 watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.4 - 4.9  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately 14 watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>	4.3 - 4.8  More property is required for new corridor; however, most property required is through undeveloped lands.  Multi-span bridges are required over approximately 12 watercourses along the new corridor.  Impacts to proposed development plans at connection to existing freeways.  Connection with Highway 400 in Vaughan: <ul style="list-style-type: none"> <li>Potential conflicts with adjacent interchanges along Highway 401 (King Road and Teston Road).</li> <li>Potential impacts to the King City Airport, north of King-Vaughan Road.</li> </ul>

FACTOR	SUB-FACTOR AND MEASURE	3-1	4-1	4-2	4-3	4-4	4-5
	WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)	<ul style="list-style-type: none"> <li>Limited flexibility in modifying the location of 407 ETR Transition Stations due to the proximity to the existing hydro corridor.</li> <li>Potential impacts to the Transitway include: vertical profile, ramps and structures, grade separations, adjacent arterial roads and access to stations and parking areas.</li> </ul>	<ul style="list-style-type: none"> <li>Conflicts with integrating new corridor with existing Highway 410 extension north of Mayfield Road (i.e. Highway 410 extension designed to 4-lane maximum).</li> <li>Potential conflicts to existing subdivisions (i.e. Valleywood), and planned developments.</li> </ul>	<ul style="list-style-type: none"> <li>Connection with Highway 401 / 407 ETR in Peet.</li> <li>Conflicts with existing free-way-to-free-way interchange ramps and bridges at Highway 401 and 407 ETR.</li> <li>Potential conflict with adjacent interchanges on Highway 401 (Trafalgar Road and Winston Churchill Blvd) and local road network.</li> <li>Will likely require a new core-collector system on this section of Highway 401 which would require replacement of bridges and reconfiguration of ramps.</li> </ul>	<ul style="list-style-type: none"> <li>Connection with Highway 401 in Milton.</li> <li>Conflicts with proposed Tremaine Road interchange and existing Regional Road 25 interchange.</li> <li>Potential impacts to the Niagara Escarpment lands and Kelso Conservation area.</li> </ul>	<ul style="list-style-type: none"> <li>Connection with Highway 6 in Guelph (north).</li> <li>Proposed Highway 7 (new) connection with Highway 6 will require reconfiguration.</li> <li>Proposed Hanlon Expressway extension from Highway 7 (new) to Highway 6 will require reconfiguration.</li> <li>Potential impacts to existing residential properties.</li> </ul>	
6.1.3 Potential transportation construction staging impacts		<p>Complex construction staging (and detours) are required along freeways, interchanges and roadway crossings.</p> <p>Duration of construction, disruption to traffic on 407 ETR and adjacent roadways and impacts to major utilities during construction.</p> <p>Impacts at freeway to freeway interchanges, including closures of directional ramps for extended periods (i.e., entire construction seasons) are unacceptable (i.e., it is too disruptive to close existing ramps from Highway 407 EB to Highway 400 NB for extended periods such as entire construction seasons or longer etc).</p> <p>Impacts to local road systems associated with increased major traffic volumes avoiding major construction and detour areas, as well as economic impacts of increased travel time through the study area would also be significant during extended construction periods.</p>	<p>Less disruption to flow of existing traffic during construction than Alternative 3-1 because the new corridor is located primarily through undeveloped lands.</p> <p>Some minor disruption (detours) may be required for constructing crossing roads.</p>	<p>Less disruption to flow of existing traffic during construction than Alternative 3-1 because the new corridor is located primarily through undeveloped lands.</p> <p>Some moderate disruption (detours) may be required for constructing crossing roads, including the connection with Highway 401 / 407 ETR.</p>	<p>Less disruption to flow of existing traffic during construction than Alternative 3-1 because the new corridor is located primarily through undeveloped lands.</p> <p>Some minor disruption (detours) may be required for constructing crossing roads.</p>	<p>Less disruption to flow of existing traffic during construction than Alternative 3-1 because the new corridor is located primarily through undeveloped lands.</p> <p>Some minor disruption (detours) may be required for constructing crossing roads.</p>	
6.1.4 Requirements for environmental mitigation / compensation / restoration		<p>Lowest environmental mitigation measures are required, primarily in the vicinity of watercourse crossings.</p>	<p>Moderate level of environmental mitigation measures will be required at watercourse crossings and through wetlands and sensitive areas.</p>	<p>Moderate level of environmental mitigation measures will be required at watercourse crossings and through wetlands and sensitive areas.</p>	<p>Moderate level of environmental mitigation measures will be required at watercourse crossings and through wetlands and sensitive areas.</p>	<p>Highest levels of environmental mitigation measures will be required for the crossing of the Niagara Escarpment / greenbelt areas, at watercourse crossings and through wetlands and sensitive areas.</p>	<p>Highest levels of environmental mitigation measures will be required for the crossing of the Niagara Escarpment / greenbelt areas, at watercourse crossings and through wetlands and sensitive areas.</p>

FACTOR	SUB-FACTOR AND MEASURE	3-1 WIDENING EXISTING PROVINCIAL HIGHWAYS (WIDEST HIGHWAY 407 EAST OF HIGHWAY 401)	4-1 REDUCED HIGHWAY 407 WIDENING (EAST OF HIGHWAY 401) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 410	4-2 REDUCED WIDENING (SAME AS 4-1) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401	4-3 REDUCED HIGHWAY 401 WIDENING (THROUGH MILTON) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 401 WEST OF MILTON	4-4 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (NORTH OF GUELPH)	4-5 NARROWEST HIGHWAY 401 WIDENING (THROUGH MILTON TO HIGHWAY 6) AND NEW CORRIDOR FROM HIGHWAY 400 TO HIGHWAY 6 (SOUTH OF GUELPH)
SUMMARY COST AND CONSTRUCTABILITY		<p><b>LEAST PREFERRED</b> – because widening existing freeways is the most complex to construct. Alternative 3-1 has the highest staging impacts, particularly along 407 ETR and potential impacts to the future 407 Transitway. Widening impacts through freeway to freeway interchanges include reconstruction of major bridges and directional ramps that require closure for extended periods during construction. Changes / disruption at interchanges during construction will also impact local transportation network and adjacent land uses. This alternative is the most costly to construct.</p>	<p><b>MOST PREFERRED</b> – because a new corridor is less complex to construct compared to widening existing freeways. This alternative requires a moderate level of freeway widening, but has the shortest length of new corridor and is the least costly to construct.</p>	<p><b>MODERATELY PREFERRED</b> – because a new corridor is less complex to construct compared to widening existing freeways. This alternative requires a moderate level of freeway widening and is one of the most costly to construct. This alternative has challenges associated with future interchange requirements at the existing Highway 401 / 407 ETR interchange in Mississauga, which other Group #4 alternatives do not have.</p>	<p><b>MOST PREFERRED</b> – because a new corridor is less complex and costly to construct compared to widening existing freeways. This alternative has the shortest length of freeway widening and fewer property impacts through built-up areas.</p>	<p><b>MOST PREFERRED</b> – because a new corridor is less complex and costly to construct compared to widening existing freeways. This alternative has the shortest length of freeway widening and fewer property impacts through built-up areas.</p>	<p><b>MOST PREFERRED</b> – because a new corridor is less complex and costly to construct compared to widening existing freeways. This alternative has the shortest length of freeway widening and fewer property impacts through built-up areas.</p>
OVERALL SUMMARY		<p>Alternative 3-1 is least preferred because it is more expensive than the other alternatives and will result in very high construction staging impacts that will have negative effects on the provincial and municipal transportation systems, land uses adjacent to the road networks impacted, as well as local economic impacts associated with major traffic disruption and delay for many construction seasons (i.e., years), during reconstruction of freeway to freeway interchange ramps and structures. All of the Group #4 alternatives have relatively similar costs and significantly reduce the construction staging issues associated with Alternative 3-1. However, Alternative 4-2 is slightly less desirable because of construction staging challenges associated with future interchange connections at the existing Highway 401 / 407 ETR interchange in Mississauga.</p> <p><b>Therefore, Alternatives 4-1, 4-3, 4-4 and 4-5 are most preferred from a cost and constructability perspective.</b></p>					

	GROUP 3-1	GROUP 4-1	GROUP 4-2	GROUP 4-3	GROUP 4-4	GROUP 4-5	
NATURAL ENVIRONMENT	Large circle	Medium circle	Medium circle	Medium circle	Small circle	Small circle	
LAND USE/SOCIAL ENVIRONMENT (INCLUDES AIR QUALITY)	Small circle	Medium circle	Large circle	Large circle	Small circle	Small circle	
CULTURAL ENVIRONMENT	Large circle	Medium circle	Medium circle	Medium circle	Small circle	Small circle	
AREA ECONOMY	Large circle	Small circle	Medium circle	Large circle	Medium circle	Medium circle	
TRANSPORTATION	Small circle	Small circle	Medium circle	Large circle	Large circle	Large circle	
COST AND CONSTRUCTABILITY	Small circle	Large circle	Medium circle	Large circle	Large circle	Large circle	
SUMMARY	NOT RECOMMENDED	NOT RECOMMENDED	CARRIED FORWARD	CARRIED FORWARD	NOT RECOMMENDED	NOT RECOMMENDED	



Alternatives 4-4 and 4-5 have the longest new corridor sections that may have the largest impacts to potential built heritage features and archaeological resources, as well as the cultural landscape, especially at the new escarpment crossings. Alternatives 4-1, 4-2 and 4-3 have relatively moderate impacts that can be mitigated through route location and design.

**Alternative 3-1 is preferred from a cultural perspective.** Alternatives 4-1, 4-2 and 4-3 are slightly less preferred than Alternative 3-1 as they result in relatively similar moderate impacts. Alternatives 4-4 and 4-5 result in significantly higher impacts than the other alternatives.

#### Area Economy Summary

From an economic perspective, Alternative 4-1 is the least desirable due to its short length and lack of efficient connection to most future employment growth areas, or provision of connections to trade routes. The other new corridor alternatives provide similar economic benefits. However, Alternatives 4-4 and 4-5 are less desirable than Alternatives 3-1 and 4-3 as they serve future growth areas less effectively. Alternative 4-2 is moderately preferred because the new corridor section does not extend to directly service Milton as well as Alternative 4-3.

**Alternatives 3-1 and 4-3 are the most preferred from an economic perspective** because they have the highest economic benefit and / or serve the economic growth areas most effectively.

#### Transportation Summary

Alternatives 4-3, 4-4 and 4-5 perform best in terms of overall traffic operations (i.e. road network performance at critical screenlines, percentage of inter-regional trips on inter-regional facilities) and result in reduced delays on both the inter-regional and local road network for auto and truck trips. Alternative 4-3 provides the greatest opportunity for new linkages, including transit connections to Milton where there is potential to serve a substantial growth in future demand. Alternative 4-2 performs second best to 4-3 and 4-5 in terms of overall traffic operations, but it does not provide significant opportunities for modal integration and new linkages.

Alternatives 3-1 and 4-1 address future capacity needs but provide only moderate potential for transit linkages, provide limited redundancy benefits and result in higher use of local roads by longer distance inter-regional traffic.

**Alternatives 4-3, 4-4 and 4-5 are the most preferred from a transportation performance perspective.**

#### Cost and Constructability

Alternative 3-1 is least preferred because it is more costly than the other alternatives and will result in high construction staging impacts that will have negative impacts on the provincial and municipal transportation systems, land uses adjacent to the road networks impacted, as well as local economic impacts associated with major traffic disruption and delay for many construction seasons (i.e. years) during reconstruction of freeway to freeway interchange ramps and structures. All of the Group #4 alternatives have relatively similar costs and significantly reduce the construction staging issues associated with Alternative 3-1. However, Alternative 4-2 is slightly less desirable because of construction staging challenges associated with future interchange connections at the existing Highway 401 / 407 ETR interchange in Halton.

**Alternatives 4-1, 4-3, 4-4 and 4-5 are the most preferred from a cost and constructability perspective.**

#### Overall Summary

The summaries provided above for each Factor Group and Exhibit 4-49 demonstrate that although Alternative 3-1 is preferred for Natural, Cultural and Economic Environment, it is the least preferred for Land Use / Social Environment, Transportation Performance and Cost and Constructability; therefore it is not recommended to be carried forward. Alternative 4-1 is preferred for Cost and Constructability with moderate impacts on the Natural, Land Use / Social and Cultural Environment criteria. However, this alternative is least preferred for the Economic Environment and overall Transportation and is therefore not recommended to be carried forward. Although Alternatives 4-4 and 4-5 are preferred for the Transportation and Cost and Constructability factors, they have the greatest potential impacts on the Natural, Land Use / Social and Cultural Environment and as such are not recommended to be carried forward. The overall assessment

indicates that Alternatives 4-2 and 4-3 provide better overall benefits and fewer potential impacts and were carried forward for further consideration.