Ontario

Ministry of Transportation

Highway 7&8 Transportation Corridor Planning and Class EA Study

Greater Stratford to New Hamburg Area
MTO Group Work Project # 13-00-00

Report C: 'Area Transportation System' Problems and Opportunities

DRAFT

June, 2008

www.7and8corridorstudy.ca

This report is presented in draft format in order to obtain information and comments from stakeholders. Your input is requested by August 15, 2008 so the report can be finalized.

TSH engineers architects planners

"Ce document hautement spécialisé n'est disponsible qu'en anglais en vertue du règlement 411/97, qui en exempte l'application de la Loi sur les services en français. Pour de l'aide en français, veuillez communiquer avec le ministère des Transports, Bureau des services en français au: 905-704-2045 ou 905-704-2046."

TABLE OF CONTENTS

LIST OF EXHIBITS

1.0 INTRODUCTION

1.1 Introduction To The Highway 7&8 Transportation Corridor Planning And Class EA Study

The Ministry of Transportation (MTO) has initiated a Highway 7&8 Transportation Corridor Planning and Class Environmental Assessment (Class EA) Study, from Greater Stratford to the New Hamburg area. The study will:

- develop a plan that addresses:
  - capacity, operation and safety needs along the 2-lane and 4-lane sections of Highway 7&8 between Stratford and the New Hamburg area and on Highway 7&8 through the urban centres (Stratford, Shakespeare and New Hamburg) for the movement of people and goods; and
  - linkage needs between the analysis area to transportation corridors serving other regions in the province.
- prepare a preliminary design for the provincial roadway components of that plan; and
- be documented in a Transportation Environmental Study Report for public review at study completion.

This study will also:

- Review and build on the MTO Highway 7&8 Study Design – Greater Stratford to New Hamburg Area, December 2005;
- Address the transportation policies and directions of the 'Growth Plan for the Greater Golden Horseshoe' (recognizing that a portion of the analysis area for this project lies within the GGH);
- Recognize several municipal transportation initiatives in the area;
- Recognize other relevant transportation corridor studies being undertaken by MTO; and
- Be carried out as a Group 'A' project, in accordance with the Class Environmental Assessment for Provincial Transportation Facilities.

Access to the above documents can be obtained through the study website at www.7and8corridorstudy.ca.

A major component of the study will be an outreach and consultation program structured around six key points of decision-making, each of which will be supported by:

- the release of a newsletter;
- the release of draft reports for review and comment;
- a round of Public Information Centres (PICs);
- posting of information on the study website; and
- newspaper notices announcing the above.

At the completion of the study, the filing of a Transportation Environmental Study Report (TESR) will be announced through newspaper notices. Decisions on funding and timing of

detail design and construction are based upon environmental clearance of the TESR, since it determines the type of transportation facilities and their location.

For orientation and reference, a map of the Analysis Area is provided in **Exhibit 1.1** below. The Analysis Area is discussed in Section 2 of this report.

Exhibit 1.1: Map of Analysis Area

Highway 7&8 Transportation Corridor Planning and Class EA Study

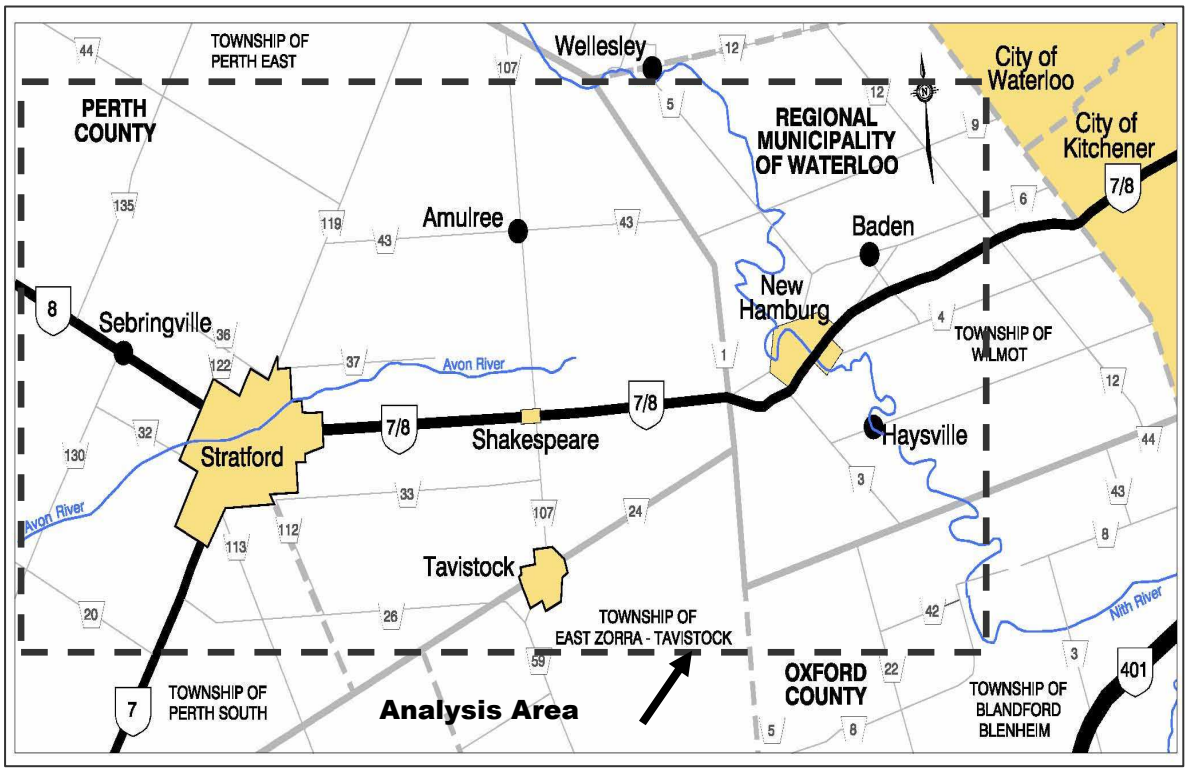


Exhibit 1.2 below provides a summary of study objectives from Report A of this study (the 'Study Plan for Technical Work, Outreach and Consultation'):

Exhibit 1.2: Summary of Study Objectives Highway 7&8 Transportation Corridor Planning and Class EA Study
1. To identify and assess the factors that are driving 'Area Transportation System' needs
2. To apply those driving factors in preparing a Transportation Development Strategy to address long-term multi-year needs for the movement of people and goods
3. To undertake the planning and preliminary design of the provincial roadway components (provincial highways and provincial transitways) of those strategies

Exhibit 1.2: Summary of Study Objectives Highway 7&8 Transportation Corridor Planning and Class EA Study
4. To conduct the planning and preliminary design of provincial roadways with an inherent approach of avoiding or minimizing overall environmental impacts
5. To identify highway access management measures for growth management and highway protection
6. To engage public and stakeholders early in the study process and continue to engage them throughout the study process

Exhibit 1.3 below provides a preliminary statement of transportation problems and opportunities from Report A of this study:

Exhibit 1.3: Preliminary Statement of Transportation Problems and Opportunities Highway 7&8 Transportation Corridor Planning and Class EA Study
1. There is inadequate transportation capacity to meet current and projected needs (to 2031) for the efficient movement of both people and goods along the 2-lane and 4-lane sections of Highway 7&8 between Stratford and the New Hamburg area and on Highway 7&8 through the urban centres (Stratford, Shakespeare and New Hamburg).
2. Provincial / inter-regional traffic through the urban centres (Stratford and Shakespeare) along Highway 7&8 interferes with their "downtown / historic crossroads" function.
3. The connection of the Analysis Area to transportation corridors serving other regions in the province is inadequate for long-term transportation and economic development needs.
4. Geometric and traffic safety characteristics along Highway 7&8 are not appropriate to address forecasted needs in a manner that facilitates their safe and efficient use for the movement of people and goods.
5. There is currently no comprehensive highway access management plan for Highway 7&8 from Greater Stratford to New Hamburg to protect highway function/operation/safety, and to discourage inappropriate highway-related land development/growth.
6. Area transportation system planning and local land use planning in the analysis area need to be co-ordinated, in order to ensure new/intensified development associated with forecasted population and employment growth in the Analysis Area does not negatively affect or even preclude alternatives to address transportation problems and opportunities.
This preliminary statement of problems and opportunities may be refined as appropriate during the Class EA to reflect study findings and input received through consultation and engagement.

1.2 Purpose, Relevance and Position of Report "C" Within the Study Process

The purpose of Report C is to document 'Area Transportation System' needs, including existing and future problems, deficiencies and opportunities. This will allow for the appropriate scoping of the remaining technical and consultation requirements of the Class EA and Preliminary Design components of the Study.

As can be seen in **Exhibit 1.4** below, Report C is the fourth of 11 reports to be prepared for this study and the third report of Phase 2, Area Transportation System Planning.

Exhibit 1.4: Summary of Reports Highway 7&8 Transportation Corridor Planning and Class EA Study
STUDY PHASE 1: STUDY PLAN
• Report "A" Study Plan For Technical Work, Outreach And Consultation
STUDY PHASE 2: AREA TRANSPORTATION SYSTEM PLANNING
• Report "B": Working Paper – Overview of Transportation, Land Use and Economic Conditions Within the Analysis Area
• Report "F" 1st Part: Working Paper - Environmental Conditions And Constraints
• ***Report "C": Working Paper – 'Area Transportation System' Problems and Opportunities***
• Report "D": Working Paper – Area Transportation System Alternatives
STUDY PHASE 3: PRELIMINARY PLANNING
• Report "E": Milestone Report – Transportation Corridor Needs Assessment
STUDY PHASE 4: DETAILED PLANNING FOR PROVINCIAL ROADWAYS
• Report "F" 2nd Part: Working Paper - Environmental Conditions And Constraints
• Report "G": Working Paper – Generation of Detailed Planning Alternatives for Provincial Roadway
• Report "H": Milestone Report - Selection of Detailed Planning Alternatives for Provincial Roadway
STUDY PHASE 5: PRELIMINARY DESIGN FOR PROVINCIAL ROADWAYS
• Report "I": Working Paper - Generation of Provincial Roadway Preliminary Design Alternatives
• Report "J": Milestone Report - Selection of Preliminary/Concept Design Alternatives for Provincial Roadway
STUDY PHASE 6: TRANSPORTATION ENVIRONMENTAL STUDY REPORT
• Report "K": Transportation Environmental Study Report

Report C is designed to provide a comprehensive overview of the 'Area Transportation System' needs within the Analysis Area. For highlights of the report, readers are referred to the following exhibits:

- Exhibit 5.2: Existing Transportation Issues
- Exhibit 6.1: Transportation Problems
- Exhibit 6.2: Transportation Opportunities

- Exhibit 8.1: Process Overview for the Development, Assessment and Evaluation of the 'Area Transportation System' Alternatives (Phase 2 of Study)
- Exhibit 8.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

2.0 SUMMARY OF ANALYSIS AREA EXISTING CONDITIONS

A comprehensive overview of transportation, land use and economic conditions within the Analysis Area was provided in Report B: Overview of Transportation, Land Use and Economic Conditions within the Analysis Area. A summary of the findings of this report is provided in the following sections.

2.1 Identification of Analysis Area

The Analysis Area was established to identify transportation problems and opportunities associated with Highway 7&8 between Greater Stratford and the New Hamburg Area. The Analysis Area is not intended to represent a Study Area for the planning alternatives to be generated during the course of the study. The Study Area will be generated by the MTO Study Team through consultation with stakeholders.

2.2 Summary of Transportation, Land Use and Economic Conditions within the Analysis Area

As documented in Report B, a number of key factors that influence the 'Area Transportation System' needs were identified through a preliminary assessment based on a field review and the review of available related documentation/reports. The key factors driving 'Area Transportation System' needs were summarized under the following themes:

- Policy Framework;
- Area Economy;
- Modal Outlooks;
- Existing Transportation System Travel Characteristics; and
- Existing Highway Conditions.

The following sections provide an overview of the analysis and conclusions documented in Report B.

2.2.1 Policy Framework

The policy developed by various levels of government is consistent with respect to the direction on land-use planning and transportation to promote strong communities, a clean and healthy environment, and a strong economy. The policies recognize the complex inter-relationships among economic, environmental and social factors in planning.

From a provincial perspective, an improved transportation corridor has to function within the provincial transportation network, and connect to existing provincial facilities at locations that are compatible with existing infrastructure or future plans. Better use of land and infrastructure can be made by directing growth to the existing urban areas. The provincial policy including the Greenbelt Plan and Places to Grow envisages increasing intensification of the existing built-up

areas, with a focus on urban growth centres, intensification corridors, major transit station areas, brownfield sites and greyfields. Concentrating intensification in these areas provides a focus for transit and infrastructure investment to support growth.

Area municipal staff and politicians are concerned with the location and function of a future transportation corridor within their respective municipalities, and the compatibility of the future corridor with their land use strategies and plans for future development.

2.2.2 Socio-Economic Conditions

The socio-economic conditions in the Analysis Area can be described as undergoing significant change. Over the period from 1961 to 2001, Southwestern Ontario grew from 1.6 million to 2.8 million people. The region's population is projected to grow at a rate similar to the rest of Ontario, to 4 million by 2026. Southwestern Ontario employment almost doubled between 1961 and 2001 to over 1.1 million jobs. Total employment is projected to grow to almost 1.9 million by 2026.

Population and employment growth is focused on major urban centres beyond the GTA along Highways 400, 401, and 403. Modest growth is projected for the Region of Waterloo, the counties of Simcoe and Middlesex, and in the urban areas of Kitchener-Waterloo, London, Barrie, Cambridge and Guelph. Population and employment forecasts indicate that the Region of Waterloo will continue to grow an average of 2% per year over the next 30 years.

One expected outcome of this growth will be increased travel times and costs for commuting and other travel due to increasing travel distances and congestion within the Analysis Area. Reduced accessibility and increased travel time will affect this region's economic competitiveness as goods movement and employee commuting times increase due to highway congestion.

Even as urban centres evolve and new growth management policies for more compact forms of development and alternative forms of transportation are provided between the major centres, the strong auto-based commuting patterns between Stratford and the New Hamburg area are expected to continue. Accordingly, the continued success of the Analysis Area from a socio-economic perspective would benefit from an improved transportation corridor between Stratford and the New Hamburg area.

2.2.3 Modal Outlooks

The Regional transportation system in and around the Highway 7&8 Corridor comprises automobile/truck modes, pedestrian/cycling modes, and rail, bus, and air to meet inter-city passenger needs. Major freight transportation modes include truck and rail.

Automobiles

Automobile traffic using the provincial highway system is by far the predominant mode of travel, accounting for more than 90% of the passenger kilometers travelled. The remaining transportation modes (bus, rail, air, cycling, and walking) account for 7.5% of the passenger

kilometres travelled. The automobile continues to be the preferred mode of travel in Southern Ontario. Auto ownership rates have been growing faster than the population growth rate over the previous decades with the popularity of suburban life being a major contributor.

Trucking

Trucking is the principal means of goods transport in Southern Ontario with highways linking to all major manufacturing centres and international border crossings. The trucking industry is expected to maintain its existing share of the transportation market for short and medium haul shipping, even as rail attempts to expand its long haul share into the short/medium market.

Industrial and commercial development will also continue to require timely access to customers and suppliers located within and external to the Analysis Area. An improved east-west highway between the urban centres is required in order to serve this need.

Railways

The Goderich-Exeter Railway corridor runs parallel to Highway 7&8 from Stratford easterly to Kitchener. The railway is generally located 400 m south of Highway 7&8 from Stratford to approximately 1.5 km west of the intersection with Waterloo Regional Road 1 where the railway crosses the highway. This rail corridor then extends eastward paralleling Highway 7&8 to the north through New Hamburg.

This section of rail carries approximately 8 to 10 trains per day. The volume of rail traffic consists of both freight and passenger trains. The trains using this rail corridor are traveling from destinations to the west, from as far as Sarnia and Chicago, and from Toronto in the east. Via Rail and Amtrak use this track for their personal service.

Transit

Within the Analysis Area, both public and inter-city transit is limited. Currently, the only inter-city bus service provider in the area is Greyhound Bus Lines, which has only one bus terminal in the Analysis Area (located in downtown Stratford). Municipal public transit is only available within the City of Stratford, and offers a limited number of routes through the outer residential areas in the Greater Stratford area.

With regard to future transit improvements, the province has recently announced that GO Transit bus service will be expanded to the Kitchener-Waterloo area. While future transit expansion may lead to increased capacity of transit networks, it is not anticipated that the capacity of the overall transportation network in the vicinity of the Highway 7&8 corridor will be sufficiently increased to eliminate the need for roadway improvements.

Enhancing the role of transit in the Highway 7&8 corridor would help to achieve the provincial and municipal policy objectives for sustainable transportation and environment.

Airports

The majority of local, national or international air travel is serviced from Toronto's Pearson Airport, approximately 90 minutes southeast. The Stratford Municipal Airport is operational year round servicing charters, flight training and business jet travel along with necessary maintenance services. The Waterloo Regional Airport provides limited international (Detroit) and charter passenger service via small commuter aircraft. It also accommodates cargo, business charter and flight training along with necessary service facilities. The London Airport also provides passenger and cargo services.

Marine

Four major ports are also located within two hours trucking time: Goderich, Toronto, Port Stanley, and Hamilton. This transportation accessibility is one potential advantage for locating businesses with national or international markets in the Analysis Area.

2.2.4 Existing Transportation System Travel Characteristics

The travel pattern for Highway 7&8 from Stratford City Limits to Waterloo Road 1 is Commuter Tourist Recreation (CTR). From Waterloo Road 1 to Waterloo Road 4 – West Junction, Highway 7&8 has a Commuter Recreation (CR) travel pattern. The segment from Waterloo Road 4 – West Junction to 0.8 km east of Waterloo Road 5 has a Commuter (C) travel pattern. Within the study area, Highway 7&8 experiences a Summer Average Daily Traffic (SADT) greater than the Average Annual Daily Traffic (AADT). Historically, over the past five years, SADT has been approximately 10 to 30 percent greater than the AADT. Seasonal traffic volume variations on the highway are attributed to increases in recreational and tourist trips during the summer months.

The 2004 count data (AADT) provided in **Exhibit 2.1** shows that the highest traffic volumes on Highway 7&8 in the Analysis Area are occurring on the section between Waterloo Road 4 (West Junction) and Waterloo Road 5. The traffic volumes are high enough to support the need for additional capacity along both the 2-lane and 4-lane sections of Highway 7&8 or the diversion of traffic to another corridor (new or existing).

Exhibit 2.1: Highway 7&8 Mainline Existing Traffic Volumes (2004)

Highway 7&8	2004 Average Annual Daily Traffic (AADT)	2004 Design Hour Volume (DHV)
Stratford City Limits to 2.9 km East of Stratford City Limits	9,800	980
2.9 km East of Stratford City Limits to Perth Road 107	9,800	980
Perth Road 107 to Waterloo Road 1	10,600	1,060

Exhibit 2.1: Highway 7&8 Mainline Existing Traffic Volumes (2004)		
Highway 7&8	**2004 Average Annual Daily Traffic (AADT)**	**2004 Design Hour Volume (DHV)**
Waterloo Road 1 to Waterloo Road 4 (West Junction)	13,800	1,380
Waterloo Road 4 (West Junction) to Waterloo Road 4 (East Junction)	19,800	1,980
Waterloo Road 4 (East Junction) to 0.8 km East of Waterloo Road 5	18,400	1,840

Traffic along this highway corridor is mostly uninterrupted free-flow (i.e. no stop or yield control for the Highway 7&8 approaches) except at the following intersections which are signalized:

- Highway 7&8 /Perth Road 107;
- Highway 7&8 /Waterloo Road 1;
- Highway 7&8 /Waterloo Road 4 – West Junction;
- Highway 7&8 /Waterloo Road 4 – East Junction; and
- Highway 7&8 /Waterloo Road 5 (Nafziger Road).

Under existing conditions, most of the key intersections along Highway 7&8 are currently operating within acceptable levels of service during the a.m. and p.m. peak hours. There are some exceptions at the unsignalized intersections, such as at Perth Road 111, where there are high turning volumes to / from the side street. In all these cases, the critical movements are for the northbound and / or southbound approaches. Thus, eastbound and westbound approaches are operating well; however, notable delays and / or high v/c ratios are experienced on the side streets. There are limited opportunities to improve these conditions, all of which must be cognizant of the minimal side street approach volumes.

The operations at the signalized intersections (Perth Road 107, and West and East Junctions of Waterloo Regional Road 4) revealed LOS 'D' or better, with the exception of the Perth Road 107 intersection during the p.m. peak hour, which was found to be operating at LOS 'F'. It is noted that optimization of the signal timing at these locations resulted in improved intersection operations with no critical movements.

Commercial vehicle data provided by MTO indicates that Highway 7&8 through the Analysis Area is a major through trucking route, with trucks representing approximately 10% to 16% of the total traffic. Concerns have been raised regarding speed of trucks, volume of trucks, traffic safety and excessive noise.

2.2.5 Existing Highway Conditions

Highway 7&8 assumes three distinct cross-sections between Stratford and New Hamburg on the basis of the number of eastbound and westbound lanes that are provided, as well as the degree of separation that is provided between the eastbound and westbound lanes.

At the west end of the study limits, Highway 7&8 is a four-lane rural arterial roadway from the east limits of the City of Stratford to 2.9 kilometres easterly. This segment of Highway 7&8 is referred to as being 'undivided', as there is no separation provided between the eastbound and westbound lanes of the highway. Through the City (in a westerly direction) the highway separates into Highway 8 continuing in a northwesterly direction, and Highway 7 continuing in a southwesterly direction.

From 2.9 kilometres east of the Stratford east city limits to Waterloo Regional Road 1, Highway 7&8 is an undivided two-lane rural arterial roadway. The 700 m long section of Highway 7&8 through Shakespeare was constructed with a two lane urban cross-section and features a reduced posted speed of 50 km/h. (The posted speed for all other sections of Highway 7&8 within the corridor is 80 km/h). There is also a signalized intersection at Shakespeare's main street, Perth Road 107.

From Waterloo Regional Road 1 to the east limits of New Hamburg, Highway 7&8 is a four-lane staged freeway with at-grade intersections and controlled access. This section of the highway is referred to as being 'divided', as there is a 1 m flush median separating eastbound and westbound lanes. There are signalized intersections at Waterloo Regional Road 5 (Nafziger Road), Hamilton Road / Bleams Road (east junction of Waterloo Regional Road 4), Peel Street / Haysville Road (west junction of Waterloo Regional Road 4) and Waterloo Regional Road 1.

East of the Analysis Area, Highway 7&8 continues as the major link between Stratford and the Kitchener / Waterloo / Cambridge area. Throughout this segment, Highway 7&8 is a controlled access, four-lane, divided rural freeway from east of New Hamburg through to Kitchener and the Greater Toronto Area via Highway 8 and Highway 401.

The west section of Highway 7&8 in the vicinity of Stratford and the central section through Shakespeare pass through the built-up urbanized areas (primarily commercial land uses) with a significant number of access points and/or traffic signals. The remaining sections of Highway 7&8 are generally rural. The numerous intersections and entrances throughout the highway corridor are an indicator that more stringent access management policies would be necessary to improve/maintain the level of capacity along the corridor. For a highway to effectively move people and goods there should be no or limited impediments to through traffic due to traffic control devices or turning traffic.

The applicable design speed for Highway 7&8 is 100 km/h (i.e. 20 km/h higher than the posted speed limit) except through the built-up areas where a reduced design speed applies given the lower posted speed limit. Several horizontal alignment elements and numerous vertical alignment elements do not meet the requirements for the applicable 100 km/h design speed.

Limited passing opportunities exists due to the horizontal alignment, vertical alignment and intersection spacing resulting in through vehicles spending a high proportion of time in platoons and operating at less than their desired speeds.

Numerous safety related concerns have been expressed by the public and stakeholders in previous studies. Concerns relate to alignment deficiencies, accessibility, vehicle speeds, volume of trucks, signage, and general congestion.

The available road allowance along the existing corridor and the built environment towards the west end of the Analysis Area and in pockets throughout the study corridor may be a significant constraint to achieving acceptable capacity and safety improvements along the existing corridor and/or to providing a transitway facility.

2.2.6 Conclusions

The assessment of the existing conditions provided sufficient information to move to the next stage of the Class Environmental Assessment. Specifically, it was concluded that:

- The existing transportation system between Stratford and the New Hamburg area exhibits network congestion in peak periods;
- The Stratford to New Hamburg area travel corridor serves significant flows of people and goods through the Analysis Area; and
- Comprehensive network based strategies are required to address current and future mobility challenges. These strategies must recognize the interrelationship between all elements of the transportation system and land use in the Analysis Area.

2.3 Process to Define 'Area Transportation System' Problems and Opportunities

As noted in Section 10 of Report B, the review of the transportation system and the identification of the problems and opportunities build on a review of the federal and provincial policy framework and a series of related goals and objectives. The goals are summarized below, while the objectives associated with each goal are documented in Report B:

- Optimize the use of existing and new infrastructure;
- Provide sustainable transportation choices;
- Safe and efficient movement of people and goods;
- Ensure the development of infrastructure that links the Analysis Area and provides connectivity between economic nodes and centres within the Analysis Area and the Province;
- Support and promote sustainable economic growth at federal, provincial and municipal levels;
- Support the urban form and intensification strategies embodied in the Growth Plan; and
- Create a multi-modal transportation strategy that promotes the protection, conservation, enhancement and the wise use of natural resources.

3.0 TRAVEL DEMAND FORECASTING APPROACH AND METHODOLOGY

3.1 Approach

To address the goals identified in Report B, the Area Transportation System was reviewed in the context of existing and future performance based on planned changes to the socio-economic and transportation environments. Travel demand forecasts were prepared for the Analysis Area in consideration of the potential future environment using industry accepted computer based planning tools.

A strategic assessment of the corridor and facility performance was undertaken by assessing the demand versus the provided capacity (volume to capacity). The assessment was made on Highway 7 and Highway 8 and at critical screenline locations through the Analysis Area to identify any capacity deficiencies. The traffic forecasting and travel demand analysis is structured to provide sufficient detail to define the future need for major transportation corridor improvements within the Analysis Area.

The travel demand analysis included the following components:

- Review of existing data bases (Transportation Tomorrow Survey (TTS), Census, Statistics Canada, Commercial Vehicle Studies, Provincial and Regional traffic characteristics from existing Origin-Destination Surveys) and previous transportation reports to describe the existing travel characteristics in the Highway 7&8 corridor between the Stratford Area and New Hamburg, and to areas beyond the Analysis Area, including the Region of Waterloo and the Greater Toronto Area;
- Strategic assessment of longer-term (2031) travel demand in the Stratford-New Hamburg corridor by specific user type (commuter, tourist and commercial vehicle). The strategic demand provides a perspective on the travel patterns and flows in the greater Analysis Area;
- Development of a strategic model to forecast future person trips based on the Origin-Destination Surveys completed as part of the Highway 7&8 Transportation Needs Assessment Report (July 2005), and Census data including origin-destination information for 2001 work trips made by residents in the broader Analysis Area. The forecasting model allows for the assessment of various alternative networks including potential infrastructure outside of the immediate corridor, and the existing provincial and regional road network;
- Forecast travel demands were developed based on planned population and employment growth in the Analysis Area and in municipalities in Central / Southwestern Ontario, assuming that current trends in trip distribution would be maintained over the long term (fratar process);
- Traffic analysis was undertaken for the average weekday conditions as opposed to peak summer flow conditions which yields a more conservative result. Design Hour Volume (DHV) demands were derived using established existing relationships to the Average Annual Daily Traffic (AADT) condition;
- Identification of transportation system deficiencies and needs; and

- Identification of problems and opportunities.

3.2 Land Use

Growth Plan for the Greater Golden Horseshoe

As noted in Report B, "Overview of Transportation, Land Use and Economic Conditions with the Analysis Area", a major influence to the socio-economic environment in the Analysis Area is the recently published Growth Plan for the Greater Golden Horseshoe (GGH Growth Plan), released by the province on June 16, 2006, which reflects the Places to Grow Act's underlying principles of intensification and reduced urban sprawl. While the only portion of Analysis Area that falls within the GGH is the New Hamburg area, the Growth Plan outlines specific growth policies and targets for the Region of Waterloo and other municipalities further to the east that will influence travel demands in the Analysis Area.

Population and employment forecasts for municipalities in the Greater Golden Horseshoe, as set in the Places to Grow Act are detailed in **Exhibit 3.1.**

Exhibit 3.1: Forecasted Population and Employment in the Greater Golden Horseshoe (000)

MUNICIPALITY	POPULATION				EMPLOYMENT			
	2001	2011	2021	2031	2001	2011	2021	2031
GTA + Hamilton	5,810	6,860	7,770	8,620	2,950	3,630	4,040	4,330
County of Northumberland	80	87	93	96	29	32	33	33
County of Peterborough	56	58	144	149	16	17	60	60
City of Peterborough	74	79			37	41		
City of Kawartha Lakes	72	80	91	100	20	23	25	27
County of Simcoe	254	294	583	667	85	102	230	254
City of Barrie	108	157			53	77		
City of Orillia	30	33			16	17		
County of Dufferin	53	62	71	80	19	22	25	27
County of Wellington	85	91	269	321	36	41	137	158
City of Guelph	110	132			63	76		
Region of Waterloo	456	526	623	729	236	282	324	366
County of Brant	35	39	157	173	16	17	67	71
City of Brantford	94	102			39	45		
County of Haldimand	46	49	53	56	17	19	19	20
Region of Niagara	427	442	474	511	186	201	209	218
Total GGH	**7,790**	**9,090**	**10,330**	**11,500**	**3,810**	**4,640**	**5,170**	**5,560**
Note: from Schedule 3 of the GGH Growth Plan								

The Growth Plan promotes planning on a more regional level and sets the stage for future growth and land use scenarios by providing guidelines for municipal planning that are intended to:

- stimulate economic prosperity;
- facilitate the efficient movement of goods by linking intermodal facilities, international gateways, and communities within the GGH;
- revitalize downtowns;
- provide growth forecast objectives:
- promote intensification - by the year 2015 and for each year thereafter to 2031, a minimum of 40 percent of all residential development in upper and single tier municipalities will be in the built-up area;
- designate urban growth centres which will generally be planned to achieve a minimum gross density target (the closest centres to which this applies are uptown Waterloo and downtown Kitchener);
- encourage more compact communities, with services, shops and businesses close to home;
- curb urban sprawl;
- preserve greenspace and agricultural lands that are under pressure in the GGH;
- cut down on car dependency by increasing modal share of alternatives to the automobile;
- contribute to better air quality;
- spur transit investment and create conditions favourable to public transit use; and
- promote a culture of conservation.

Through its policies, the GGH Growth Plan will impact the future land use / socio-economic environment in the analysis area, by establishing guidelines for future growth, land use (including greenspace and agriculture) and transportation objectives.

In brief, the transportation policy is to provide for the long-term multi-year needs for the movement of people and goods within the context of a balanced and integrated 'Area Transportation System', which:

a) provides adequate 'Area Transportation System' capacity, in order to serve current and projected needs of the travelling public, stimulate economic growth, and create jobs;
b) ensures that the corridors necessary for the various travel modes of the 'Area Transportation System' are identified and protected, in order to maintain and improve transportation linkages;
c) is co-ordinated and consistent with land-use related growth objectives, in order to reflect the impact of designation of areas as urban growth centres, major transit station areas, settlement areas, built-up areas, intensification areas and corridors, non-urban areas, greenfield areas and greenbelt; and
d) in addition, for areas within the geographic boundary covered by the GGH Growth Plan, has the following attributes:
    (i) considers both the connectivity of modes, and the separation of modes within corridors, in order to provide access to the various modes of the 'Area Transportation System' that allows people choices by reducing reliance on any single mode;

(ii) puts the transit component of the 'Area Transportation System' (GO Transit, provincial transitways, other inter-city transit) as the first investment priority in order to support growth in a compact and efficient form;
(iii) puts goods movement as the first investment priority in the provincial highway component of the 'Area Transportation System', in order to service cities and other major centres of population, priority truck routes leading into those communities, and major regional facilities for primary goods movement such as intermodal facilities.

Urban Growth Centres

The population contained in urban areas – cities, towns and villages – represented almost 75% of the Southwestern Ontario population in 1996. People living in the Southwestern Ontario's 18 cities account for approximately 50% of the region's total urban population. All major cities, with populations in excess of 50,000 are close to provincial highways.

The Kitchener/Waterloo/Guelph/Cambridge triangle has become a growth centre in the areas of computer-technology, engineering and telecommunications. Other major high growth centres in the broader analysis area include London, and to a lesser extent the emerging industrial employment areas in Ingersoll and Woodstock.

For the municipalities in the broader analysis area that are not covered by the Growth Plan for the Greater Golden Horseshoe, population and employment growth forecasts were obtained from local municipal official plans or forecasts prepared by the Ministry of Finance. A summary of the population and employment forecasts used in the Analysis Area and adjacent municipalities are illustrated in **Exhibit 3.2.**

Exhibit 3.2: Forecasted Population and Employment in the Analysis Area & Adjacent Municipalities (000)

MUNICIPALITY	POPULATION				EMPLOYMENT			
	2001	2011	2021	2031	2001	2011	2021	2031
Perth East	12.1	12.3	12.3	12.3	2.0	2.0	2.0	2.0
Perth South	4.3	4.2	4.2	4.2	0.9	0.9	0.9	0.9
West Perth	9.1	9.0	9.0	9.0	2.8	2.8	2.8	2.8
North Perth	12.1	12.5	12.5	12.5	4.6	4.8	4.8	4.8
City of Stratford[3]	29.8	33.3	37.1	42.8	18.3	21.2	24.0	26.9
Town of St. Marys[3]	6.3	7.2	7.8	8.5	3.9	4.4	4.8	5.3
County of Perth[1]	**73.7**	**79.3**	**84.4**	**89.2**	**32.4**	**35.8[2]**	**39.2[2]**	**42.5[2]**
East Zorra-Tavistock	7.2	7.8	8.5	9.0	2.7	3.3	3.7	3.8
Woodstock	33.0	39.5	46.9	52.8	17.1	22.7	26.0	26.7
Ingersoll	11.0	13.1	15.3	17.1	7.8	9.7	11.0	11.3
Zorra	8.1	9.2	10.3	11.2	2.9	3.3	3.7	3.9
Tillsonburg	14.0	16.6	19.5	21.6	9.6	11.7	13.4	13.9
Blandford	7.9	8.5	9.0	9.4	2.3	2.9	3.2	3.3
Norwich	10.5	11.5	12.7	13.7	3.9	4.9	5.6	5.9
SW Oxford	7.8	8.2	8.7	9.1	1.8	2.1	2.2	2.3
Total Oxford County[4]	**99.5**	**114.4**	**130.9**	**143.9**	**48.1**	**60.6**	**68.8**	**71.1**
City of London[5]	336.5	368.6	402.0	432.2	178.7	205.7	219.4	229.0
Middlesex County[6]	71.6	75.4	81.8	97.8[1]	36.2	38.2[2]	41.4[2]	49.5[2]
Huron County[1]	59.7	62.2	65.2	68.4	Employment forecasts not available			
Chatham-Kent[1]	111.0	116.7	122.6	125.7				
Lambton County[1]	131.8	132.2	134.4	137.0				
Elgin County[1]	84.7	92.1	100.1	107.0				

Figures have been rounded to the nearest 100

1)Figures estimated based on County Estimates, Ministry of Finance Population Projections (Spring 2007)
2) Employment Forecasts Not Available - Estimated based on 2001 employment activity rates
3) Stratford Population Forecasts based on Official Plan, Northwest / Northeast Secondary Plan capacity and historical share of County Population. Town of St. Marys population forecast based on historical share of County population.
4) Oxford County forecasts based on County Population & Employment Forecasts Report, Hemson Consulting, April 2006
5) City of London population employment forecasts based on 2004 TMP and Development Charge update study (preliminary)
6) Middlesex County population forecast based on County Population Projections Report, 2001-2026

3.3 Model Development

The demand forecasting tool for this Class EA Study was developed for the Analysis Area using data from a number of sources:

- ***Ministry of Transportation, Highway 7&8 EA Study Design, From the Greater Stratford Area to New Hamburg, Origin-Destination Survey Summary Report & TransCad Model:*** As part of the original study design work undertaken in 2004-2005 an extensive origin-destination survey was undertaken at 6 stations along the Highway 7&8 corridor to better understand the nature of the traffic flows using the highways in the area. The origin-destination surveys, undertaken during the summer of 2004, captured both weekday and weekend travel patterns, and collected information on the auto occupancy, trip lengths, and trip purposes for vehicles using the major provincial highways in the Analysis Area. Additional data from the 1999/2000 Commercial Vehicle Survey was used to provide information about truck movements on the Highway 7&8 corridor. A strategic model was developed as part of this study to forecast traffic flows on the highways in the Analysis Area.

- ***Statistics Canada Place of Residence – Place of Work Data:*** As part of each Census, Statistics Canada collects information about the place of work, commuting patterns, and mode of travel for work trips made by residents of Canada, based on a sample of approximately 20% of the population. Based on the 2001 Statistics Canada Data, a profile of commuting flows between communities in the Analysis Area was developed for residents that make work trips to a normal place of work. Residents who work at home or do not have a usual place of work (i.e. truck drivers, some construction workers) are summarized separately.

- ***Traffic Count Data:*** Traffic Count data was collected from each of the municipalities in Perth County, adjacent municipalities, and from the Ministry of Transportation Annual Traffic Count program.

The development of a Travel Demand Forecasting Model for the broader Analysis Area was based on the original strategic model developed as part of the Highway 7&8 Study Design project. To provide a better understanding of area wide travel patterns the existing model was significantly enhanced to provide improved forecasting ability for the study highways and the parallel municipal road network. The model development process was structured in a series of steps that included:

  - Refinements in the level of detail of the Transportation Network,
  - Refinements to the zone system used in the modeling process, and
  - Refinements to the base travel demands in the analysis area.

The following sections describe the approach to each of these aspects of the model development process.

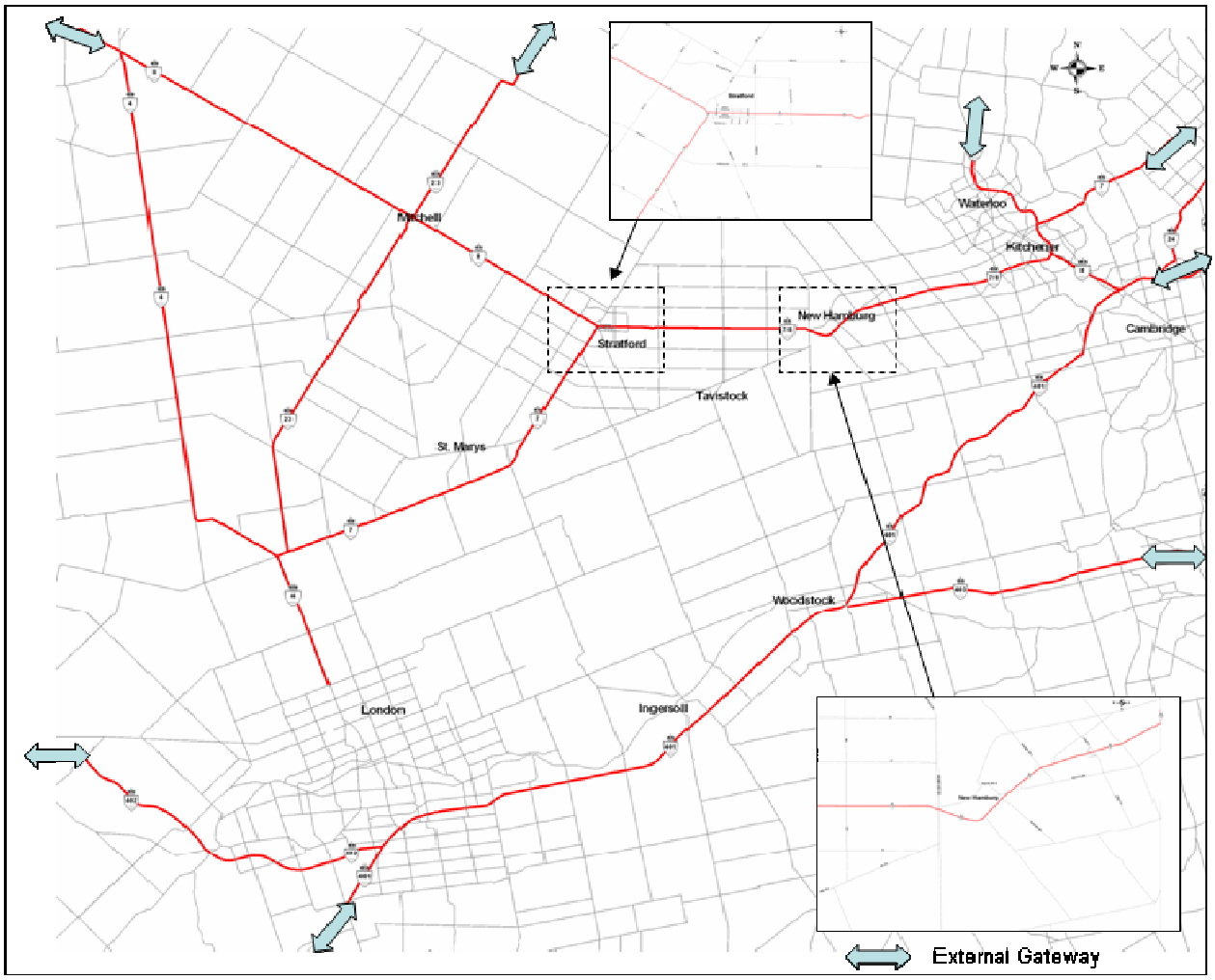
3.4 Transportation Network

The transportation network used by the model is a geographical representation of the road network in the Analysis Area. Travel demands, in terms of auto trips, are assigned to the transportation network, and the model uses established relationships between roadway characteristics (such as roadway classifications, speeds, and capacity) to determine the optimum routing of vehicles between their origin and destination.

The transportation network used by the model includes all of the major highways in the broader Analysis Area, the major County roads in Perth, Oxford, and Middlesex Counties, the major Regional roads within the Region of Waterloo, and some of the local municipal roads within the built up areas of St. Marys, Stratford, Tavistock, New Hamburg, and other adjacent communities.

Exhibit 3.3 illustrates the transportation network used in the Highway 7&8 model, including the gateways to other regions.

Exhibit 3.3: Highway 7&8 Model Transportation Network Coverage



Planned improvements to the Transportation Network, primarily reflecting improvements that have been planned by other road authorities, were assumed to have been implemented by the 2031 planning horizon. This approach ensures that improvement projects that have the potential to benefit the transportation patterns in the Analysis Area have been accounted for in assessing the Area Transportation System problems and opportunities.

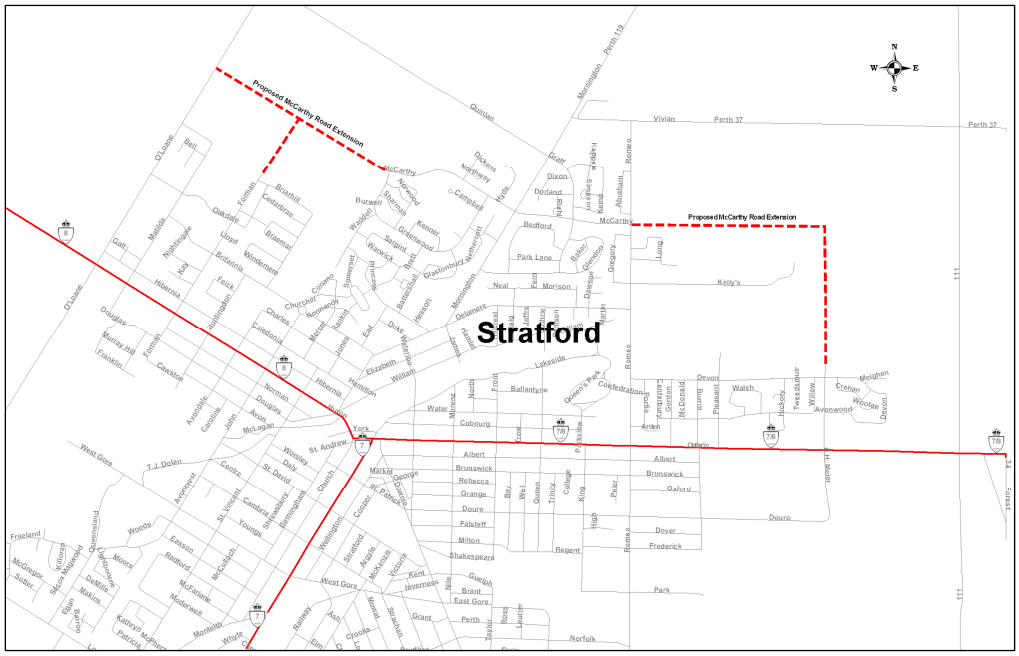
In the Stratford Area, planned road network improvements include the east and west extensions of McCarthy Road, identified by the City as a part of their Northeast and Stratford West Secondary Planning Studies.

The Northeast Secondary Plan Study has recommended an easterly extension of the existing McCarthy Road, to provide a 4-lane arterial road that loops through the secondary planning area, and proceeds south to connect to C.H. Meier Boulevard. The City has completed an Environmental Assessment Study for this new connection road.

Although the Stratford West Secondary Planning Study has not been formally approved, the preliminary findings of this study include the need for a westerly extension of McCarthy Road, to connect to O'Loane Avenue, which connects to Highway 8 at the west end of Stratford. At this time, the west extension of McCarthy Road is envisioned as a 2-lane arterial road.

The combination of these two improvements will create an internal arterial ring road around the north side of Stratford, which would provide an alternative route around the busy downtown core area, potentially offering some relief to the Highway 7&8 to Highway 8 linkage through downtown Stratford. The conceptual alignment of the McCarthy Road extension projects are illustrated in **Exhibit 3.4**.

Exhibit 3.4: Transportation Network Improvements to 2031 – Stratford



Improvements to existing Provincial Highways in the broader Analysis Area include:

- The planned widening of Highway 401 to 6 lanes, between Cambridge and Woodstock, which is planned to be completed by 2009.
- The planned widening of Highway 8 to 8 lanes, from Highway 7&8 to Sportsworld Drive Interchange.
- Intersection improvements / truck climbing lane on Highway 7, between Middlesex Road 50 and Perth Road 9, St. Marys.

Transportation improvements to 2031 within the Region of Waterloo are based on the projects identified in their 1998 Regional Transportation Master Plan. The Region is currently in the process of updating their Transportation Master Plan.

3.5 Transportation Model Zone System

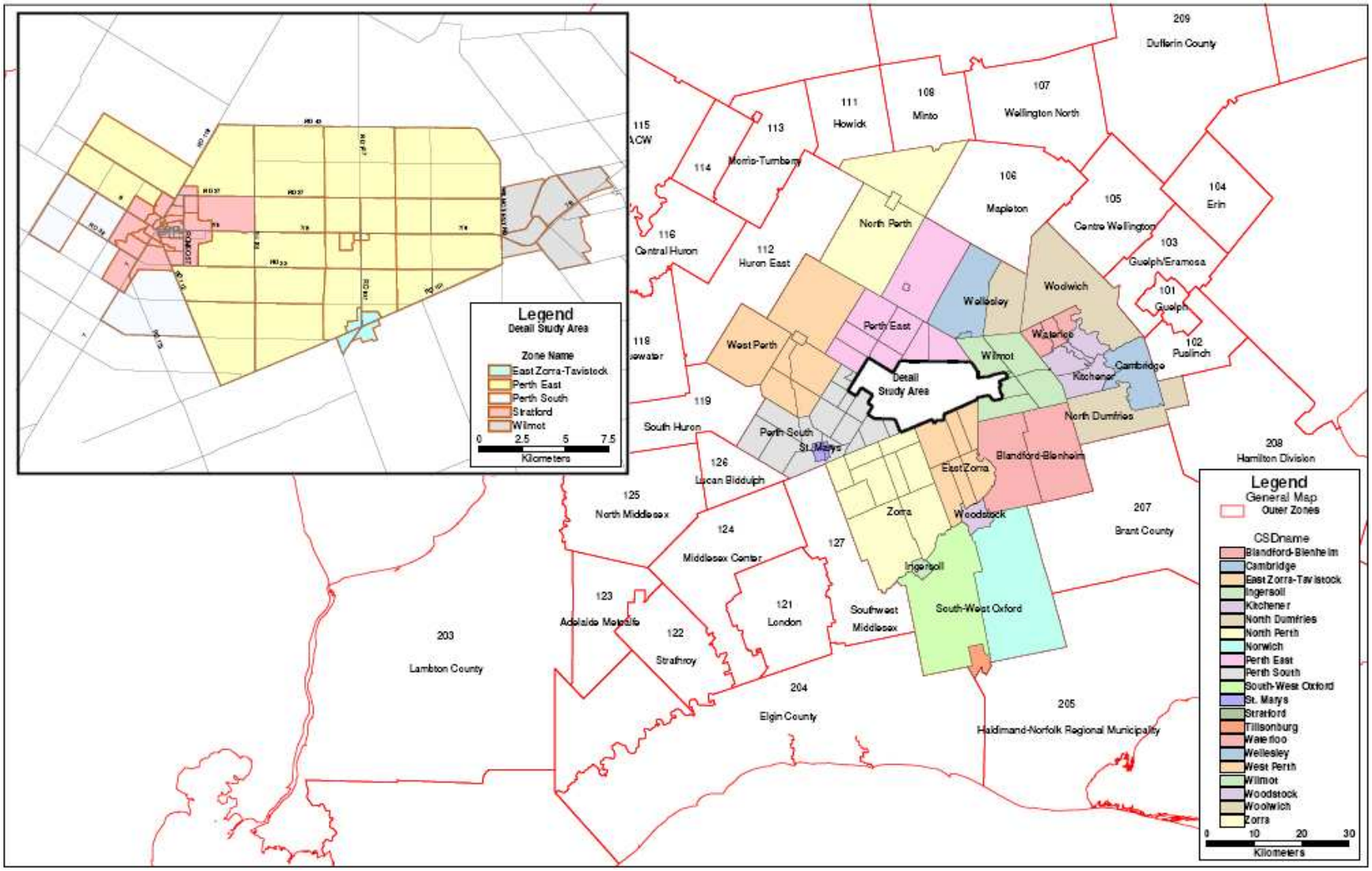
Transportation model zones are used in the travel demand forecasting process to group and aggregate socio-economic and travel data into geographic areas. Zones are used by the model to act as "activity centers" where trips are generate from or attracted to, based on the land uses within each area. The zones represent geographic areas or neighbourhoods that share common transportation infrastructure boundaries, or have similar types of land use patterns. The size of the zones will often vary within a model, where small zones are used in the detailed analysis area to reflect a higher level of detail in the forecasting of demands on specific roadways or corridors. In outlying areas, the zone system is usually larger, or aggregated to reflect municipal boundaries or larger regional areas, with a focus on forecasting travel demands at gateway locations. These larger regional areas are often referred to as external areas or gateway areas, and are used to represent the travel interaction on major transportation corridors serving travel between the Analysis Area and other communities or areas that are external to the Analysis Area.

For the Highway 7&8 Analysis Area, the zone system utilized in the original Origin-Destination travel surveys, completed in 2004, was refined to provide additional detail in the Analysis Area, particularly in the Perth County, Stratford and New Hamburg areas. This additional detail in the zone system allows for more accurate loading of trips onto the local transportation network, allowing for a better representation of local travel patterns and how they may be affected by different transportation alternatives. **Exhibit 3.5** summarizes the enhancement to the zone system within the Analysis Area and **Exhibit 3.6** illustrates the zone boundaries used in the model.

Exhibit 3.5: Comparison of Zone Systems (Model Enhancement)

Area	Previous Number of Zones (OD Survey)	New Number of Zones
Stratford	9	27
Perth East	13	34
Perth South	7	20
West Perth	4	7
St Marys	1	4
New Hamburg	3	10

Exhibit 3.6: Transportation Model Zone System

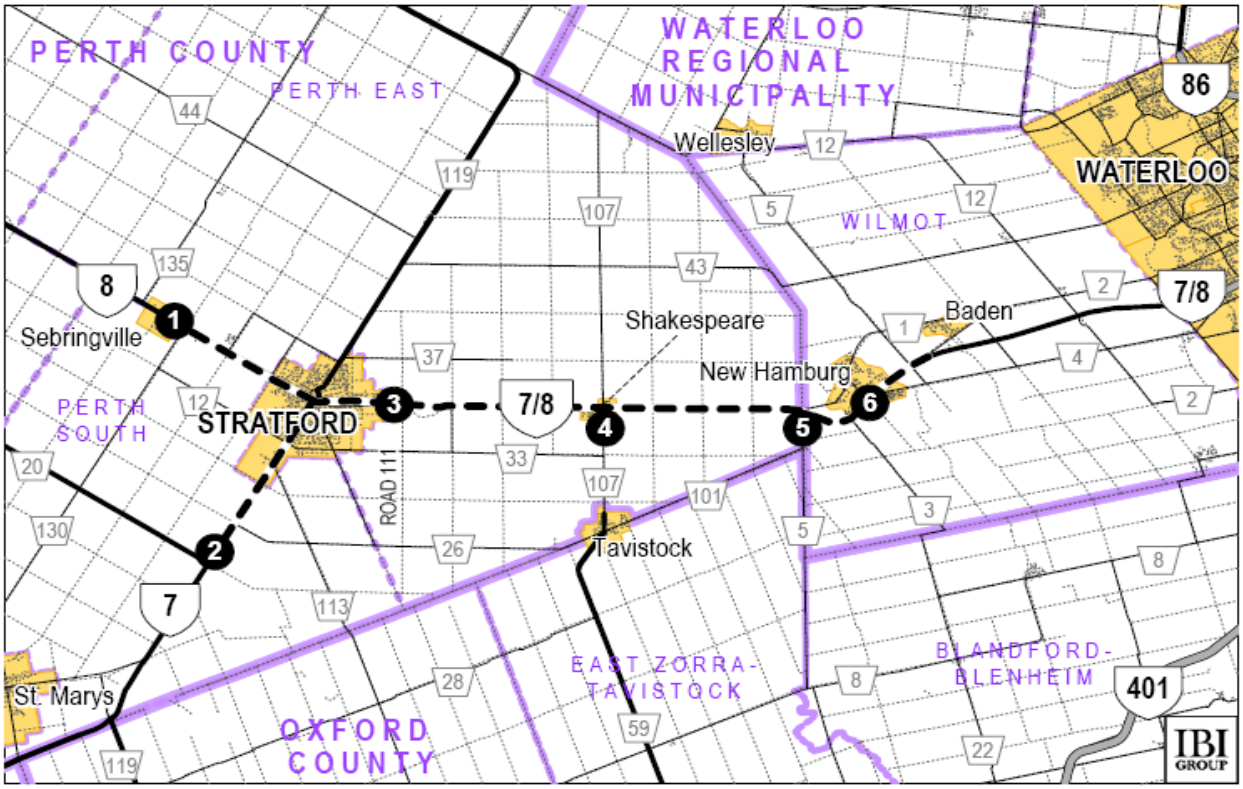


3.6 Refinement to Base Travel Demands

The refinement of the base travel demands in the Analysis Area was a complicated process utilizing data obtained from a number of sources. The origin-destination surveys, undertaken during the summer of 2004, captured both weekday and weekend travel patterns, and collected information on the auto occupancy, trip lengths, and trip purposes for vehicles using the major provincial highways in the Analysis Area. Additional data from the 1999/2000 Commercial Vehicle Survey was used to provide information about truck movements on the Highway 7&8 corridor.

Exhibit 3.7 illustrates the location of the six survey stations where origin-destination data was collected as part of the original study.

Exhibit 3.7: Original O-D Survey Locations[1]



The survey locations were as follows:

- Station #1: Highway 8 West of Perth Road 130 (Northwest of Stratford);
- Station #2: Highway 7 North of Perth Road 20 (Southwest of Stratford);
- Station #3: Highway 7&8 at East Limit of Stratford (West of Road 111);

[1] IBI GROUP REPORT, Highway 7&8 EA Study Design From Stratford to New Hamburg, Origin-Destination Survey Technical Report, November 2005 Page 2

- Station #4: Perth Road 107 South of Highway 7&8 (Town of Shakespeare);
- Station #5: Wilmot-Easthope Road / Waterloo Road 1 South of Highway 7&8 (West of New Hamburg); and
- Station #6: Highway 7&8 West of Waterloo Road 4/Hamilton Street (Town of New Hamburg).

While this data provided an excellent overview of the travel patterns for automobile trips using these facilities, it did not capture traffic patterns for other roadways outside the Highway 7&8 corridor, and did not capture trip making using other modes of travel. To provide a more thorough picture of the transportation demands in the Analysis Area, this base survey data was supplemented with:

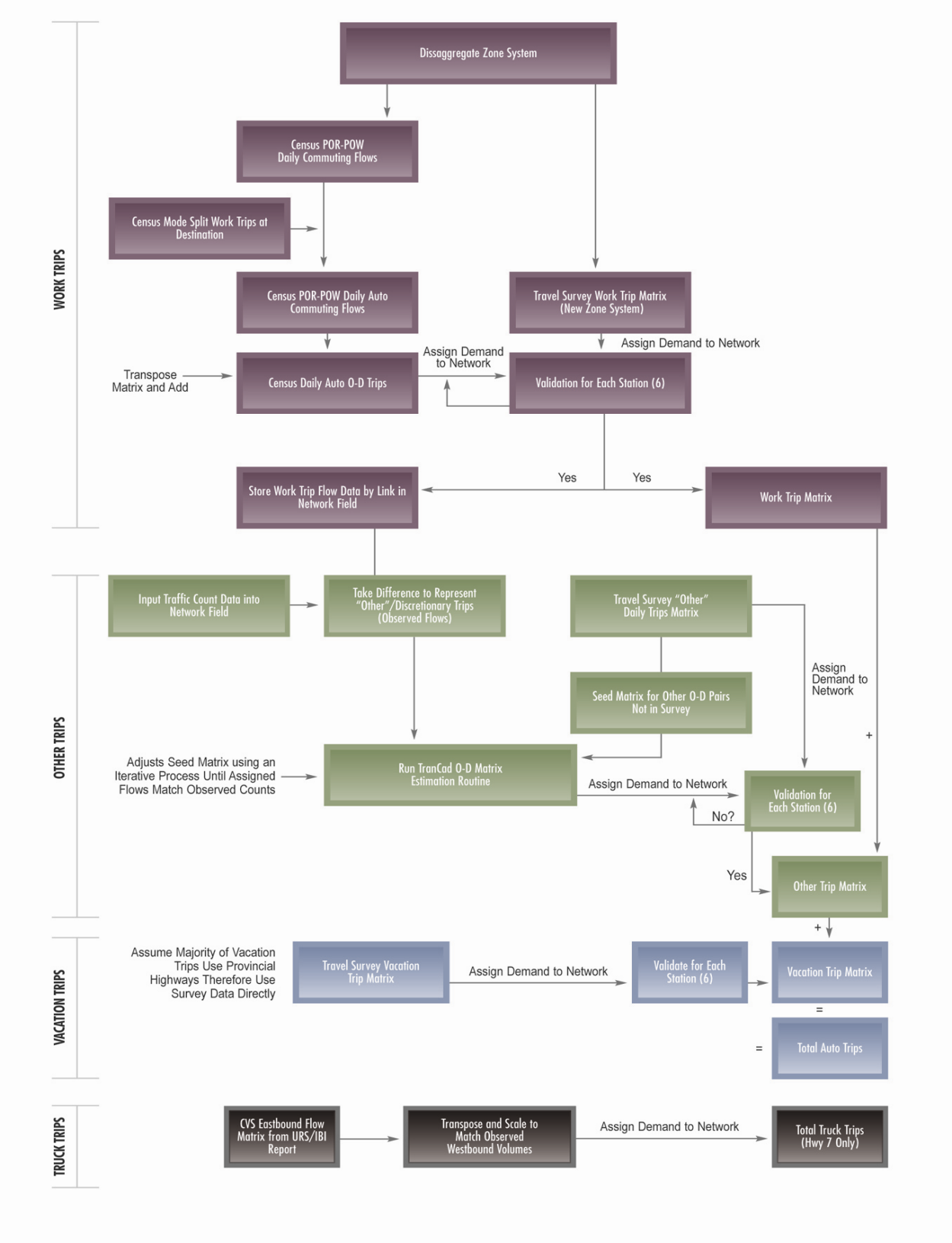
- Statistics Canada Place of Residence – Place of Work Data; and
- Traffic Count Data collected from the Ministry of Transportation and Municipalities in the Analysis Area.

The refinement to the base travel demands was undertaken for four distinct trip purposes using data to augment the original travel survey data collected in 2004. A brief discussion of each trip purpose is summarized below.

- Work trips – Work trips represent approximately 40-46% of weekday auto traffic using Highway 7&8 between Stratford and New Hamburg. Work trip making for the broader Analysis Area was estimated using 2001 Census Place of Residence-Place of Work information obtained from Statistics Canada;
- Vacation Trips – representing longer distance vacation and recreational trips between external areas and the Analysis Area and trips passing through the Analysis Area were used directly from the original O-D survey data as it assumed that the majority of long distance vacation trips tend to utilize the Provincial Highway network and Major County Roads that were sampled as part of the O-D Survey. Under weekday conditions, these trips represent a minor component of the overall demand on the Highway 7&8 corridor, ranging from 8-13% of weekday traffic;
- Other Trips – representing non work related trip making in the Analysis Area for shopping, personal business, social and other related purposes. Travel demands for other trips were estimated based on the observed patterns from the O-D survey, supplemented with traffic count data on the major roadways in the Analysis Area; and
- Trucks Trips – representing commercial vehicle traffic using Highway 7&8. Data on truck traffic was obtained from the 1999/2000 Commercial Vehicle Survey undertaken by the Ministry of Transportation at the Commercial Vehicle Inspection Facility near Shakespeare on Highway 7&8. Updated commercial vehicle counts from the 2007 Commercial Vehicle Survey were used to update this data since the actual survey results are not yet available.

The detailed process used to update the base travel demands is illustrated in **Exhibit 3.8,** and is further described in the following sections.

Exhibit 3.8: Approach to Refinement of Base Travel Demands



3.6.1 Update of Work Trip Demands

As noted above, the refinement of the base travel demands for work related trips utilized data on commuting flows obtained from the 2001 Census. The Census Place of Work data includes information on the place of residence (home location), place of work, and normal mode of travel to work for all residents in the Country based on a sample representing 20% of the entire population.

Commuting flows for work trips made by residents over the age of 15, which were identified as having a normal place of work, were summarized by municipality across the province. To use this data in the demand forecasting process, these demands (summarized by Municipality) were disaggregated to the traffic zone system used in the model.

The dissaggregation (also referred to as splitting the trips into subzones) was completed using a series of zone split factors for trip productions (the home end of the home to work trip) and trip attractions (representing the work end of the home to work trip). The zone split factors for trip productions were developed based on the relative share of the population living within each of the zones. Thus, for example, a zone with 20% of the population of a municipality would generate 20% of the home to work trips. The zone split factors for the trip attractions was based on a combination of the population within each zone combined with an assessment of the potential trip generation from non residential land uses, such as employment areas and commercial areas. These adjustments were done based on a review of existing traffic count data in these areas, combined with a review of aerial mapping.

The Census Place of Work data also includes information on the mode of travel used for work trips. The information provided by Statistics Canada summarized the share of work trips made by each mode of travel for each destination zone (representing the workplace locations). Using these observed mode shares, the commuting flows were split into trips made as Auto Driver, Auto Passenger, trips by transit, and trips by Other modes of transportation (i.e. walking, cycling, taxi, etc).

The commuting flows by mode were summarized in a matrix format, with the rows representing the trip origins (home location) and the columns representing trip destinations (work location). Each of the cells within the matrix contains the number of observed persons that lived in one zone and traveled to a work place in another zone.

In the example to the right, between zone 3 and zone 2 (highlighted in bold) there were 200 people who lived in zone 3 and traveled to a work place in zone 2 as a driver of an automobile. Separate matrices were developed for each mode of travel in a similar fashion, using the observed census data. **Exhibit 3.9** summarizes the 2001 Place of Residence-Place of Work Total Commuting flows by municipality for all modes of travel.

Example Matrix – Auto Driver Trips				
Zone	1	2	3	….
1	20	5	8	
2	10	30	10	
3	50	**200**	25	
…				

Exhibit 3.9: 2001 Place of Residence – Place of Work Daily Commuting Flows by Municipality

ORIGIN	DESTINATION														
	Perth East	Stratford	Perth South+St Mary	Perth West	Wilmot	Wellsley	Kitchener	Waterloo	Cambridge	Rest of Middlesex Co	Woodstock	Ingersol	Rest of Oxford Co	London	Total Study Area
Perth East	940	1615	125	95	175	120	255	285	55		15	15	105	60	3,860
Stratford	260	11610	435	230	105	20	260	115	90	10	75	25	95	175	13,505
Perth South+St Mary	30	1230	2430	55		10	10	50	10	80	20	35	50	310	4,320
Perth West	90	1075	270	1580			80		30				20	105	3,250
Wilmot	45	150		10	2120	60	1875	965	445		55	15	60	45	5,845
Wellsley	50	40			140	565	575	770	160	10			10	10	2,330
Kitchener	20	265	20	10	615	90	46745	18145	8720		105	20	50	120	74,925
Waterloo		140	10		275	115	11960	21275	2400		35		20	80	36,310
Cambridge		45			85		5825	1730	30780		85		30	135	38,715
Rest of Middlesex Co		125	325	20			20	40	30	3080	105	350	190	11550	15,835
Woodstock		240	45	10	45		200	80	170	90	9030	840	1490	875	13,115
Ingersol		25	30				55	20	10	60	600	2520	365	635	4,320
Rest of Oxford Co	105	665	360	10	430	35	760	210	525	215	3290	1490	8730	1425	18,250
London		285	340	50			200	80	210	3030	670	950	625	121450	127,890
Total Study Area	1,540	17,510	4,390	2,070	3,990	1,015	68,820	43,765	43,635	6,575	14,085	6,260	11,840	136,975	362,470

To convert the Place of Residence-Place of Work data into daily person trips, the return movement also needs to be considered. This represents the trips leaving work at the end of the work day (the trip origin) and arriving at home (the trip destination). To estimate this aspect of the demand, the previously developed matrices were transposed and added together to obtain the total daily work person trips between each origin zone and each destination zone. This was done for each mode of travel.

To test the validity of this approach to estimating the work trip travel patterns in the Analysis Area, the total daily work trips were assigned to the road network in the transportation model. To represent the number of auto vehicle trips on the road network, the auto driver matrix was used to represent the number of automobiles that would travel between each pair of zones, as each of these respondents indicated they drive to work.

The volume of work trips assigned to each link in the network was obtained, and these results were validated against the observed patterns from the 2004 travel survey, which represented the number of work trips passing by each of the six survey stations on a typical weekday. If the model assignment results matched the observed flows from the survey within acceptable error limits, the resulting work trip flow data for each link in the road network was saved in a network field for use in later stages of the model development process.

3.6.2 Vacation Trips

As part of the model development process, one major assumption was made with respect to vacation trips using the transportation network in the Analysis Area. Vacation trips were assumed to utilize the key provincial highways and County Roads in the Analysis Area, given the fact that they are typically of a long distance nature (the 2004 travel survey showed that typical weekday vacation trips had an average trip length greater than 100 km). Therefore it was assumed that the share of recreation / vacation trips using the minor local roads in the Analysis Area is less than the typical daily variation that could reasonably be assumed to occur over the course of a week. As noted previously, even for the survey stations on Highway 7&8, the recreational / vacation trips only represent between 8 and 13% of the typical weekday travel demands.

Therefore, the travel patterns observed during the origin-destination survey were assumed to represent the vast majority of the recreation / vacation trips using the Analysis Area road network on a typical weekday. These demands were also assigned to the road network using the transportation model. If the model assignment results matched the observed flows from the survey within acceptable error limits, the resulting vacation trip flow data for each link in the road network was saved in a network field for use in later stages of the model development process.

3.6.3 Update of Other Trip Demands

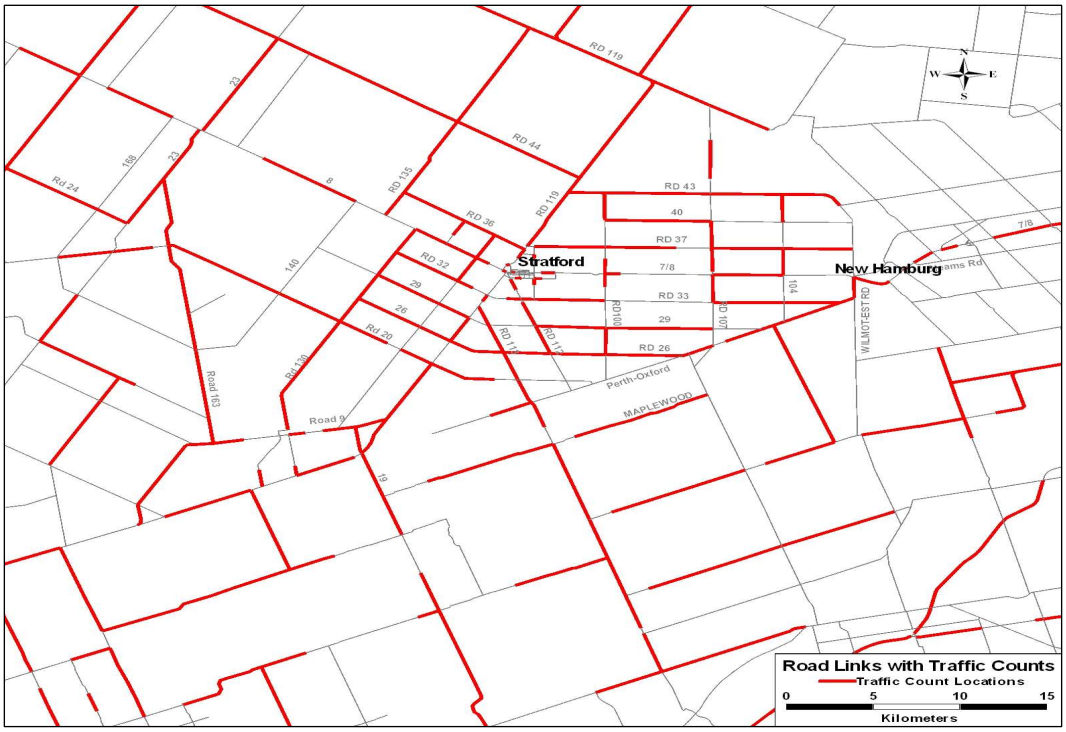
To update the travel patterns for the other trip purposes, traffic count information was collected from the Ministry of Transportation and many of the municipalities in the detailed Analysis Area. These daily traffic volumes were also entered into a field in the transportation model

database. Where traffic count data was available for an individual road link, this was compared to the estimated number of work trips and vacation trips that were forecast to be using the same road segment, based on the previous discussion in 3.6.1 and 3.6.2, above. The difference between the total traffic flows and the estimated work trips and vacation trips using the same link was assumed to represent the auto trips made for other trip purposes. These values were stored in the model road network database as the volume of autos using each road segment for other trip purposes.

To use these estimates of the volume of other trips using each road segment in the demand forecasting process, these volumes were converted to estimates of the origin-destination flows between zones. These estimates were developed using the Origin-Destination Matrix Estimation (ODME) procedure developed for use in the TransCad model software. This ODME procedure was designed to update a base travel demand matrix using traffic count data and a transportation network. The base travel demands are assigned to the transportation network and are adjusted to match observed traffic counts, using an iterative process. The more traffic count locations that are utilized in this procedure, the higher the level of confidence that can be placed in the resulting trip matrix.

Within the Analysis Area, traffic count data was available for 307 individual road network links representing a majority of the roadways in the Analysis Area. These locations are illustrated in **Exhibit 3.10**.

Exhibit 3.10: Traffic Count Stations



The base matrix used in the ODME procedure was the matrix developed as part of the 2004 Origin-Destination travel survey. To estimate the trips between zones that were not captured in

the survey of users of Highway 7&8, the matrix was seeded using values representing the probability of trips occurring between the zones based on the relative distance between the origin zone and the destination zone location. This approach places a higher probability on trips occurring between adjacent zones, than between zones that are separated by long distances. The result is a new matrix that when assigned to the road network, closely matches the observed traffic counts.

To validate this process for estimating the origin-destination flows for other trip purposes, the estimated matrix was assigned to the road network and the assigned flows were compared to the observed flows at each of the six survey stations in the Analysis Area.

3.6.4 Update of Truck Travel Demands

Truck travel patterns in the Analysis Area were obtained from the data collected as part of the 1999/2000 Commercial Vehicle Survey (CVS), a roadside interview survey of truck traffic on many of the major Provincial Highways throughout the province. Data from the CVS was obtained from the Shakespeare station, which is located in the eastbound direction of Highway 7&8, in the vicinity of Perth Road 107 in Shakespeare (refer to **Exhibit 3.11**).

To estimate the truck travel patterns in the westbound direction, the eastbound daily truck trip matrix was transposed and scaled to match the observed westbound truck volumes during the survey time period. This results in approximately 1290 daily truck trips using Highway 7&8 on a typical weekday.

Updated Commercial Vehicle Surveys were completed in 2007, but the detailed results were not available in time for use in this study. Vehicle classification counts taken as part of the survey showed little change in the overall volume of trucks using the Highway 7&8 corridor, with an annual growth rate of 0.2% per year observed over the year period between surveys. It does appear, however, that the proportion of medium sized trucks is increasing compared to the 2000 observed patterns and the proportion of large trucks is reducing. This could be reflecting a trend towards the use of smaller trucks to transport smaller finished goods to local markets as opposed to large trucks carrying bulk commodities to longer distance markets.

Exhibit 3.11: 2006 Commercial Vehicle Survey Data – EB Highway 7&8, Shakespeare

Date	Total Vehicles	Passenger Cars	Medium trucks	Large trucks	Combination trucks	Total Trucks	% Trucks	% medium	% large	% combination
05/29/2007	5396	4623	433	105	234	773	14.33%	8.02%	1.95%	4.34%
05/30/2007	5752	4960	461	98	231	792	13.77%	8.01%	1.70%	4.02%
1/6/2007	5853	5150	447	81	174	703	12.01%	7.64%	1.38%	2.97%
		Average Weekday Volume 2007 CVS				**756**	**13.37%**	**7.89%**	**1.68%**	**3.78%**
		Average Weekday Volume 2000 CVS				**747**	**11.4%**	**4.90%**	**3.40%**	**3.10%**
		Annual Increase				**0.2% / year**				

3.7 Model Calibration

The test of a model's reliability is its level of calibration (the degree to which it replicates the pattern level of existing traffic). The 2004 base year model was calibrated using MTO and area traffic count data along with the results of the origin-destination surveys, completed in 2004. As part of the calibration process, the base network was reviewed in detail in terms of link assumptions, such as speed, capacity, number of lanes and centroid/zone connections. Conventionally, a modelled/observed ratio of less than 15% of difference is considered as an acceptable level of calibration. Comparison of the year 2006 assigned volumes with travel survey findings showed that the major stations were calibrated to acceptable levels and within industry standards of reasonableness.

Exhibit 3.12 shows the degree to which the model is calibrated, for each of the travel survey stations. Based on the model calibration process, it was concluded that the model is an acceptable tool to forecast future traffic volumes, examine highway deficiencies and test a range of roadway improvement options in the Analysis Area.

Exhibit 3.12: Model Calibration – Analysis Area

Work Trip Model Validation

Survey Station	Total Survey Count (24 hr)	Observed Daytime Total Trips (6am-8pm)	Observed Daytime Work Trips (6am-8pm)	24/14 hr adjustment factor	Estimated 24 Hr Work Trips	Sim Work Trips	sim/obs
1	6770	5421	2471	1.249	3086	3023	0.98
2	8930	7349	3654	1.215	4440	3188	0.72
3	10010	8194	3397	1.222	4150	4206	1.01
4	4830	4200	1724	1.150	1983	2154	1.09
5	4830	4101	2310	1.178	2721	1742	0.64
6	19850	16938	7817	1.172	9161	10446	1.14

Other Trips Model Validation

Survey Station	Total Survey Count (24 hr)	Observed Daytime Total Trips (6am-8pm)	Observed Daytime Other Trips (6am-8pm)	24/14 hr adjustment factor	Estimated 24 Hr Other Trips	Sim Other Trips	sim/obs
1	6770	5421	2267	1.249	2831	2917	1.03
2	8930	7349	2742	1.215	3332	5531	1.66
3	10010	8194	3878	1.222	4737	5086	1.07
4	4830	4200	1946	1.150	2238	2307	1.03
5	4830	4101	1458	1.178	1717	3446	2.01
6	19850	16938	7310	1.172	8567	8530	1.00

Vacation Trips Model Validation

Survey Station	Total Survey Count (24 hr)	Observed Daytime Total Trips (6am-8pm)	Observed Daytime Vacation Trips (6am-8pm)	24/14 hr adjustment factor	Estimated 24 Hr Vacation Trips	Sim Other Trips	sim/obs
1	6770	5421	683	1.249	853	389	0.46
2	8930	7349	954	1.215	1159	647	0.56
3	10010	8194	919	1.222	1123	1051	0.94
4	4830	4200	530	1.150	610	327	0.54
5	4830	4101	334	1.178	393	320	0.81
6	19850	16938	1811	1.172	2122	1683	0.79

Total Trips

Survey Station	Total Survey Count (24 hr)	Observed Daytime Total Trips (6am-8pm)	Observed Daytime Total Trips (6am-8pm)	24/14 hr adjustment factor	Estimated 24 Hr Total Trips	Simulated Total Trips	sim/obs
Notes	*1*	*2*		*3*	*4*	*5*	*6*
1	6770	5421	5421	1.249	6770	6329	0.93
2	8930	7349	7350	1.215	8931	9366	1.05
3	10010	8194	8194	1.222	10010	10343	1.03
4	4830	4200	4200	1.150	4831	4788	0.99
5	4830	4101	4102	1.178	4831	5508	1.14
6	19850	16938	16938	1.172	19850	20659	1.04

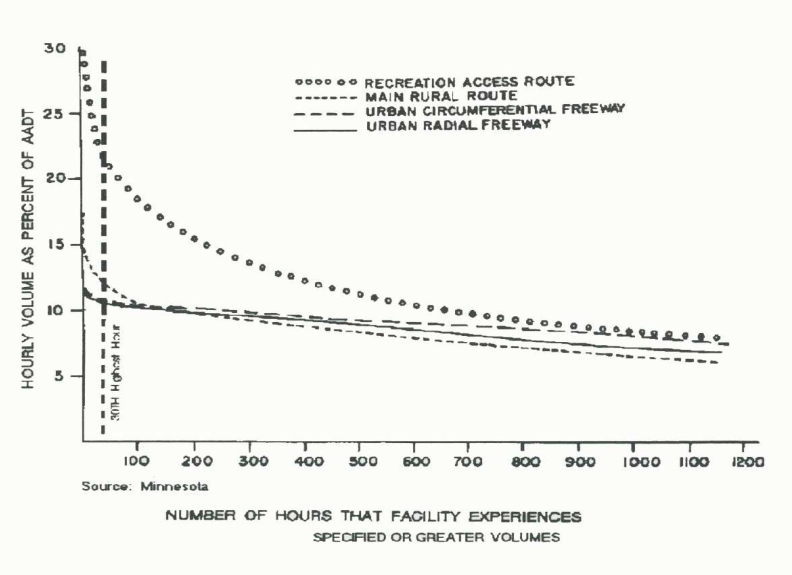
Notes : 1) Total Survey Count as part of 2004 OD Survey
2) Observed Daytime trips during survey period
3) Factor to adjust observed trips during 14 hr survey to 24 hr trips - based on factor from counts
4) Estimated 24 hr total trips by type - observed during 2004 survey
5) Simulated daily total trips from model
6) Simulated / Observed Ratio (target of +/- 15% for validation)

4.0 FORECASTED FUTURE 'AREA TRANSPORTATION SYSTEM' TRAVEL CHARACTERISTICS AND PATTERNS

4.1 Design Hour Volume (DHV)

The Design Hour Volume for a transportation facility represents the 30th highest hourly volume of the year, and typically represents an appropriate volume threshold to be used in the planning and design of new transportation facilities in rural areas. Designing a facility to accommodate the 30th highest hourly volume ensures that the roadway will accommodate expected volumes 99.7% of the time, with capacity exceeded for only 29 hours of the year. For most roadway facilities, the 30th highest hourly volume also represents the point where the variation in hourly volume demands begin to flatten out, and approach the typical weekday peak conditions experienced on most rural and urban roadways outside of higher tourist areas, making it a representative threshold to use for planning and design of transportation facilities. **Exhibit 4.1** is an excerpt from Chapter B of the MTO Geometric Design Manual which illustrates the typical hourly volume distribution throughout the year.

Exhibit 4.1: Hourly Volume Distribution for Typical Highways



Where an annual hourly profile for a transportation facility is available, a design hour volume can be identified based on analysis of the count data. In the absence of an annual hourly profile for Highway 7&8, the Design Hour Volume is estimated based on a percentage of the Average Annual Daily Traffic volume (AADT). This percentage factor varies dependant on the role and function of the highway, i.e. whether it is a commuter route or recreational/tourist route, whether it is an urban facility or rural facility, or whether it is an arterial or highway facility, and is developed based on a series of permanent traffic count stations that the Ministry monitors from across the province.

The existing traffic conditions on Highway 7&8 are summarized in **Exhibit 4.2** in terms of the *Average Annual Daily Traffic (AADT)* and the *Design Hour Volume (DHV)*. The AADT represents the average traffic volume on a given road segment over a 24-hour period, for a particular year. The Design Hour Volume percentage for the Highway 7&8 corridor is 10% of AADT. The existing traffic volumes presented in **Exhibit 4.2** were obtained from the Ministry of Transportation Traffic Volumes Publication, 1988-2004.

Exhibit 4.2: Highway 7&8 Mainline Existing Traffic Volumes (2004)

Highway 7&8	2004 Average Annual Daily Traffic (AADT)	2004 Design Hour Volume (DHV)
Stratford City Limits to 2.9 km East of Stratford City Limits	10,100	1,010
2.9 km East of Stratford City Limits to Perth Road 107	10,100	1,010
Perth Road 107 to Waterloo Road 1	10,600	1,060
Waterloo Road 1 to Waterloo Road 4 (West Junction)	14,400	1,440
Waterloo Road 4 (West Junction) to Waterloo Road 4 (East Junction)	20,700	2,070
Waterloo Road 4 (East Junction) to 0.8 km East of Waterloo Road 5	19,200	1,920

As can be seen in **Exhibit 4.2**, there is a significant increase in traffic volumes east of the west junction of Waterloo Road 4 to the east study limits. This is likely the result of significant local traffic volumes along this section of the highway.

4.2 Analysis of Future Transportation Markets

The transportation market in the Analysis Area can be divided into two principle segments: people transportation and freight transportation. People transportation can be further categorized into two types of trips: utilitarian and non-utilitarian. Utilitarian refers to trips made by an individual or group of individuals on a frequently recurring basis for personal reasons (trips to work, school or commuter type traffic shopping). Non-utilitarian seasonal/recreational refers to trips made by an individual or group for recreation purposes where the frequency and regularity of the trip is less frequent and less predictable (seasonal, weekend travel).

Freight transportation relates to the movement of goods through the Analysis Area by either truck, rail, marine or air.

The following sections provide an overview of the travel characteristics in the Analysis Area for the different trip markets. The characteristics provide additional context for existing conditions on the transportation network and the framework for the development of future conditions.

Work Trips

Population and employment based trips are the most significant component of the travel within the Analysis Area. Based on the 2004 Travel Survey undertaken as part of the Study Design Report, on a typical weekday, work trips represent between 41 and 46% of the traffic demand using the Highway 7&8 corridor as shown in **Exhibit 4.3**. These trips are regular, occurring from Monday to Friday, and are generally equally distributed eastbound and westbound during the morning and afternoon peak periods.

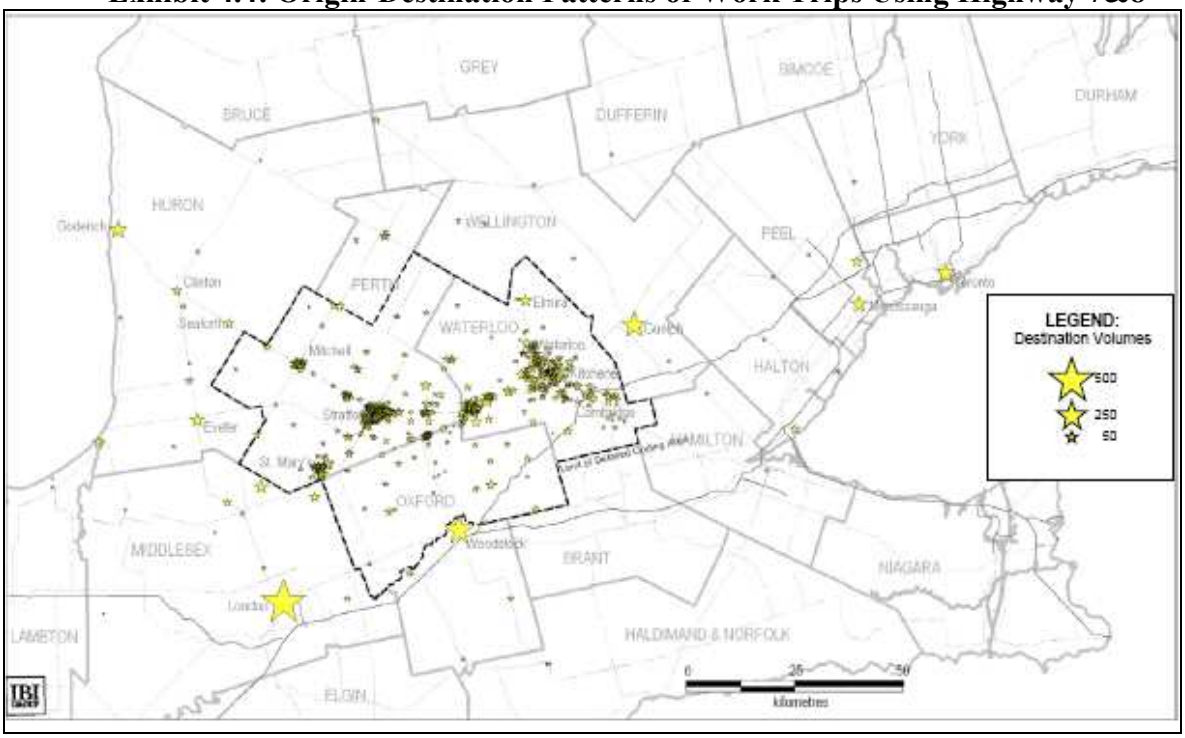
Exhibit 4.3 – Share of Work Trips Using Highway 7&8

Survey Station	Total Trips (6am-8pm)	Work Trips (6am-8pm)	Work Trip Share
Station 3 – Highway 7/8 East Limit of Stratford	8,194	3,397	41%
Station 4 – Perth Rd 107 South of Highway 7/8 Shakespeare	4,200	1,724	41%
Station 5 – Wilmot-Easthope Road / Waterloo Rd 1 South of Highway 7/8	4,101	2,310	56%
Station 6 - Highway 7/8 West of Waterloo Road 4 New Hamburg	16,938	7,817	46%

More than half of all work/business trips in the corridor start or end in the Stratford area (including Perth East/Shakespeare). Stratford is an important employment centre in the corridor, with several key industries, Stratford General Hospital and theatres and tourist industries drawing workers from throughout Perth County, Kitchener-Waterloo, London and beyond. New Hamburg and Baden also serve as small employment centres, with almost 4,700 work/business trips (30%) starting or ending in west Wilmot Township.

Based on the results of the origin and destination survey undertaken in 2004, travel flows were established as being predominantly between the cities of London and Stratford, Woodstock and Stratford, and between Stratford and the New Hamburg and Kitchener areas within the Region of Waterloo. Trip patterns for daily work trips using the Highway 7&8 corridors are illustrated in **Exhibit 4.4**.

Exhibit 4.4: Origin-Destination Patterns of Work Trips Using Highway 7&8



Source: Highway 7&8 EA Study Design, Origin-Destination Survey Summary Report, IBI

These patterns are forecast to continue into the future with only minor changes. Increased population and employment that has been designated under the Places to Grow, Growth Plan for the Region of Waterloo will have a strong influence on the nature of future travel demands between the Analysis Area and this emerging growth area. While planned intensification of the Urban Growth Centres is expected to result in more internalized trip making within each community, the Region of Waterloo will continue to act as a regional hub for employment and services to the outlying communities in the Analysis Area. Thus, the general patterns with respect to trip distribution in the Highway 7&8 corridor are expected to continue into the future.

Exhibit 4.5 summarizes the forecast growth in daily work trips between the Analysis Area and major adjacent municipalities.

Exhibit 4.5: Forecast Growth in Daily Work Trips – 2001 to 2031

From the Analysis Area To:	Total Daily Person Trips 2001	Total Daily Person Trips 2031	Growth in Work Trips
Analysis Area	52,150	62,703	20%
Waterloo	780	951	22%
Kitchener	1,110	1,563	41%
Cambridge	259	303	17%
London Area	1,709	2255	32%
Guelph-Wellington	1,200	1736	45%
GTA	379	406	7%
Hamilton-Niagara	80	53	-34%
Total	***5,517***	***7,267***	***32%***

Other Trips

The demand for shopping, social, and personal business travel is historically linked to the overall growth in population in a given area. To assess the growth in other trips in the Analysis Area, growth factors were developed based on the relative share of population growth within each municipality in the Analysis Area and adjacent municipalities. Existing patterns of trip making within the Analysis Area, and between the Analysis Area and other adjacent municipalities was assumed to continue in accordance with the relative growth in population in each area.

A fratar process was used to forecast the future travel demands in the Analysis Area using the base observed trip tables for other trips, and the population growth rates for each municipality in the Analysis Area.

Exhibit 4.6 summarizes the forecast growth in daily other trips between the Analysis Area and major adjacent municipalities.

Exhibit 4.6: Forecast Growth in Daily "Other" Trips – 2001 to 2031

From the Analysis Area To:	Total Daily Auto Trips 2001	Total Daily Auto Trips 2031	Growth in Other Trips
Analysis Area	72,693	82,908	14%
Kitchener-Waterloo	1,019	1,607	58%
Cambridge	83	292	252%
London Area	3,851	3,974	3%
Guelph-Wellington	37	118	219%
GTA	744	2,333	214%
Hamilton-Niagara	103	368	257%
Total	***78,530***	***91,600***	***17%***

Recreation Auto

Recreational auto travel associated with tourists within the Analysis Area constitutes a significant component of the annual traffic flow using Highway 7&8. However, this tourist flow is limited to weekend and peak summer season periods. During the afternoon peak period, only 7% of trips using Highway 7&8 on the east side of Stratford have been identified as recreational in purpose. On a daily basis this share represents 11% of trips.

Exhibit 4.7 summarizes the seasonal variation in traffic that typically occurs throughout the Highway 7&8 corridor. Based on the Summer Average Daily Traffic Volumes (SADT) reported by the Ministry of Transportation, daily traffic demands in the Highway 7&8 corridor are an average of 21% higher than the average volumes experienced through the year. This increase reflects the role the Highway 7&8 corridors play in serving both the local and inter-regional tourist demands in the region, and supporting the tourism industry in the local communities along the corridor.

Exhibit 4.7: Seasonal Variation in Daily Volume (2004) for Highway 7&8

Highway 7&8	2004 Average Annual Daily Traffic (AADT)	2004 Summer Average Daily Traffic (SADT)	% Increase
Stratford City Limits to 2.9 km East of Stratford City Limits	10,100	12,700	25.7%
2.9 km East of Stratford City Limits to Perth Road 107	10,100	12,700	25.7%
Perth Road 107 to Waterloo Road 1	10,600	13,400	26.4%
Waterloo Road 1 to Waterloo Road 4 (West Junction)	14,400	17,700	22.9%
Waterloo Road 4 (West Junction) to Waterloo Road 4 (East Junction)	20,700	23,200	12.1%
Waterloo Road 4 (East Junction) to 0.8 km East of Waterloo Road 5	19,200	21,500	12.0%

Between 1988 and 2004, summer recreational traffic has grown at an average of about 1.2% per year, on the section of Highway 7&8, between Stratford and New Hamburg. On Highway 8, to the west of Stratford, the annual growth has been 1.8% and on Highway 7 to the south of Stratford, the growth rate has been approximately 2.5% per year. **Exhibit 4.8** summarizes the historical Summer Average Weekday Traffic Volumes (SAWDT) on the key provincial highways in the Analysis Area.

Exhibit 4.8: Historical Growth in Recreational Traffic Volumes

Year	Highway 7/8 at Perth Rd 107 SAWDT	Highway 8 at Perth Rd 135 SAWDT	Highway 7 at Perth Rd 20 SAWDT
1988	9,600	5,800	7,000
1989	10,100	6,100	7,400
1990	10,300	6,300	7,600
1991	11,400	6,300	7,800
1992	11,000	6,200	8,000
1993	11,200	6,500	8,300
1994	11,500	6,900	8,750
1995	11,700	7,050	8,850
1996	11,700	7,200	9,400
1997	11,900	7,400	9,700
1998	11,800	7,550	9,950
1999	11,800	7,700	10,300
2000	11,900	7,700	10,600
2001	12,000	8,050	10,900
2002	12,000	8,000	10,900
2003	12,100	8,100	10,900
2004	12,200	8,050	10,900
Average Annual Growth Rate Prior to 2001	1.78%	2.58%	3.47%
Average Annual Growth Rate After 2001	0.55%	0.00%	0.00%
Average Annual Growth Rate	1.55%	2.09%	2.82%

The pattern has shown strong growth in the corridor leading up to 2001, with growth dropping off following 2001, due in part to 9/11, SARS, higher fuel costs, and the rising Canadian Dollar.

A similar pattern has been experienced with annual visitation to the Stratford Festival, as summarized in **Exhibit 4.9**.

Exhibit 4.9: Visitation Trends – Stratford Festival

Year	Stratford Festival Attendance
1998	523,000
1999	590,200
2000	639,100
2001	614,200
2002	627,900
2003	607,400
2004	568,700
2005	550,000
2006	512, 600
2007	527,000
Average Annual Growth Rate Prior to 2001	10.5%
Average Annual Growth Rate After 2001	-2.6%

In the two years prior to 2001, annual attendance had grown at a rate of 10.5% per year, to a high of over 639,000 visitors in 2000. Since 2001, visitation has been declining at a rate of about 2.6% per year, although there has been a slight upward trend between 2006 and 2007. Stratford Festival organizers have projected 2008 attendance to continue to grow to about 551,000 visitors.

Recent market survey data collected by the festival organizers shows that there is a strong U.S. audience that attends the festival each year, representing about 29% of total visitation. Organizers note that over recent years, when there has been a significant decline in U.S. travel to Ontario, the festival has experienced less of a decline than other organizations. They attribute this to a very loyal core U.S. audience.

A significant share of Stratford visitation comes from the local residents in the Analysis Area, with the Region of Waterloo, London and Stratford contributing over 18% of annual visitation. Visitation from the GTA represents about 24% of attendees, with the rest coming from other locations throughout Ontario. The high Canadian dollar and the higher fuel costs are expected to reduce U.S. visitation somewhat in the future, although it is also anticipated that this reduction will be made up by increased visitation by Ontario residents looking to vacation locally.

This overall recreational pattern was also noted in the recent Ontario Tourism Outlook for the 2007-2011 periods, published by the Ministry of Tourism in June 2007. Outbound tourism trips are expected to increase by 4.2% per year over the forecast period, largely driven by the strong Canadian dollar and continued economic performance in Ontario.

Residence of Visitors	Share of Visitors
Toronto	23.9%
Kitchener/Waterloo	7.2%
London	5.7%
Stratford	5.4%
Rest of SW Ontario	19.0%
Rest of Ontario	6.8%
Rest of Canada	3.3%
Total Canada	**71.3%**
Detroit Area	6.0%
Rest of Michigan	8.3%
Buffalo Area	0.8%
Rest of New York	1.9%
Ohio	2.9%
Illinois	2.3%
Rest of US	6.2%
Total US	**28.6%**
Other	0.2%
TOTAL	**100.0%**

This report noted that tourist trips to Ontario are expected to grow by 1.2% per year over the forecast period, largely driven by increased intra-provincial travel (due to rising fuel costs, border crossing issues), and travel from overseas. The growth in inter-provincial travel was estimated at 1.6% per year, and may be higher still, if gas prices continue to increase as recent trends have forecast. Local trip making may play a larger role in vacation trip planning for Ontario residents than travel to the U.S., if the cost of travel continues to outpace the increased buying power of the higher Canadian dollar.

Based on the above assessment, a reasonable forecast of growth in tourism / recreational traffic demand in the Highway 7&8 corridor has been estimated at 1.5% per year.

Transit

Within the Analysis Area, both public and inter-city transit is limited. Currently, the only inter-city bus service provider in the area is Greyhound Bus Lines, which has only one bus terminal in the Analysis Area (located in downtown Stratford). Municipal public transit is only available within the City of Stratford, and offers a limited number of routes through the outer residential areas in the greater Stratford area.

VIA Rail offers inter-city transit services in the corridor using the Goderich-Exeter Rail Line (GEXR), immediately south of the Highway 7&8 corridor. VIA provides daily service between Sarnia, London, Stratford, Kitchener and the GTA, with three trains running per day per direction between Stratford and Toronto. Train service between Stratford and Toronto is provided at 6:09, 8:52, and 21:00, with return trips leaving Toronto at 10:50, 17:40, and 22:00. Travel time by train is estimated at 2 hours each way.

Total ridership on the Toronto to Sarnia line for 2007 was approximately 468,000 passengers and is forecast to grow to 480,000 in 2008[2]. The busiest segment of this line is the London to Toronto segment, although ridership by segment was not available.

VIA ridership to/from the Stratford station has been increasing significantly between 2004 and 2007, with a reported increase in annual ridership of approximately 50% over this time period as illustrated in **Exhibit 4.10**.

Exhibit 4.10: VIA Rail Ridership Trends at Stratford Station 2004-2007

Year	Annual Boardings	Annual Alighting	Total Annual Ridership
2007	22,897	24,120	47,017
2006	20,813	21,825	42,638
2005	18,863	19,982	38,845
2004	15,081	16,206	31,287

[2] Information provided by VIA Rail, via email

With regard to future transit improvements, the province recently announced that GO Transit bus service will be expanded to the Kitchener-Waterloo area, and there have been feasibility studies examining the extension of Rail service to either Cambridge or Kitchener in the longer term future. The Region of Waterloo is also undertaking an Individual EA study to implement Rapid Transit in their Central Transit Corridor, running north-south between Waterloo, Kitchener and Cambridge. The Region is planning to integrate this service with both regional surface transit routes and the VIA / future GO rail service should it be extended. While the Waterloo Rapid Transit (RT) service would not directly compete with the Highway 7&8 corridor as a transportation option for commuters, the improved linkages provided to Waterloo and Cambridge could improve the overall market of destinations that will be better served by transit in the future. Improved intercity transit in the Highway 7&8 corridor, or use of the existing VIA rail service to Kitchener (with a transfer to this improved transit network) could offer a significant opportunity to increase transit use in the Analysis Area and boost ridership from local residents.

While future transit expansion projects may offer significant opportunities to improve transit use in the Analysis Area, it is not anticipated that the market will be large enough or offer enough capacity / travel time savings to eliminate the need for roadway improvements in the Highway 7&8 corridor.

Commercial Vehicle Trips

Based on the findings of the Commercial Vehicle Survey (CVS), it is estimated that the total commodity value of long-distance trucks passing through the Analysis Area is $23.9 million per day, which equates to almost $9 billion annually. When the commodity value of local truck traffic is included, the total commodity value for all long-distance and local trucks passing through the Analysis Area equates to approximately $11 billion annually[3]. This signifies the high importance of the Highway 7&8 corridor as a trade route within Central Ontario.

The CVS data also shows that the majority of commercial vehicle trips originate from the St. Marys and Stratford areas, largely reflecting the aggregate/cement industries in St. Marys, the manufacturing base in Stratford and the general farming industry in the areas along the Highway 7&8 corridor. West of Stratford and St. Marys, the commercial vehicle origins cover a broad area with a strong northwest focus in the Highway 8 corridor (Mitchell, Clinton, Goderich) and extending to the southwest towards London. The main destinations for this commercial vehicle travel include Waterloo Region, Cambridge, Guelph and the GTA.

While no surveys were undertaken for the westbound direction, flows on Highway 7&8 could be deduced from origin-destination records from surveys undertaken at other stations. Approximately 540 westbound trips were identified through this process with a commodity value of $11.7 million[4] daily.

[3] Highway 7&8 Study Design, Transportation Needs Assessment Report, URS/IBI, July 2005
[4] Highway 7&8 EA Study Design, Origin-Destination Survey Summary Report, IBI, Nov 2006

Daily commercial vehicle traffic in the Highway 7&8 corridor is estimated at approximately 1290 trucks per day, representing 13% of the daily traffic volumes in the corridor. Although growth in commercial vehicle use has been relatively flat over the past few years (an annual growth of 0.2% per year was observed between 2000 and 2007), increased manufacturing based employment in the London, Woodstock, and Kitchener-Waterloo regions may drive commercial vehicle growth higher than the past few years would suggest.

A further review of the growth in Gross Domestic Product for Canada between 2001 and 2005 (see **Exhibit 4.11**), shows that manufacturing has grown at 1% per year.

Exhibit 4.11: GDP analysis for the period 2001 – 2005

	Growth Factor (per annum)	
Industry	**2001-2005**	**2005**
All Industry	1.03	1.03
Agricultural, forestry, fishing and hunting	1.03	1.03
Mining, oil and gas extraction	1.03	1.01
Manufacturing	1.01	1.01
Construction industries	1.05	1.06
Utilities	1.03	1.04

It is also noted that the long-term employment growth in the Analysis Area is forecast to be in the range of 1.0% per year and up to 1.5% per year in the Region of Waterloo.

For the purpose of forecasting future demands, the potential commercial vehicle growth rate in the corridor has been estimated at 0.5% per year growth, which translates into 195 additional truck trips per day in the corridor. Although not significant in terms of magnitude, it does constitute a component of the corridor travel demand, and given the nature of the capacity constraints on Highway 7&8, the impact of truck traffic on the highway should not be understated.

5.0 IDENTIFICATION AND ASSESSMENT OF CURRENT AND FUTURE AREA TRANSPORTATION SYSTEM PROBLEMS AND OPPORTUNITIES

5.1 Existing Assessment

The assessment of existing and future transportation system problems and opportunities is largely tied to capacity of the existing infrastructure to safely and efficiently accommodate forecasted travel demands.

The capacity of the road network is dependant on the prevailing speed, the number of lanes to serve demand, and the role and function of the roadway. For example, the more side street access, driveway access and intersecting roadways, the less effective capacity is available on the roadway. On two lane highways, capacity can be significantly affected by passing opportunities, and the impact of roadway grades and the presence of commercial vehicles in the traffic stream.

In the case of link volumes, a level of service (LOS) is assigned on the basis of volume to capacity (v/c) ratios (the volume of traffic versus the ability of the roadway to accommodate traffic flow). The v/c ratio provides a measure of traffic volume demand to the available capacity, with a theoretical capacity represented by a v/c ratio of 1.0 (i.e. volume equals capacity).

The correlation between levels of service and volume/capacity ratios is defined in **Exhibit 5.1**.

Exhibit 5.1: Level of Service Definitions

Levels of Service (LOS)	Volume to Capacity (v/c)	Travel Characteristics		Levels of Service (LOS)	Volume to Capacity (v/c)	Travel Characteristics	
LOS A	0 to 0.59	Free flow	(uncongested)	**LOS D**	0.80 to 0.89	Unstable flow	(High potential for congestion)
LOS B	0.60 to 0.69	Stable flow	(Low potential for congestion)	**LOS E**	0.90 to 1.0	Capacity	(Congested)
LOS C	0.70 to 0.79	Stable flow	(Low potential for congestion)	**LOS F**	> 1.0	Forced Flow	(Congested with high potential for diversion in network traffic resulting in system wide failure)

Acceptable level of service in rural conditions are typically representative of LOS C or better. LOS D or E are generally considered acceptable during peak hours in urban areas. For longer term planning LOS D is used. For this Study, the upper end of LOS D was used as the threshold where a link was reaching operational capacity.

It is noted that network performance can be measured using other criteria:

- average speed;
- hours of delay (vehicle-hours);
- out of way travel (vehicle-km); and
- temporal extent of congestion (closure impacts, amount of network operating under congested conditions).

These quantitative performance measures require threshold criteria to establish when a problem is considered to have occurred (i.e. while increases in travel times or out of way travel as a result of congestion can be measured, no benchmark exists that defines when out of way travel becomes a problem). These additional performance measures will therefore only be applied in the relative comparisons of the alternatives to the undertaking.

The findings of the existing level-of-service assessment are presented in **Exhibit 5.2**.

Exhibit 5.2: Existing Highway 7&8 Mainline Traffic Operations

Highway 7&8	Cross-Section	2004 AADT	2004 DHV Peak Direction	Capacity Peak Direction (veh/hr)	Volume / Capacity Ratio	Existing LOS
Stratford City Limits to 2.9 km East of Stratford City Limits	4-Lane	10,100	610	2400	0.25	A
2.9 km East of Stratford City Limits to Perth Road 107	2-Lane	10,100	610	750[5]	0.81	D
Perth Road 107 to Waterloo Road 1	2-Lane	10,600	640	750	0.85	D
Waterloo Road 1 to Waterloo Road 4 (West Junction)	4-Lane	14,400	865	2400[6]	0.36	A*
Waterloo Road 4 (West Junction) to Waterloo Road 4 (East Junction)	4-Lane	20,700	1,240	2400	0.52	A*
Waterloo Road 4 (East Junction) to 0.8 km East of Waterloo Road 5	4-Lane	19,200	1,150	3600	0.32	A

* Level-of-Service is influenced by urban-type conditions and defined by intersection operations within the segment

[5] Typical Planning Capacities for a 2-lane rural highway are approximately 800-900 veh/hr/ direction. An operational analysis for the existing 2-lane section has found that the capacity and LOS of this section is affected by restricted passing opportunities and high truck percentages, therefore a lower planning capacity has been used for this segment to reflect local conditions.

[6] A planning capacity of 1200 veh/hour/lane has been used for existing four lane undivided sections of Highway 7/8 to reflect influence of traffic signals and entrances.

As can be seen in **Exhibit 5.2**, the Highway 7&8 mainline is operating within acceptable levels of service along the assessed four-lane highway sections of the highway, but with poor levels of service along the existing two-lane section of the highway.

The section of Highway 7&8 from 2.9 km East of Stratford Limits to Waterloo Regional Road 1 is currently operating at LOS D. Based on an analysis of the warrant for passing lanes along the two-lane section of Highway 7&8, a condition of lane obsolescence has been identified. This condition occurs when there are a high percentage of slow moving vehicles, and thus the benefit of providing passing lanes is negated since queues will typically accumulate immediately after the termination of the passing lane. Under such conditions, there is no benefit to providing passing lanes and the required capacity improvement involves the provision of additional 'through' lanes, either through widening of the existing highway to four lanes or the construction of a new parallel arterial highway corridor.

The existing urbanized section of Highway 7&8 through New Hamburg shows that the current four-lane cross section has sufficient capacity and operates at a LOS A. However, a detailed assessment of the intersection operations in this area (as discussed in Report B) has shown that these signalized intersections operate at a lower level of service than the mainline section due to the heavy turning volumes, delays due to left turn phasing, and the impact of heavy sideroad volumes. This suggests that the intersection operations may fail prior to the mainline section reaching its ultimate planning capacity. The Highway 7&8 intersections with Waterloo Region Rd 1 (LOS F in PM Peak hour), Waterloo Regional Road 3 (LOS D in PM Peak Hour), and Waterloo Regional Road 5 (LOS F in PM Peak Hour) are notable examples[7].

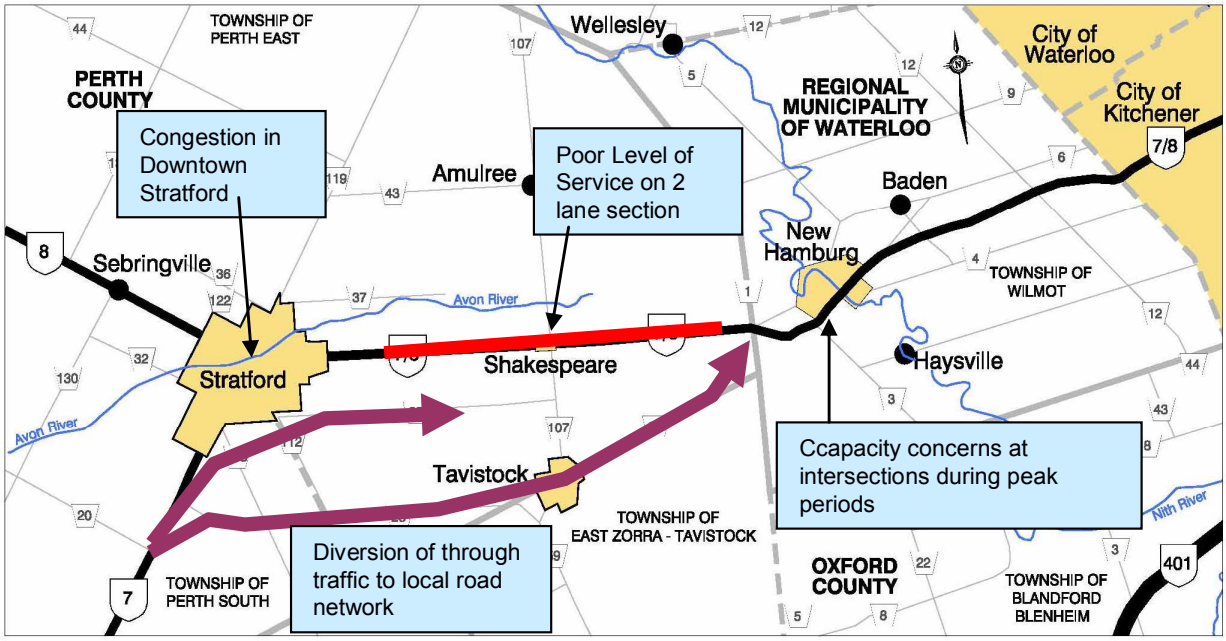
Based on the assessment of the existing conditions, the following transportation issues were identified:

- Poor level of service along 2-lane section of Highway 7&8 between Stratford and New Hamburg due to increasing traffic volumes.
- Reduced passing opportunity on the existing 2-lane section of Highway 7&8 due to high volumes and trucks may affect safety in the corridor.
- Highest hourly traffic volumes on Highway 7&8 occur during the commuter periods.
- Transportation capacity concerns are evident for the movement of both people and goods on Highway 7&8, between Stratford and New Hamburg.
- Increasing use of parallel County / Township roads, such as Perth Road 33 and Perth-Oxford Road 101 as alternate routes to the busier sections of Highway 7&8 and to avoid congestion in downtown Stratford.

Exhibit 5.3 provides an overview of these transportation issues.

[7] Refer to detailed intersection capacity analysis results, Exhibit 5.5, Report B

Exhibit 5.3: Existing Transportation Issues



5.2 Horizon Year Assessment

The Base Case demand analyses was undertaken for the 2031 horizon year using daily auto vehicle trip tables, generated using the updated base demands described in Section 3, and reflecting the forecast of growth in work trips, other trips, commercial vehicle trips, and recreational / vacation trips as discussed in Section 4.

These trip tables represent base case auto vehicle trips, with the assumption that the Transit Mode Split (TMS) representing the percent of trips made by transit remains unchanged. It should be noted that the absolute number of transit person trips grows in proportion to overall growth in trips, i.e. total number of transit trips increases over time. Other TMS assumptions will be considered in the context of the Assessment of Transportation Alternatives to be undertaken at a later stage in the study. The purpose of assessing future conditions with a TMS based on the existing trend was to provide an understanding of potential future conditions without significant changes to societal travel habits or patterns.

The 2031 daily auto trip tables were assigned to the 2031 base road network to estimate the future auto demands on the various roadways in the Analysis Area. These networks, as described in Section 3, incorporated anticipated upgrades to municipal and provincial road facilities within the Analysis Area.

The results of this analysis are summarized in **Exhibits 5.4**.

Exhibit 5.4: Capacity Analysis – 2031 Weekday Conditions

Highway 7 & 8	Lanes	2004 AADT	2031 AADT	Annual Growth Rate	2031 DHV	2031 DHV v/c Ratio	2031 LOS
Waterloo RR 5							
	4	18,400	54,200	4.0%	5,420	0.90	E
Waterloo RR 4 (east Junction)							
	4	19,800	49,200	2.4%	4,920	1.23	F*
Waterloo RR 4 (west Junction)							
	4	13,800	36,300	3.9%	3,630	0.91	E*
Waterloo RR 1							
	2	10,600	20,000	3.2%	2,000	1.60	F
Perth Road 107 - Shakespeare							
	2	9,800	19,100	2.4%	1,910	1.53	F
East of Stratford Limits							
	4	9,800	19,000	2.4%	1,900	0.48	A
Stratford Limits							
	4	18,000	28,600	1.8%	2,860	1.07	F
Romeo St							

Segment over capacity

* Level-of-Service is also influenced by urban-type conditions and defined by intersection operations within the segment

Based on the results of the base case analysis, the following conclusions are reached regarding transportation and traffic conditions in the Analysis Area:

Stratford to New Hamburg Travel Corridor

- By 2031 current capacity deficiencies on the two-lane section of Highway 7&8 between Stratford and New Hamburg will significantly exceed the capacity of the existing corridor. The level of service on these two facilities will continue to deteriorate over time.

- By 2031 the existing 4-lane section through the urbanized area of New Hamburg (between Waterloo Rd 4 east and Waterloo Rd 4 west) will exceed the capacity of the four-lane section. The intersection operations will fail prior to 2031 if improvements are not made.

- By 2031 the existing 4-lane section within Stratford, east of Romeo Street, will be operating over its capacity, resulting in congestion through the built up area, and additional diversion to parallel County Roads.

- The forecasting of future travel demands has been completed based on typical weekday conditions. Summer weekday volumes in the corridor are between 12% and 26% higher than weekday conditions.

- Extensive congestion can be expected in the corridor, during the summer peak travel periods, affecting both person and goods movement, and reducing the attractiveness of the Stratford area as a tourism destination.

6.0 SUMMARY OF TRANSPORTATION SYSTEM NEEDS

As documented in Section 2, a number of key factors influence the 'Area Transportation System' needs. The analysis of the transportation problem and opportunities has been prepared in consideration of these themes.

6.1 Transportation Problems

Exhibit 6.1 identifies the transportation related problems which were identified during the analysis and assessment of existing and potential future operating conditions on the transportation network within the Analysis Area.

Exhibit 6.1 **Transportation Problems**
• There is inadequate transportation capacity to meet current and projected needs (to 2031) for the efficient movement of both people and goods along the 2-lane and 4-lane sections of Highway 7&8 between Stratford and the New Hamburg area and on Highway 7&8 through the urban centres (Stratford, Shakespeare and New Hamburg). A capacity deficiency of 1 lane in each direction will be realized in the corridor between Greater Stratford and the New Hamburg area by 2031. In addition, there are capacity constraints at intersections in urban areas.
• Capacity constraints result in trip diversion to parallel rural roadways in the Analysis Area. Such routes are generally not designed to accommodate high traffic volumes. These routes also travel through rural communities where through traffic results in safety and operational concerns.
• Provincial / inter-regional traffic through urban centres along Highway 7&8 interferes with their "downtown / historic crossroads" function.
• Geometric and traffic safety characteristics along Highway 7&8 are not appropriate to address forecasted needs in a manner that facilitates their safe and efficient use for the movement of people and goods.
• There is currently no comprehensive highway access management plan for Highway 7&8 from Greater Stratford to New Hamburg to protect highway function/operation/safety, and to discourage inappropriate highway-related land development/growth.
• The connection of the Analysis Area to transportation corridors serving other regions in the province is inadequate for long-term transportation and economic development needs.
• Limited inter-city transit service is available so the majority of trips are auto-based.
• Truck trips in the corridor have limited route choice and are subject to either traffic congestion in Stratford and/or New Hamburg or connecting roadways that are inadequate or not intended for commercial vehicle activity.

6.2 Transportation Opportunities

In response to the transportation-related problems as noted above, there are opportunities that may be available to address these issues and improve the transportation system within the Analysis Area to the benefit of all users and the environment as noted in **Exhibit 6.2**.

Exhibit 6.2 **Transportation Opportunities**

• Policies and objectives of the Provincial Growth Plan promote opportunities to:
  • Provide for "transit-first" initiatives that support the provision of transit service between urban growth centres; and
  • Recognize the importance of balanced investment in the road and highway system, to better serve goods movement and the needs of the travelling public.

• Area transportation system planning and local land use planning in the Analysis Area need to be co-ordinated, in order to ensure new/intensified development associated with forecasted population and employment growth in the Analysis Area does not negatively affect or even preclude alternatives to address transportation problems and opportunities.
• The local transportation network is an integral part of the overall transportation network within the Analysis Area. The planned road programs of the area municipalities as identified in the Official Plans and Transportation Master Plans aim to preserve, improve and maximize use of the existing infrastructure.
• Implementation of alternative mobility strategies will assist in managing growth and congestion, provide a framework for increased transit use, provide opportunities to consider car pool, HOV and other transportation options, and optimize the current system through continued and necessary infrastructure investment.
• The provision of regular transit service between communities would provide an alternative to the auto in the Highway 7&8 corridor which could reduce auto demands in the corridor.
• Opportunities for use of the rail corridor to improve passenger travel connections between the Analysis Area and urban centres to the east could reduce auto demands in the corridor.
• A new transportation corridor has the potential to avoid overloading existing urban arterials and parallel rural roadways.
• A new transportation corridor linking Greater Stratford and the New Hamburg area would improve reliability and redundancy in the area transportation system.

7.0 DESCRIPTION OF GENERIC TRANSPORTATION SYSTEM MODAL AND FUNCTIONAL ALTERNATIVES

Alternatives to the undertaking represent reasonable means of resolving the stated transportation problems and opportunities, as well as meeting the purpose of the undertaking. The objectives used in the identification of alternatives include, but are not limited to:

- Meet the purpose of the undertaking;
- Address the transportation problems and opportunities outlined in Section 6.0;
- Consider policy framework goals and objectives in identification, assessment and evaluation of alternatives to the undertaking. The following represents a list of goals extracted from relevant Provincial, Federal and local policy documents, established as a guide to assess infrastructure alternatives;
    (a) *Transportation Goals*
        - Optimize the use of existing and new infrastructure;
        - Provide sustainable transportation choices; and
        - Ensure the safe and efficient movement of goods:
    (b) *Economic Goals*
        - Ensure the development of infrastructure that links the Analysis Area and provides connectivity between economic nodes and centres within the Analysis Area and the Province; and
        - Support and promote sustainable growth at Federal, Provincial and Municipal levels.
    (c) *Land Use Goals*
        - Support the urban form and intensification strategies embodied in the Proposed Growth Plan.
    (d) *Environmental Goals*
        - Promote the protection, conservation, enhancement and the wise use of natural resources.

7.1 Definition of 'Area Transportation System' Alternatives

Area Transportation System alternatives are defined as fundamentally different ways of addressing the identified transportation problems and opportunities. In recognition of these fundamental differences, it is appropriate to examine the effectiveness of each type of alternative in addressing the problems and opportunities at a functional level.

Individual Area Transportation System alternatives are described in detail below.

"Do Nothing" - The "Do Nothing" alternative is considered the status quo, where the area transportation system would be limited to maintenance of current transportation infrastructure and the implementation of approved provincial, regional municipality and local municipality initiatives.

Improved Local Transit Services - The provision of new or improved local transit service could divert people movement from private cars and relieve congestion on existing municipal roadways.

Transportation Demand Management (TDM) - TDM strategies include measures that improve the operation of the current area transportation system by managing travel demand independent of actually expanding or constructing new infrastructure. The emphasis of TDM strategies is to: reduce overall demands on the transportation network, especially auto trips; shift demands to time periods outside of the critical congestion periods; and shift demands from auto based trips to alternative modes of transportation, principally transit, cycling and walking.

Transportation Systems Management (TSM) - TSM can improve the efficiency and safety of the existing area transportation system and optimize the use of existing and planned infrastructure through a wide range of strategies and technology policies and initiatives on municipal roads and provincial highways. TSM measures include: transit priority facilities (e.g. bus priority at intersections), Intelligent Transportation Systems (ITS) strategies, carpooling and park and ride facilities; intersection improvements; and conversion of existing general-purpose lanes or existing shoulders on municipal roads or provincial highways for High Occupancy Vehicle (HOV) lanes and Reserved Bus Lanes (RBL).

Improved and/or New Freight Rail Service - Increased freight rail services for goods movement within existing rail corridors and/or along new rail corridors could encourage the diversion of freight from trucks. The ability to expand rail service and divert longer haul goods to rail may provide some relief to network congestion both on regional arterials and on the provincial highway network.

Improved and/or New Air Transport Service - Modifications to existing air transport services and any associated structural modifications/new infrastructure could result in a change in travel patterns for both passenger and freight.

Improved and/or New Marine Service – Would be limited to navigable waterways. It would have the greatest scope for recreational use as seasons/weather permit.

Improved and/or New Inter-Regional Transit Service / Passenger Rail - Providing inter-regional transit and passenger rail through new/increased services within the existing area transportation system and/or through new services in new corridors, could relieve congestion and increase the performance of the area transportation system. Inter-regional transit could be provided through the following: heavy rail; light rail; provincial transitway; reserved bus lanes on municipal roads or provincial highways; and buses in general purpose lanes of municipal roads or provincial highways.

Improved and/or New Municipal Roads – The provision of improved capacity and operations on existing facilities and/or accommodating required capacity on new municipal road corridors could increase the performance of the transportation network. Congestion could be relieved through additional capacity on existing roadways.

Improved and/or New Provincial Highways/Transitways - The provision of improved capacity and operations on existing provincial roadways, and/or accommodating required capacity on new roadways, could increase the performance of the area transportation system. Provincial highways/transitways maintain a high degree of access control in order to preserve the travel mobility characteristics of the corridor. Commercial and private entrances would be prohibited and access would be limited to: at-grade highway intersections, grade separations or potentially highway interchanges with key municipal arterial roads; and to transit stations for a provincial transitway. Use of sections of existing roadways could also be considered. In this regard, provincial roadways could include the following:

- Provincial highways
- Provincial transitways
- Transportation system management (TSM) facilities on provincial highways, including;
  - new lanes for high occupancy vehicles on provincial highways;
  - new lanes reserved for buses on provincial highways; and
  - new transit priority facilities on provincial highways.
- Combinations of provincial roadway alternatives

7.2 Definition of Combination Alternatives

Given the nature and extent of the problems in the Analysis Area there is a need to assess transportation requirements in a systems context and evaluate the merits of different transportation network alternatives and modal shift opportunities.

A comprehensive transportation strategy must recognize the interrelationship between all elements of the transportation system as well as the inherent relationship between land use, transportation, the economy and the environment. Such a strategy should also recognize the provincial policy directions on sustainable development and the importance of transit in developing balanced transportation solutions.

Elements of the Area Transportation System alternatives, when used in combination, are expected to fall into the following distinct categories:

- **Combination 1** – Optimize existing network (all modes – local transit, inter-regional transit, passenger rail, freight rail, air, marine, TDM, TSM). The objective of Combination #1 is to improve the operation of the current transportation system independent of actually expanding or constructing new transportation infrastructure;
- **Combination 2** – New/expanded non-road infrastructure (local transit, inter-regional transit / passenger rail, freight rail, air, marine) plus elements from Combination #1. The objective of Combination #2 is to provide more area transportation system capacity for the movement of people and goods without providing new/expanded municipal roads and provincial highways;
- **Combination 3** – Widen municipal roads and/or provincial highways beyond what is currently planned, plus elements from Combination #2. The objective of Combination #3 is

to provide more area transportation system capacity for the movement of people and goods without providing new provincial highways;

- **Combination 4** – New provincial roadways (highways/transitways), plus elements from Combination #3.

8.0 PROCESS AND CRITERIA FOR EVALUATING AND SELECTING THE PREFERRED 'AREA TRANSPORTATION SYSTEM' ALTERNATIVE

8.1 Process Overview for the Development, Assessment and Evaluation of Area Transportation System Alternatives

The process for the identification, assessment and evaluation of the 'Area Transportation System' alternatives is depicted in **Exhibit 8.1**. A brief description of the key elements of the process follows:

Step 1: Building upon the groundwork documented in Reports, A, B, F (Part 1) and this Report C, a rationale for the undertaking has been developed that articulates the existing and future transportation problems and opportunities as a basis for identifying alternative solutions.

Phase 1 Study Reports form the foundation for the study. They include:

- Study Plan (Report A) - Establishes the framework to guide the study.
- Overview of Transportation, Land Use and Economic Conditions within the Analysis Area (Report B) - Establishes analysis area overview and outlook and identifies existing transportation conditions.
- Report "F" – Part I: Working Paper – Environmental Conditions and Constraints - Establishes environmental overview within Analysis Area based upon secondary source information.

Report C: 'Area Transportation System' Problems and Opportunities - Establishes future transportation conditions, problems and opportunities and key factors driving area transportation system needs.

Step 2: Identify and Define a Long List of Area Transportation System Alternatives – Provides a description and rationale for generic transportation system functional and modal alternatives. The Long List of Alternatives was described in detail in the previous section.

Step 3: Determine the degree to which individual Area Transportation System Alternatives address Problems and Opportunities.

- Review the potential for generic transportation modal/functional alternatives to address the identified problems and opportunities to determine which alternatives should be short-listed for further review.

Exhibit 8.1
Process Overview for the Development, Assessment and Evaluation of the Area Transportation System Alternatives (Phase 2 of Study)

Study Plan for Technical Work, Outreach and Consultation (Report A)

Overview of Transportation, Land Use, and Economic Conditions within the Analysis Area (Report B)

Identification of Area Transportation System Problems and Opportunities (Report C)

Working Paper - Environmental Conditions and Constraints (Report F-1)

Develop Long List of Area Transportation System Alternatives

"Do Nothing"	Local Transit*	TDM	TSM	Freight Rail*	Air Service*	Marine Service*	Inter-Regional Transit / Passenger Rail*	Municipal Roads*	Provincial Highways/ Transitways*

* - Improved Services and/or new infrastructure

Determine Degree to which Individual Area Transportation System Alternatives address Problems and Opportunities

Develop Elements of Area Transportation System Alternatives and Group them into Combinations

"Do Nothing"	"Combination #1"	"Combination #2"	"Combination #3"	"Combination #4 "
Existing infrastructure and programmed improvements	*Optimize Existing Network (all modes)* (Optimize Existing Local Transit, Interregional Transit / Passenger Rail, Freight Rail, Air, Marine, TDM, TSM)	*New/Expanded Non-Road Infrastructure* + *Elements from Combination 1* (Local Transit, Interregional Transit / Passenger Rail, Freight Rail, Air, Marine)	*Widen Municipal Roads and/or Provincial Highways* + *Elements from Combination 2* (Widen / Improve Municipal Roads / Provincial Highways)	*New Provincial Highways/Transitways* + *Elements from Combination 3*

Determine the Degree to which Combination Alternatives Address the Problems and Opportunities and Select the Preferred Combination(s)

Select the Alternatives that will Proceed to Preliminary Planning

Generate the Detailed Elements of the Preliminary Planning Alternatives
(e.g. new/expanded services, areas of widening, new corridors, etc.)

Comparative Evaluation of the Relative Advantages and Disadvantages of Preliminary Planning Alternatives
(Based on Transportation, Natural, Land Use / Social, Economic, and Cultural Factors)

Select the Alternatives for Incorporation into the Transportation Development Strategy

Recommended Transportation Projects under the Jurisdiction of MTO (Proceed with next phase of the EA study process)	Recommended Transportation Projects under the Jurisdiction of Others (Go Transit / municipal / other)

Area Transportation System Planning

Evaluation of Area Transportation System Alternatives

Each of the long list of Area Transportation System alternatives is examined based on the following criteria:

- Potential to address transportation problems and opportunities;
  - Efficient movement of people;
  - Efficient movement of goods;
  - Recreational / tourist travel;
  - System reliability / redundancy;
  - Safety;
  - Accessibility; and
  - Modal opportunities.
- Support for provincial policies (Greater Golden Horseshoe Growth Plan, etc.)
- Supports land use and growth objectives of province and municipalities

Those alternatives with limited or no potential are *"screened out"* from more detailed analysis. Those alternatives with potential to address the problem and opportunity statement are short-listed for further review.

Step 4: Develop Combinations of Alternatives based on short-listed elements of Area Transportation System Alternatives

- The rationale for combining alternatives, as well as a description of each the Combination Alternatives is provided in Section 7 of this report. Combination Alternatives are examined for their potential to address the identified problems and opportunities.

Step 5: Determine Degree to which Combinations of Area Transportation System Alternatives address Problems and Opportunities

- Each of the Combination alternatives is examined based on the criteria applied in Step 4 above.

Step 6: Develop and Assess Preferred Combination of Area Transportation System Alternative(s)

- The Preferred Combination Alternative(s) from Step 6 is further developed, refined and assessed to *"screen out"* inferior options from more detailed analysis. Those alternatives with potential to address the problem and opportunity statement are carried forward for further review.

Step 7: Comparative Assessment of the Relative Advantages and Disadvantages of Short List Combination Alternatives Based on Transportation, Socio-Economic, Land Use and Environmental Factors

- The advantages and disadvantages of the short listed combination 'Area Transportation System' alternatives will be compared using a reasoned argument methodology to select a recommended alternative(s). The factors and sub-factors used to assess, evaluate and select a preferred Area Transportation System alternative(s) are described in detail in **Exhibit 8.2**. 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. The relative significance of the impacts are examined to provide a clear rationale for the selection of a preferred alternative. The rationale that favours the selection of one alternative over all others will be derived with consideration of input from the following sources:

- Government legislation, policies and guidelines;
- Municipal policy (i.e. Official Plans);
- Public, Agencies, First Nations, Consultation Groups, and other stakeholder issues and concerns; and
- Study Team (staff from MTO and their Consultants) expertise.

Step 8: Identify Recommended Area Transportation System Strategy
(presented in Report E)

- Based on the reasoned argument assessment and evaluation, an Area Transportation System Strategy will be developed. To determine next steps, the selected 'Area Transportation System' Strategy will be placed into one of the following four categories:
  - If the preferred Area Transportation System alternative is "Do Nothing" – the EA process is complete and no further study will be undertaken.
  - If the preferred Area Transportation System alternative is not a provincial roadway recommendation – the current EA process will be halted; MTO will refer the planning alternative to the appropriate agency or jurisdiction for further review and action.
  - If the preferred Area Transportation System alternative is a provincial roadway recommendation – the EA process continues and MTO will proceed to the Preliminary Planning phase as outlined in Section 2.2 of the Study Plan Report.
  - If the preferred Area Transportation System alternative is a combination of provincial roadway recommendations and recommendations that are not provincial roadways – the EA process continues for provincial roadway solutions, with MTO proceeding to the Preliminary Planning phase as outlined in Section 2.2 of the Study Plan Report; and Area Transportation System alternatives that are not provincial roadways are referred to the appropriate agency or jurisdiction for further review and action.

Exhibit 8.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR/ SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR, SUB-FACTOR AND CRITERIA EVALUATION
1.0 Natural Environment Factors			
1.1 Fisheries and Aquatic Ecosystems	1.1.1 Fish Habitat	Potential to affect fish species at risk (vulnerable, threatened or endangered fish species) and their habitat.	• The crossing of water bodies by transportation facilities has the potential to affect fish and aquatic habitat features through impediments to fish passage, loss of vegetation, changes to channel geomorphology (channel form and function), substrate and cover, changes to the water quality due to erosion and sedimentation, stormwater discharge and temperature changes. • PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements_ identified below. • PPS Policy 2.1.5 requires that development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements. In addition, policy 2.1.6 restricts development and site alteration on adjacent lands to natural heritage features (e.g. significant - wetlands, woodlands, valleylands etc.) unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions. • It is an objective of the PPS to protect, improve or restore the quality and quantity of surface water, including headwaters. Surface water features are an important part of the natural, economic and cultural landscape. PPS Policy 2.2.2 restricts development and site alteration in or near sensitive surface water features and groundwater features such that these features and their related hydrologic functions will be protected, improved or restored. • The Federal Fisheries Act prohibits the harmful alteration, disruption or destruction of fish habitat, the introduction of deleterious substances to fish habitat and the blockage of fish passage. Where impacts cannot be mitigated, a Fisheries Compensation Plan is prepared in consultation with the CA/DFO to address agency concerns/requirements. • Subsection 36(3) of the Fisheries Act prohibits the deposit of a deleterious substance, directly or indirectly, into waters frequented by fish.
	1.1.2 Fish Community		
1.2 Terrestrial Ecosystems	1.2.1 Wildlife	Potential to affect wildlife species at risk (vulnerable, threatened or endangered wildlife species) and their habitat.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • The presence of species identified by COSEWIC and COSSARO as vulnerable, threatened or endangered (VTE) requires consideration in the generation of route alternatives. Species or populations may be under pressure or susceptible to stress as a result of development. Since habitat for these species is often limited, impacts to areas where the presence of species at risk is suspected or confirmed should be avoided or minimized. The assessment should have regard for the PPS objective that development and site alteration will not be permitted in significant portions of the habitat of Threatened and Endangered Species. The reported presence of Species of Conservation Concern (as defined by MNR in the Significant Wildlife Habitat Technical Guides (SWHTG – MNR, 2000) and TRCA species of concern will also be considered. • The general prohibitions under the Species at Risk Act, which apply to federally protect migratory bird and aquatic species at risk as well as to all endangered and threatened species on federal lands. • Section 6 of the Migratory Bird Regulations under the Migratory Birds Convention Act, 1994, which prohibits the incidental take of migratory birds and the disturbance and destruction of taking of the nest of a migratory bird. • PPS Policy 2.1.4 prohibits development and site alteration in significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E. The assessment should have regard for this objective. Wetlands serve ecological functions to varying degrees including groundwater recharge/discharge, flood attenuation, wildlife movement corridors, habitat for flora and fauna, and water filtration. • The Canadian Federal Policy on Wetland Conservation promotes the goal of no net loss of wetland function in areas where wetland loss has reached critical levels.
	1.2.2 Wetlands	Potential to affect provincially and locally significant wetlands.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • It is important to recognize identified ecologically functional linkages between factors and sub-factors (within a natural heritage system) that contribute to landscape connectivity. The assessment should have regard for PPS Policy 2.1.2 which states that the diversity and connectivity of natural features in an area, and the long term ecological function and biodiversity of natural heritage systems, should be maintained, restored, or where possible improved, recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features. The avoidance of wildlife corridors minimizes risks of wildlife mortality during operation of the facility. Secondary information on ecosystem linkages (aquatic and terrestrial) will be reviewed and supplemented by other available sources (including contacts with specialists, field findings).
	1.2.3 Forests (e.g. woodlands [forest stands, woodlots and interior forest habitat] and significant valley lands [valley and stream corridors])	Potential to affect significant woodlands/ valley lands and areas supporting known populations of vegetation species at risk (vulnerable, threatened or endangered species).	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • The PPS Policy 2.1.4 only permits development and site alteration in significant woodlands south and east of the Canadian Shield where it can be demonstrated that there will be no negative impacts on the natural features or their ecological function. The assessment should have regard for the PPS protection objectives. • The study area is located within the Carolinian Zone and may have important representations of Carolinian species assemblages. These natural heritage areas require protection. • Small degraded, isolated remnant woodlots and wetlands can have ecological value. Large natural and relatively undisturbed features have high ecological sensitivity and value.
	1.2.4 Vegetation		
	1.2.5 Designated/Special Areas (such as world biosphere reserves, heritage rivers, ESAs, ESPAs, ANSIs, environmental plan areas, conservation reserves; and the designated special areas of national parks, provincial parks, conservation areas, etc)	Potential to affect designated/special areas.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Important habitat areas, which may not be associated with other features protected by other means (ANSIs, ESAs, PSWs), require consideration during the generation and evaluation of alternatives. These areas may be of local or regional significance to wildlife that is not necessarily at risk. Other areas may be identified as important habitat for wildlife species requiring larger habitat blocks or with specialized habitat requirements. The assessment should have regard for PPS Policy 2.1.4 which states that development and site alteration shall not be permitted in certain listed significant wetlands, woodlands, valleylands, wildlife habitat and areas of natural and scientific interest. Development and site alteration may be permitted in significant wildlife habitat if it can be demonstrated that there will be no negative impacts on the natural features or functions for which the area is identified. • Areas that have been designated as Environmentally Significant Areas, Areas of Natural and Scientific Interest or Significant Valleylands may have landforms or plant communities associated with the area that are designated locally, regionally or provincially significant, or provide important corridors. • ESAs are not explicitly included in the Provincial Policy Statement, but are often associated with other features subject to the policy statement (e.g. ANSIs, significant woodlands, significant habitat of endangered species or threatened species, significant wetlands, valleylands and wildlife habitat). They are also reflected in the MNR Land Use Guidelines, Conservation Authority Plans and municipal land use plans. • PPS Policy 2.1.6 provides for development and site alteration on adjacent lands to listed natural heritage features and areas, only where the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological function. • Policy 4.2.1.2 of the Greenbelt Plan 2005 states that the location and construction of infrastructure and expansions, extensions, operations and maintenance of infrastructure in the Protected Countryside are subject to specified criteria.

Exhibit 8.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR/ SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR, SUB-FACTOR AND CRITERIA EVALUATION
1.3 Groundwater	1.3.1 Areas of Ground water Recharge and Discharge	Potential to affect areas of groundwater recharge and discharge.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Section 2.2 of the PPS identifies that the quality and quantity of water (including groundwater) should be protected improved or restored. The assessment should have regard for this objective. Transportation facilities have the potential to impact groundwater resources through removal of recharge areas, interference with discharge areas/shallow groundwater zones, and introduction of contaminated runoff. Consequently, impacts to areas identified as being susceptible to groundwater contamination and/or interference should be avoided/minimized to the extent possible.
	1.3.2 Groundwater Source Areas and Wellhead Protection Areas	Potential to affect groundwater source areas and wellhead protection areas.	
	1.3.3 Large Volume Wells	Potential to affect large volume wells.	
	1.3.4 Private Wells	Not considered in this phase	
	1.3.5 Groundwater-Dependent Commercial Enterprises (e.g. water bottling operations)	Not considered in this phase	
	1.3.6 Groundwater-Sensitive Ecosystems (e.g. groundwater fed wetlands, coldwater streams)	Not considered in this phase	
1.4 Surface Water	1.4.1 Watershed / Sub-Watershed Drainage Features/Patterns	Potential to affect permanent watercourses.	• Surface water features are an important part of the natural landscape in the Analysis Area. There are a number of permanent and intermittent watercourses flowing through the Analysis Area as well as a number of provincially and locally significant wetlands and various unnamed tributaries and agricultural swales present in the analysis area. Consequently, surface water quantity and quality could be negatively affected by the undertaking (e.g., reduction in surface water quantity, degradation of surface water quality, etc.) and therefore the ability to protect surface water quality, including the function of headwaters, need to be considered in the evaluation.
	1.4.2 Surface Water Quality and Quantity	Not considered in this phase	
1.5 Air Quality	1.5.1 Local and Regional Air Quality (Total contaminant and greenhouse gas emissions)	Potential to reduce the air quality consequences of traffic congestion.	• Air Quality impacts have the potential to affect human health. • Alternatives through or near urban areas create the potential for increased contaminant levels. • Dust emissions associated with construction related activities could cause temporary air quality issues. • Greenhouse gases contribute to global warming.
	1.5.2 Sensitive receptors to air pollutants and greenhouse gas emissions	Not considered in this phase	
2.0 Land Use / Socio-Economic Environmental Factors			
2.1 Land Use Planning Policies, Goals, Objectives	2.1.1 First Nations Land Claims	Potential to affect areas for which there are First Nations outstanding land claims	• It is important that Aboriginal People's land claims within the Analysis Area are documented • The Ontario Provincial Policy Statement notes that long-term prosperity and social well-being of Ontarians depends on maintaining strong communities, a clean and healthy environment and a strong economy. Transportation facilities play a key role in achieving these objectives. • There is a need to co-ordinate transportation planning with municipal land planning as established through Official Plans, Secondary Plans and Zoning by-laws as these specify land uses supported by residents, municipalities and the province. • The Greenbelt Plan notes that infrastructure is important to economic well-being, human health and quality of life in southern Ontario and the Greenbelt. • Policy 4.2.1 of the Greenbelt Plan states that, for lands within the protected countryside, as defined by the Greenbelt Plan, 2005, infrastructure must meet one of the following policies; it supports agriculture, recreation and tourism, rural settlement areas, resource use or the rural economic activity that exists and is permitted within the Greenbelt; or it serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing for the appropriate infrastructure connections among urban growth centers and between these centers and Ontario's borders.
	2.1.2 Provincial/Federal land use planning policies/goals/ objectives	Potential to support federal/provincial land use policies/goals/objectives	
	2.1.3 Municipal (regional and local) land use planning policies/ goals/objectives (Official Plans)	Potential to support municipal Official Plans	
	2.1.4 Development Objectives of Private Property Owners	Not considered in this phase	
2.2 Land Use / Community	2.2.1 Indian Reserves	Potential to affect Indian Reserves	• It is important that potential and significance of impacts to Indian Reservations and sacred grounds be recognized and addressed in accordance with Ontario's New Approach to Aboriginal Affairs (Spring 2005) and the Grand River Notification Agreement • Property takings / displacements and changes / effects on local access have a significant impact on owners and tenants as well as the broader community. • Property takings / displacements and changes / effects on local access have a significant impact on owners and tenants as well as the broader community and customer/client base. • Disruption or displacement of institutional features may adversely affect the users of these features / facilities and the broader community.
	2.2.2 First Nations' Sacred Grounds	Not considered in this phase	
	2.2.3 Urban and Rural Residential	Potential to affect urban and residential areas	
	2.2.4 Commercial/Industrial	Not considered in this phase	
	2.2.5 Tourist Areas and Attractions (e.g. museums, theatres, etc.)	Not considered in this phase	
	2.2.6 Community Facilities / Institutions (e.g. hospitals, schools, places of worship, unique community features)	Not considered in this phase	
	2.2.7 Municipal Infrastructure and Public Service Facilities (e.g. sewage and water services, police/emergency services, local utilities)	Not considered in this phase	

Exhibit 8.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR/ SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR, SUB-FACTOR AND CRITERIA EVALUATION
2.3 Noise Sensitive Areas (NSAs) (residential areas and sensitive institutional uses)	2.3.1 Highway Noise	Potential for increased traffic noise in NSAs	• The Ontario Ministry of the Environment (MOE) has published Noise Pollution Control (NPC) and Land Use (LU) planning guidelines. These MOE documents establish ambient noise criteria, based on one-hour average sound pressure levels (Leq), and evaluate ambient vibration levels based on either Peak or RMS velocity, as applicable. Noise levels generally rise with increased traffic volumes. • MOE/MTO Noise Protocol requires that highway noise be considered in all Provincial (MTO) Transportation projects
	2.3.2 Construction Noise	Not considered in this phase	• The MOE/MTO Noise Protocol requires that construction noise be addressed on MTO construction projects • Construction noise may be subject to municipal (I.e., local) noise by-law
2.4 Land Use / Resources	2.4.1 Aboriginal People's Treaty Rights or Use of Land and Resources for Traditional Purposes (e.g. hunting, fishing, harvesting of country foods, harvesting of medicinal plants)	Potential to affect Aboriginal People's Treaty Rights or use of land and resources for traditional purposes	• It is important that potential and significance of impacts to Indian Reservations and sacred grounds be recognized and addressed in accordance with Ontario's New Approach to Aboriginal Affairs (Spring 2005) and the Grand River Notification Agreement Planning of transportation facilities must address Aboriginal People's treaty rights, and be conducted in accordance with Ontario's New Approach to Aboriginal Affairs (Spring 2005) and the Grand River Notification Agreement
	2.4.2 Agriculture	Potential to affect specialty crop areas and/or areas of Canada Land Inventory Classes 1, 2 and 3 soils	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Section 2.3 of the Provincial Policy Statement requires prime agricultural areas be protected for long-term use for agriculture. Prime agricultural areas include specialty crop areas and Classes 1, 2 and 3 soils in this order of priority. Ontario Ministry of Agriculture and Food (OMAF) has provincial guidelines for protection of prime agricultural lands as well as agricultural structures or infrastructure
	2.4.3 Parks and Recreational Areas (e.g. national/provincial parks, conservation areas, municipal parks, public spaces, golf courses, trails, greenways and open space linkages)	Potential to affect parks and recreational areas	• Disruption or displacement of recreational / community features may adversely affect the users of the facility/feature. Parks are generally lands in public ownership aimed at preserving significant and sometimes unique components of the environment, and providing recreational opportunities. These areas should be avoided to the extent possible however, in some cases, transportation facilities can be situated along park boundaries without adversely affecting the park. Frequently, parts are isolated islands surrounded by development and as such they can function as wildlife refuge areas or may facilitate wildlife movement opportunities. PPS, 2005, Policy 1.5.1 states that healthy active communities shall be promoted by (d) considering the impacts of planning decisions on provincial parks, conservation reserves and conservation areas.
	2.4.4 Aggregates, Mineral-Resources	Potential to affect aggregate and mineral resources sites	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Sections 2.4 and 2.5 of the Provincial Policy Statement have the objective of protecting mineral and aggregate resources for the long term. The policy statement makes provisions for the protection of both known deposits and areas of potential. MTO adheres to requirements of the Aggregates Act to protect aggregate resources while minimizing sterilization of mineral aggregate resources as much as possible.
2.5 Major Utility Transmission Corridors (e.g. railroads, hydro, gas, oil)		Potential to affect major utility transmission corridors	• Utility corridors are subject to regulations from owners and governing authorities for operation of utilities including National Energy Board, Ontario Energy Board, Transport Canada, Railway Safety Act, etc.
2.6 Contaminated Property and Waste Management (e.g. Landfills, Hazardous Waste Sites, "Brownfield" Areas, other known contaminated sites, and high-risk contamination areas)		Potential to affect landfills (open and closed), hazardous waste sites "brownfield" areas, and other known contaminated sites, and high-risk contamination areas	• Localized significant sources of property contamination can be associated with operating and closed waste disposal sites, the latter being of more significance due to their difficulty in accurately locating them. Consideration should be given to avoiding/ minimizing effects in the "area of influence" of waste disposal sites. • There is the potential that some of the lands in the project area may be contaminated due to the nature of existing and historical land use especially in older commercial/industrial areas and in areas with heavy industrial activity. Sources of potential property contamination in rural areas are most commonly associated with service stations; isolated pockets of commercial/industrial areas; unknown fill areas; scrap yards and other high-risk land uses. Impacts to these areas should be avoided / minimized to the extent possible. • Appropriate assessments will be carried on these sites and the project will comply with the appropriate.
2.7 Landscape Composition	2.7.1 Scenic Composition (total aesthetic value of landscape components)	Not considered in this phase	• Visual impacts on adjacent land use and effects on the visual experiences for users of the facility will be considered.
	2.7.2 Sensitive Viewer Groups	Not considered in this phase	
	2.7.3 Scenic value of views/vistas from the transportation facility	Not considered in this phase	
	2.7.4 Specimen Trees	Not considered in this phase	
3.0 Cultural Environmental Factors			
3.1 Cultural Heritage – Built Heritage and Cultural Landscapes	3.1.1 Buildings or "Standing" Sites of Architectural or Heritage Significance or Ontario Heritage Foundation Easement Properties	Potential to affect buildings or "standing" sites of extreme local, provincial or national interest or Ontario Heritage Foundation easements properties	• A new transportation facility may result in the loss of built heritage features resulting in a depletion of the cultural heritage resources / heritage character in the area. • Impacts to built heritage features should be avoided to the extent possible, or as a secondary alternative relocation rather than demolition could be considered. • MTO is required to operate in accordance with Cemeteries Act MTO is required to operate in accordance with Ontario Heritage Act
	3.1.2 Heritage Bridges	Potential to affect heritage bridges	
	3.1.3 Areas of Historic 19th Century Settlement	Potential to affect areas of historic 19th century settlement	
	3.1.4 Cultural Heritage Landscapes	Not considered in this phase	

Exhibit 8.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR/ SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR, SUB-FACTOR AND CRITERIA EVALUATION
	(collection of individual man-made features modifying pristine landscape)		
	3.1.5 First Nations' Burial Sites	Not considered in this phase	
	3.1.6 Cemeteries	Potential to affect cemeteries	
3.2 Cultural Heritage - Archaeology	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	• Disturbance or destruction of certain archaeological sites of extreme local, provincial or national interest represents a significant cultural loss. • Impacts to archaeological resources/sites should be avoided or minimized to the extent possible. • Significant archaeological sites shall be preserved and avoided in accordance with Ontario Ministry of Culture (OMC), and Aboriginal People's policies and procedures, and all others shall be excavated to OMC standards
	3.2.2 Historic Euro-Canadian Archaeological Sites	Potential to affect significant historic Euro-Canadian archaeological sites of extreme local, provincial or national interest	
4.0 Area Economy			
4.1 First Nations Industry		Potential to support First Nations industry in the area by efficient and reliable movement of people and goods	• Transportation congestion negatively affects existing business, industry and trade, adding significant costs to doing business and is a deterrent to new businesses considering locating or expanding in the Analysis Area. • Travel reliability for commercial vehicles is a concern given the impacts of construction, maintenance or collisions on the already congested transportation system. • A large proportion of recreational travel is based on longer distance auto based trips, therefore tourism and recreational travel is significantly affected by congestion on the area roadway network. Tourism is currently Ontario's fifth largest export industry and is projected to become the fourth largest in the near future. Tourism includes recreation and the cottage sector. • Agriculture is an important component of the overall economic base of the Analysis Area. Travel for agricultural equipment on local roads is severely affected by longer distance trips diverted from congested highways. Transportation of agricultural supplies and products is affected by congestion on the area road network. • PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • The Provincial Policy Statement, 2005 stipulates that prime agricultural areas shall be protected for long-term use for agriculture. Prime agricultural areas are areas where prime agricultural lands predominate. Specialty crop areas shall be given the highest priority for protection followed by Classes 1, 2 and 3 soils, in this order of priority.
4.2 Heavy Industry and Trade		Potential to support area heavy industry and trade by efficient and reliable goods movement	
4.3 Tourism and Recreation Industry		Potential to support area tourism and recreation industry by efficient and reliable movement of people	
4.4 Agriculture Industry		Potential to support area agriculture industry by efficient movement of goods	
5.0 Transportation Factors			
5.1 Federal/Provincial/Municipal transportation planning policies/goals/objectives		Potential to support federal/provincial/ municipal transportation planning policies/goals/objectives	• The Official Plans of municipalities within the Analysis Area, and the strategic growth policies and targets embodied in the Provincial Growth Plan, suggest that population and employment growth will continue over time and will be important to future economic prosperity. In order for this economic growth to be realized, an efficient transportation system to move both people and goods within and through the Analysis Area is considered fundamental. • The effectiveness of each alternative needs to be determined. • There is a need to determine how transportation solutions address future needs in relation to existing and proposed future transportation infrastructure. • There is a need to determine how well transportation solutions operate during peak periods. • Transportation agencies have developed design standards to ensure that safety objectives are reflected in all new/expanded infrastructure. These standards are not subject to modification or compromise to avoid/reduce impacts, costs, etc. • Goods movement between economic centres and growth areas incurs out-of-way travel and delay due to congestion through the Analysis Area. Reducing travel times, out-of-way travel and improving travel time reliability would lead to lower transportation costs and benefit the local, provincial and national economy. • There is a need to determine how well transportation solutions operate during peak periods. • There is a need to determine emergency access and safety issues related to transportation solutions. • There is a need to determine the flexibility of transportation solutions to address future needs beyond the forecasted planning horizon. • Physical conditions and staging issues can affect the feasibility of implementing transportation solutions. • There is the need identify the costs associated with possible transportation solutions. Construction costs can influence the feasibility of a given alternative.
5.2 Efficient movement of people		Potential to support the efficient movement of people between communities and regions based on network, screenline and critical link performance measures including Level of Service (LOS) and volume to capacity (v/c)	
5.3 Efficient movement of goods		Potential to support efficient movement of goods between urban growth centres and regional intermodal facilities based on road network and Highway 7&8 corridor performance measures (LOS and travel speed)	
5.4 System reliability / redundancy		Potential to support system reliability and redundancy for travel (people and goods) between regions and communities during adverse conditions	
5.5 Safety		Potential to improve traffic safety based on opportunity to reduce congestion on area road network (LOS and v/c) and reduce the frequency of intersections and entrances in the Highway 7&8 corridor	
5.6 Modal integration, balance and efficiency		Potential to improve modal choice and increase mode split for person trips between communities, regions and major transit station areas based on travel performance indicators (LOS, v/c, travel speed) at critical screenlines and on potential to provide higher order transit service in the Highway 7&8 corridor.	

Exhibit 8.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR/ SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR, SUB-FACTOR AND CRITERIA EVALUATION
5.7 Linkages to Population and Employment Centres		Potential to improve accessibility to urban growth centres for people and goods movement based on higher order network (roads and transit) continuity and connectivity. Accessibility to rural communities/users.	
5.8 Recreation and Tourism Travel		Potential to support recreation and tourism travel within and to/from the Analysis Area by provision of higher order network (roads and transit) continuity and connectivity and through network performance indicators (LOS, v/c, travel speed)	
5.9 Accommodation for pedestrians, cyclists and snowmobiles		Potential to accommodate pedestrians, cyclists within critical travel corridors in urbanized areas and snowmobiles in recognized rural trails	
5.10 Constructability		Not considered in this phase	
5.11 Construction Cost (excludes property costs and engineering costs)		Not considered in this phase	
5.12 Traffic Operations		Not considered in this phase	
NOTES:	Information to support the evaluation criteria for Transportation Needs Assess is drawn from secondary source information and preliminary field reconnaissance (the environmental information is documented in Report "F" – 1st Part)		

9.0 SUMMARY OF INPUT RECEIVED ON AREA TRANSPORTATION SYSTEM PROBLEMS AND OPPORTUNITIES AS IDENTIFIED THROUGH OUTREACH AND CONSULTATION, AND MTO RESPONSES/CHANGES

This section to be completed following the 60-day period provided for stakeholders to review and comment on Draft Report C: 'Area Transportation System' Problems and Opportunities.

SUPPORTING DOCUMENT #1

LIST OF ABBREVIATIONS AND GLOSSARY OF TERMS

LIST OF ABBREVIATIONS	
AADT	Average Annual Daily Traffic, defined as the average 24 hour, 2-way volume for the period January 1st to December 31st
ADT	Average Daily Traffic, defined as the average 24 hour, 2-way volume for the period July 1st to August 31st
ANSI	Area of Natural and Scientific Interest
AWD	Average Weekday Traffic, defined as the average 24 hour, 2-way volume for the period July 1st to August 31st excluding weekdays
CA	Conservation Authority
CEAA	Canadian Environmental Assessment Act
CPR	Canadian Pacific Railway
DHV	Design Hour Volume, the hourly volume for which a road is to be designed
EA	Environmental Assessment
ESA	Environmentally Sensitive Areas
ETR	Electronic Toll Road
FA	Federal Authorities
FEAC	Federal Environmental Assessment Coordinator
GGH	Greater Golden Horseshoe
GHG	Green House Gas
GTA	Greater Toronto Area
HOV lanes	High Occupancy Vehicle Lanes
IBA	Important Bird Area
LACAC	Local Architectural Conservancy and Advisory Committee
MAG	Municipal Advisory Group
MMAH	Ministry of Municipal Affairs and Housing
MOE	Ministry of the Environment
MTO	Ministry of Transportation
NHIC	Natural Heritage Information Centre
NRVIS	MNR database
NTS	Not to Scale
OBM	Ontario Base Map
OEAA	Ontario Environmental Assessment Act
OMAF	Ontario Ministry of Agriculture and Food
(O)MNR	(Ontario) Ministry of Natural Resources
PIC	Public Information Centre
PPS	Provincial Policy Statement
PSW	Provincially Sensitive Wetland
RA	Regulatory Authorities
RAG	Regulatory Advisory Group
RAP	Remedial Action Plan
SADT	Summer Average Daily Traffic, defined as the average 24 hour, 2-way volume for the period July 1st to August 31st
SARA	Species at Risk Act

LIST OF ABBREVIATIONS	
SAWDT	Summer Average Weekday Traffic, defined as the average 24 hour, 2-way volume for the period July 1st to August 31st excluding weekdays
SWHTG	Significant Wildlife Habitat Technical Guide
TAC	Transportation Association of Canada
TDM	Traffic Demand Management
ToR	Terms of Reference
TSM	Traffic Systems Management
WADT	Winter Average Daily Traffic, defined as the average two-way twenty-four hour volume for the periods between January 1 and March 31, and December 1 and December 31 of the given year.

Glossary of Terms

TERM	DEFINITION
Alternatives To	Functionally different ways of solving a documented transportation deficiency or taking an advantage of an opportunity.
Alternative Method	Ways of carrying out the selected alternative.
Alvar	Naturally open areas of thin or no soil over essentially flat limestone, dolostone or marble rock, supporting a sparse vegetation of mostly shrubs and herbs.
Areas of Natural and Scientific Interest	Areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education.
Built Heritage Resources	One or more significant buildings, structures, monuments, installations or remains associated with architectural, cultural social, political, economic or military history and identified as being important to a community. These resources may be identified through designation or heritage conservation easement under the Ontario Heritage Act, or listed by local, provincial or federal jurisdictions.
Connectivity	The degree to which key natural heritage or key hydrologic features are connected to one another by links such as plant and animal movement corridors, hydrologic and nutrient cycling, genetic transfer and energy flow through food webs.
Cultural Heritage Landscape	A defined geographical area of heritage significance, which has been modified by human activities and is valued by a community. It involves a grouping(s) of individual heritage features such as structures, spaces, archaeological sites and natural elements, which together form a significant type of heritage form, distinctive from that of its constituent elements or parts. Examples include heritage conservation districts designated under the Ontario heritage Act; and villages, parks, gardens, battlefields, main streets and neighbourhoods, cemeteries, trail ways and industrial complexes of cultural heritage value.
Detail Design	The final stage in the design process in which the engineering and design components of preliminary design are refined and details concerning, for example, property, drainage, utility relocations and quantity estimate requirements are prepared and contract drawings and documents are produced.
Do Nothing Alternative	In the context of a transportation project, the "Do Nothing" alternative would mean that only normal operations, maintenance and repairs of existing facilities would be carried out, however, no major improvements or undertakings would be initiated.

Glossary of Terms

TERM	DEFINITION
EA Act	Environmental Assessment Act (as amended by S.O. 1996 c. 27), RSO 1980
Ecological Function	The natural processes, products or services that living or non-living environments provide or perform within or between species, ecosystems and landscapes, including hydrologic functions and biological, physical, chemical and socio-economic interactions.
Ecological Value	The value of ecology in maintaining the health of key natural heritage or key hydrologic features and the related ecological features and functions, as measured by factors such as diversity of species and habitats etc.
Endangered Species	Species that is listed or categorized as "Endangered Species" on the Ontario MNR official species at risk list.
Environment	As defined in Section 1 (c) of the EA Act. (i) air, land or water (ii) plant and animal life including man (iii) the social, economic and cultural conditions that influence the life of man or a community (iv) any building structure, machine or other device or thing made by man (v) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities of man or (vi) any part of combination of the foregoing and the inter-relationships between any two of more of them, in or of Ontario.
Environmentally Sensitive Areas	Those areas identified by any agency or level of government which contain natural features, ecological functions or cultural, historical or visual amenities which are susceptible to disturbance from human activities and which warrant protection.
External Agencies	Includes Federal departments and agencies, Provincial ministries and agencies, conservation authorities, municipalities, Crown corporations or other agencies other than MTO.
Freeway	Freeways are controlled access median divided highway facilities with grade separated crossings and interchanges (i.e. a vertical separation between a road/road or road/rail crossing.)
Fish Habitat	As defined in the Fisheries Act c. F-14, means spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.
Flood Plain	For river, stream and small inland lake features means the area, usually low lands adjoining a watercourse, which has been or may be subject to flooding hazard.

Glossary of Terms

TERM	DEFINITION
Greater Golden Horseshoe	A geographical area represented by the single-tier municipalities of Barrie, Brantford, Guelph, Hamilton, Kawartha Lakes, Orillia, Peterborough and Toronto; the upper-tier municipalities of Brant, Dufferin, Durham, Haldimand, Halton, Niagara, Northumberland, Peel, Peterborough, Simcoe, Waterloo, Wellington and York and the lower-tier municipalities within.
Groundwater Feature	Refers to the water-related features in the earths sub-surface, including recharge / discharge areas, water tables, aquifers and unsaturated zones that can be defined by surface and subsurface hydrological investigation.
Habitat	The place or type of site where an organism or population naturally occurs. Species may require different habitats for different uses throughout their lifecycle.
Higher Order Transit	Transit that operates in its own dedicated right-of-way, outside of mixed traffic and therefore can achieve a frequency of service greater than mixed-traffic transit. Can include heavy rail, light rail and buses in dedicated right-of-ways.
Highways	Roadways under the jurisdiction of MTO including King's highways, secondary highways and tertiary roads. This includes all components within the associated right-of-way, e.g. structures, drainage works, traffic and safety devices.
Hydrologic function	Means the functions of the hydrological cycle that include the occurrence, circulation, distribution and chemical and physical properties of the water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and waters interactions with the environment including it relationship to living things.
Individual Environmental Assessment	An environmental assessment for an undertaking to which the EA Act applies and which requires formal review and approval under the Act.
Infrastructure	Means physical structures (facilities and corridors) that form the foundation of development. Infrastructure includes: sewage and water systems, waste management systems, electric power generation and transmission, communications and telecommunications, transit and transportation corridors sand facilities, oil and gas pipelines and associated facilities.
Inter-modal Facility	A location where transfers between carriers can be made, as part of a single journey. A typical freight inter-modal facility is a rail where containers are transferred between trucks and trains.
Mitigation Measure	A measure that is incorporated into a project to reduce, eliminate or ameliorate detrimental environmental effects.

Glossary of Terms

TERM	DEFINITION
Multi-modal Transportation System	A transportation system which may include several forms of transportation such as automobiles, walking, trucks, cycling, buses, rapid transit, rail (such as commuter and freight), air and marine.
Natural Heritage Features and Area	Features and areas, including significant wetlands, significant coastal wetlands, fish habitat, significant woodlands south and east of the Canadian Shield, significant valleylands south and east of the Canadian Shield, significant habitat of endangered species and threatened species, significant wildlife habitat, and significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the natural landscapes of an area.
Natural Heritage System	A system made up of natural heritage features and areas, linked by natural corridors that are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems. These systems can include lands that have been restored and areas with the potential to be restored to a natural state.
Petroleum Resources	Oil, gas, and brine resources which have been identified through exploration and verified by preliminary drilling or other forms of investigation. This may include sites of former operations where resources are still present or former sites that may be converted to underground storage for natural gas or other hydrocarbons.
Preliminary Design	That part of the planning and design process, during which various alternative design solutions are examined and evaluated including consideration of environmental effects and mitigation; the recommended design solution is then developed in sufficient detail to ensure that the horizontal and vertical controls are physically compatible with the proposed site, that the requirements for lands and right-of-ways are satisfactorily identified, and that the basic design criteria or features to be contained in the design have been fully recognized and documented is sufficient graphic detail to ensure their feasibility.
Provincial Policy Statement (PPS)	The Provincial Policy Statement (PPS) sets out the Ontario Government's interests in land use planning and development and provides policy direction on matters of provincial interest to those involved in land use planning. The PPS is the complementary document to the *Planning Act* and is issued under the authority of the *Act.*

Glossary of Terms

TERM	DEFINITION
Prime Agricultural Area	Areas where prime agricultural lands predominate. This includes: areas of prime agricultural lands and associated Canada Land Inventory Class 4-7 soils; and additional areas where there is a local concentration of farms which exhibit characteristics of ongoing agriculture.
Prime Agricultural Land	Land that includes specialty crop areas and/or Canada Land Inventory Classes 1, 2, and 3 soils, in this order of priority for protection.
Proponent	A person or agency that carries or proposes to carry out an undertaking, or is the owner or person having charge, management or control of the undertaking.
Provincial Plan	A plan approved by the Lieutenant Governor in Council or the Minister of Municipal Affairs and Housing, but does not include municipal official plans.
Regulatory Agencies	Includes Federal departments and agencies, Provincial ministries and agencies, and conservation authorities.
Site Alteration	Activities such as filling, grading and excavation that would change the landform and natural vegetative characteristics of land.
Species At Risk	Wild plants and animals that have been assessed by an independent body, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and found to be at some risk of disappearing from the wild in Canada. Species at Risk are protected by federal legislation, called the *Species at Risk Act* (SARA), proclaimed June 5, 2003.
Specialty Crop Area	Areas where specialty crops such as tender fruits, grapes, other fruit crops, vegetable crops, greenhouse crops, and crops from agriculturally developed organic soil lands are predominantly grown
Threatened Species	Species that is listed or categorized as "Threatened Species" on the Ontario MNR official species at risk list.
Transitway	A separate transit facility directly associated with a provincial freeway / highway. The transit right-of-way may be shared with a highway right-of-way.
Transportation Demand Management	Transportation demand management is a general term for strategies that result in more efficient use of existing transportation infrastructure. Examples include pricing (road tolls or transit discounts), flexible working hours, car pooling, park and ride etc.
Transportation Systems	A system consisting of corridors and rights of way for the movement of people and goods, and associated transportation facilities including transit stops and stations, cycle lanes, bus lanes, high occupancy lanes, rail facilities, inter-modal terminals, etc. and associated facilities such as storage and maintenance.

Glossary of Terms

TERM	DEFINITION
Valley Lands	A natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year.
Watershed	An area that is drained by a river and its tributaries.
Watershed Plan	A plan used for managing human activities and natural resources in an area defined by watershed boundaries. The Plan can include a water budget and conservation plan, land and water use strategies, monitoring plan and targets.
Wellhead Protection Area	The surface and subsurface area surrounding a water well or well field that supplies a public water system and through which contaminants are likely to move so as eventually to reach the waterwell or well field.
Wetlands	Lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to, or at the surface. The four major types of wetlands are swamps, marshes, bogs and fens. Periodically soaked or wet lands being used for agricultural purposes which no longer exhibit wetland characteristics are not considered to be wetlands for the purposes of this definition.
Wildlife Habitat	Areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations.
Woodland	Woodlands include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels