Ontario

Highway 7&8 Transportation Corridor Planning and Class EA Study

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

Report F (Part 1): Working Paper – Environmental Conditions and Constraints

June, 2008

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Note: Some environmental exhibits (as marked *) are also available on the enclosed CD for improved viewing.

Appendices

Appendix A – Federal and Provincial Environmental Assessment Process
Appendix B – Overview of Study Process
Appendix C – Species List
Appendix D – Canada Land Inventory Soil Capability System
Appendix E – Acronyms
Appendix F – Glossary
Appendix G – References

1.0 INTRODUCTION

1.1 Introduction to the Highway 7&8 Transportation Corridor Study

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

- Capacity, operation and safety needs along the 2-lane section of Highway 7&8 between Stratford and New Hamburg, and through the urban centers (Stratford, Shakespeare, and New Hamburg) for the movement of people and goods; and
- Linkage needs between the analysis area for broader transportation connections to other regions in the province.

A preliminary design will be prepared for the provincial roadway components of that plan, and be documented in a Transportation Environmental Study Report (TESR) for public review at study completion. This study will also:

- Build on the findings of previous MTO Highway 7&8 studies including:
  - *Study Design – Greater Stratford to New Hamburg Area* (2005);
  - *Natural Environmental Existing Conditions Report* (2006a);
  - *Business Impact Assessment – Existing Conditions* (2004);
  - *Preliminary Environmental Review of Contaminated Property and Waste Management, Secondary Source Groundwater Investigation* (2006b);
  - *Stage 1 Archaeological Resource Assessment* (2004); and
  - *Description of Man-Made Heritage in the Environment, Preliminary Report* (Dise, 1981);
- Address the policies and growth forecasts of the *Growth Plan for the Greater Golden Horseshoe* (GGH) (Ministry of Infrastructure Renewal, 2006); and
- Be carried out as a Group 'A' project, in accordance with the Class EA for Provincial Transportation Facilities.

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

A major component of the study is 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.

At the completion of the study, the filing of a 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 authorizes the type of transportation facility and its location.

For orientation and reference, a map of the analysis area is provided in **Exhibit 1.1**. The analysis area is larger than recommended in the *Highway 7&8 Study Design – Greater Stratford to New Hamburg Area*

(MTO, 2005) report because it includes a broader area in which a preliminary study area will be confirmed as part of this analysis.

Exhibit 1.1

Highway 7&8 Transportation Corridor Planning and Class EA Study
Map of Analysis Area

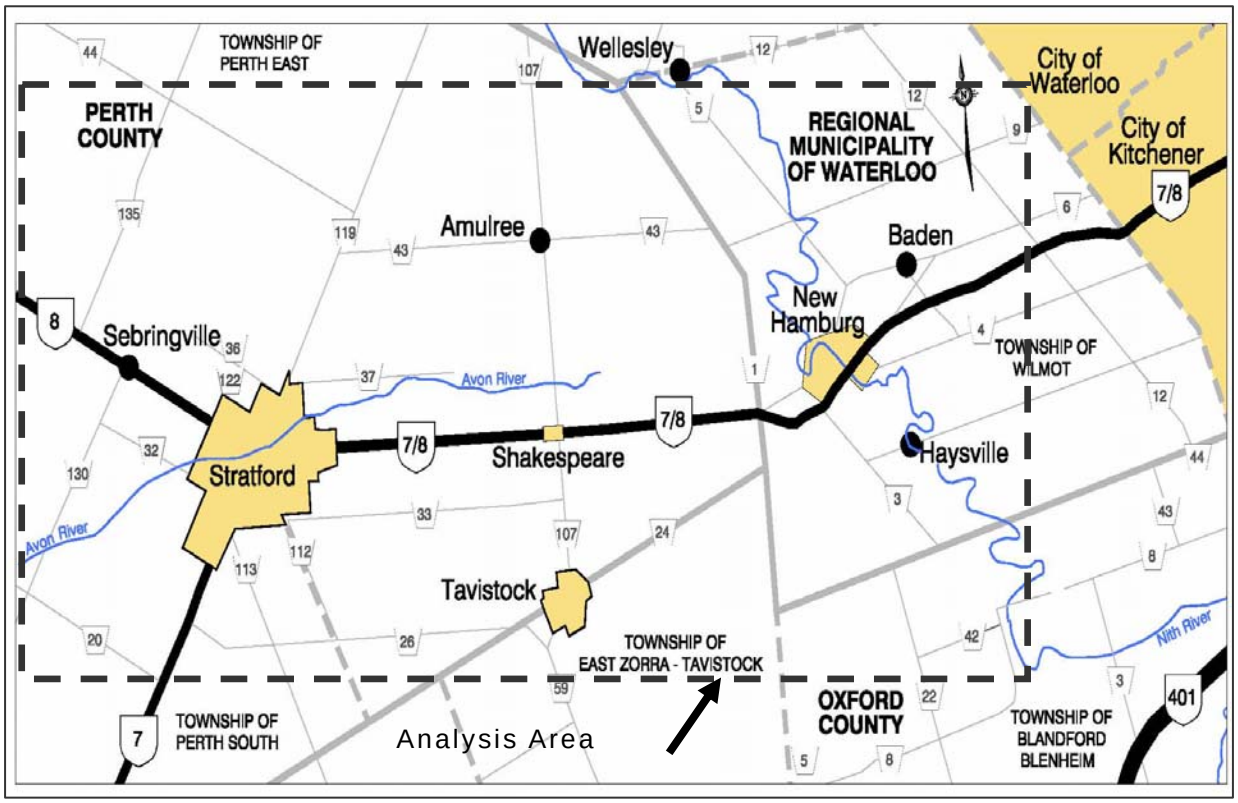


Exhibit 1.2 provides a summary of study objectives from *Report A: Study Plan for Technical Work, Outreach and Consultation.*

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.
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 provides a preliminary statement of transportation problems and opportunities from *Report A: Study Plan for Technical Work, Outreach and Consultation*.

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 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.

Exhibit 1.3
Preliminary Statement of Transportation Problems and Opportunities
Highway 7&8 Transportation Corridor Planning and Class EA Study

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 F (Part 1) within the Study Process

The main purpose of Report F (Part 1) is to document the existing environmental conditions and constraints. The environmental investigations that take place during the study will identify significant and sensitive features of the natural, socio-economic and cultural environments so they can be avoided, or so impacts can be minimized to these areas during the generation and evaluation of planning alternatives during the study. The content of Report F provides the Project Team with the information they need to satisfy Study Objective #4 listed in **Exhibit 1.2**.

Report F is managed in two parts, as follows:

- Part 1 (Summer 2007):
  - Establishes an environmental overview within the analysis area based on secondary source information (existing/secondary source information – mapping/constraint mapping, data, and reports) supplemented by preliminary field reconnaissance; and
  - Provides an overview/background level of detail that supports the selection of Area Transportation System alternatives, and the development and selection of preliminary planning alternatives.
- Part 2 (Fall 2008):
  - Identifies the environmental conditions and constraints within the detailed planning analysis area, referred to as the preliminary study area, (as identified through field investigations to augment secondary source information); and
  - Provides a higher level of detail that supports the environmental impact assessment which is a component of generating provincial roadway detailed planning alternatives and preliminary design alternatives.

The second part of the report addresses the same environmental factor-specific areas but at differing levels of detail.

It is important to note that Report F presents information on existing environmental conditions and constraints. Potential environmental impacts and mitigation will be described in subsequent reports (i.e., Reports E, G, etc.) that include a description of the evaluation of alternatives during the study process. Commitments to future environmental work, mitigation and/or compensation will be documented in the TESR (Report K).

The study is following the Federal and Provincial Environmental Assessment (EA) processes as described in **Appendix A**.

A detailed outline of the study process is provided in *Report A: Study Plan for Technical Work, Outreach and Consultation*, and an overview is provided in **Appendix B** of this report.

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

Part 1 of Report F provides a comprehensive secondary source overview of existing environmental conditions and constraints. For highlights of the report, readers are referred to the following sections of the report:

Exhibit 3.1 – Aquatic Resources
Exhibit 3.2 – Significant Natural Heritage Designations
Exhibit 3.4 – Physiography
Exhibit 3.5 – Surficial Geology
Exhibit 3.6 – North-South Cross-Section along Transect A
Exhibit 3.7 – North-South Cross-Section along Transect B
Exhibit 4.2 – Municipal Land Use
Exhibit 4.3 – Community Facilities
Exhibit 4.5 – Agricultural Soils
Exhibit 4.6 – Potential Contaminant Areas/Locations
Exhibit 5.15 – Built Heritage Resources
Exhibit 5.16 – Registered Archaeological Sites
Section 3.6 – Summary of Significant/Sensitive Natural Environmental Conditions
Section 4.8 – Summary of Significant/Sensitive Socio-Economic Environmental Conditions
Section 5.3 – Summary of Significant/Sensitive Cultural Environmental Conditions
Section 6.0 – Summary of Significant Environmental Features and Issues

Consultation and the engagement of public and stakeholders early in the study process is relevant to the content of Report F because environmental conditions and constraints require local knowledge and information. Environmental investigations rely heavily on information obtained through shared government data bases, approving agencies and ministries, local municipalities, First Nations, and the general public. Contact with agencies, ministries and municipalities were initiated early in the study, in order to obtain the secondary source information required to prepare Report F (Part 1) in time for the first PIC. Consultation in advance of the PIC has also included meetings with the Municipal Advisory Group (MAG), Regulatory Agency Group (RAG) and presentations to municipal Councils.

The early and continuous engagement of stakeholders during the study is important to the Project Team's understanding of local knowledge and the significant and sensitive features of the natural, socio-economic, and cultural environments in the analysis area.

1.3 Environmental Factors, Sub-Factors, and Criteria

The factors and sub-factors to be considered in the generation, assessment and evaluation of alternatives are presented in *Report A: Study Plan for Technical Work, Outreach and Consultation* of this study, and summarized in **Exhibit 1.5**.

Most of these environmental factors, sub-factors and criteria are discussed in the following sections of this report.

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": Milestone Report – 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 Roadways
• Report "H": Milestone Report – Selection of Detailed Planning Alternatives for Provincial Roadways
STUDY PHASE 5: PRELIMINARY DESIGN FOR PROVINCIAL ROADWAYS
• Report "I": Working Paper – Generation of Preliminary Design Alternatives
• Report "J": Milestone Report – Selection of Preliminary Design Alternatives for Provincial Roadways
STUDY PHASE 6: TRANSPORTATION ENVIRONMENTAL STUDY REPORT
• Report "K": Transportation Environmental Study Report

Exhibit 1.5
Highway 7&8 Transportation Corridor Planning and Class EA Study
Preliminary Identification of Environmental Factors, Sub-Factors and Criteria to be Considered in the Generation, Assessment and Evaluation of Alternatives

Factors/Sub-factors	Criteria
1. Natural Environmental Factors	
1.1 Fisheries and Aquatic	1.1.1 Fish Habitat
	1.1.2 Fish Community
1.2 Terrestrial Ecosystems	1.2.1 Wildlife
	1.2.2 Wetlands
	1.2.3 Forests
	1.2.4 Vegetation
	1.2.5 Designated/Special Areas (such as Environmentally Significant Areas, Environmentally Sensitive Policy Areas, and Areas of Natural and Scientific Interest)
1.3 Groundwater	1.3.1 Areas of Groundwater Recharge and Discharge
	1.3.2 Groundwater Source Areas and Wellhead Protection Areas
	1.3.3 Large Volume Wells
	1.3.4 Private Wells
	1.3.5 Groundwater-Dependent Commercial Enterprises
	1.3.6 Groundwater-Sensitive Ecosystems
1.4 Surface Water	1.4.1 Watershed/Subwatershed Drainage Features/Patterns
	1.4.2 Surface Water in Watercourses and Wetlands
1.5 Air Quality	1.5.1 Local and Regional Air Quality
	1.5.2 Sensitive Receptors to Air Pollutants and Greenhouse Gases
2. Land Use/Socio-Economic Environmental Factors	
2.1 Land Use Planning Policies, Goals, Objectives	2.1.1 First Nation Land Claims
	2.1.2 Provincial/Federal Land Use Planning Policies/Goals/Objectives
	2.1.3 Municipal (local and regional) Land Use Planning Policies/Goals/Objectives
	2.1.4 Development Objectives of Private Property Owners
2.2 Land Use – Community	2.2.1 First Nations Reserves
	2.2.2 First Nations Sacred Grounds
	2.2.3 Urban and Rural Residential
	2.2.4 Commercial/Industrial
	2.2.5 Tourist Areas and Attractions
	2.2.6 Community Facilities/Institutions
2.3 Noise Sensitive Areas	2.3.1 Transportation Noise
	2.3.2 Construction Noise
2.4 Land Use - Resources	2.4.1 First Nations Treaty Rights or Use of Land and Resources for Traditional Purposes
	2.4.2 Agriculture
	2.4.3 Parks and Recreational Areas

Exhibit 1.5 Highway 7&8 Transportation Corridor Planning and Class EA Study Preliminary Identification of Environmental Factors, Sub-Factors and Criteria to be Considered in the Generation, Assessment and Evaluation of Alternatives	
Factors/Sub-factors	**Criteria**
	2.4.4 Aggregates and Mineral Resources
2.5 Major Utility Transmission Corridors	
2.6 Contaminated Property and Waste Management	
2.7 Landscape	2.7.1 Scenic Composition
	2.7.2 Sensitive Viewer Groups
	2.7.3 Scenic Value of Views/Vistas from the Transportation Facility
	2.7.4 Specimen Trees
3. 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
	3.1.2 Heritage Bridges
	3.1.3 Areas of Historic 19th Century Settlement
	3.1.4 Cultural Heritage Landscapes
	3.1.5 First Nations Burial Sites
	3.1.6 Cemeteries
3.2 Cultural Heritage – Archaeology	3.2.1 Pre-Historic and Historic First Nations' Archaeological Sites
	3.2.2 Historic Euro-Canadian Archaeological Sites

1.4 Environmental Work Plan

The environmental work plan will be carried out in accordance with the:

- Class EA for Provincial Transportation Facilities;
- MTO Environmental Reference for Highway Design; and
- MTO Environmental Standards and Practices documents.

For access to the above documents, please refer to the study website: www.7and8corridorstudy.ca. The documents can be found by accessing the "Policy and Legislation" menu and choosing the "Environmental Policy and Legislation" drop-down choices. The Environmental Standards and Practices information can be found by using the MTO link in the MTO Environmental Requirements for Transportation Planning, Design, Construction, Operation and Maintenance Section.

These documents have been prepared for MTO undertakings and transportation projects of this type, to ensure that all Ministry studies satisfy the requirements of Federal and Provincial EA principles and guidelines.

The environmental work plan includes further environmental investigations, including secondary source reviews and field investigations, after a study area is confirmed. The work plan will also be based on filling any data gaps that are identified in Phase 1 of the project.

As the study progresses and the range of alternatives become more focused, more detailed environmental investigations will be undertaken. The level of detail and scale of mapping will increase as the Project Team begins to focus in on specific areas or corridors within the analysis area. A full complement of environmental specialists are working on the study to investigate factor-specific area(s).

2.0 PROVINCIAL POLICY STATEMENT

The Provincial Policy Statement (PPS) is issued under the authority of Section 3 of the *Planning Act*. It provides direction on matters of provincial interest related to land use planning and development, and promotes the provincial "policy-led" planning system. The new PPS came into effect on March 1, 2005. This coincides with the effective date of Section 2 of the *Strong Communities* (Planning Amendment) *Act*, 2004, which requires that planning decisions on applications that are subject to the new PPS "shall be consistent with" the new policies.

The PPS recognizes the complex inter-relationships among economic, environmental and social factors in planning and embodies good planning principles. It includes enhanced policies on key issues that affect our communities such as: the efficient use and management of land and infrastructure; protection of the environment and resources; and ensuring appropriate opportunities for employment and residential development, including support for a mix of uses. The new policies fulfill the Government's commitment to provide strong, clear policy direction on land use planning to promote strong communities, a clean and healthy environment, and a strong economy.

The PPS focuses growth within Settlement Areas away from significant or sensitive resources and areas that may pose a risk to public health and safety. Furthermore, it recognizes that the wise management of development may involve directing, promoting or sustaining growth. It states that land use must be carefully managed to accommodate appropriate development to meet the full range of current and future needs, while achieving efficient development patterns.

The PPS states that the Province's natural heritage resources, water, agricultural lands, mineral resources, and cultural heritage and archaeological resources provide important environmental, economic and social benefits. The wise use and management of these resources over the long-term is a key provincial interest. Through the PPS, the Province wants to ensure that its resources are managed in a sustainable way to protect essential ecological processes and public health and safety, minimizing environmental and social impacts to meet its long-term needs.

It is important to note that Section 1.6.6.4 of the PPS specifies the following:

> "When planning for corridors and rights-of-way for significant transportation and infrastructure facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources."

The PPS includes two sections that relate directly to environmental conditions and constraints. They are summarized in Sections 2.1 and 2.2.

2.1 Wise Use and Management of Resources

The PPS states that:

> "Ontario's long-term prosperity, environmental health and social well-being depend on protecting natural heritage, water, agricultural, mineral and cultural heritage and archaeological resources for their economic, environmental and social benefits".

The policy statement identifies six broad categories for protection as summarized below:

Natural Heritage

This section includes statements about the protection of:

- Natural features and areas for the long-term;
- The long-term ecological function and biodiversity of natural heritage systems;
- Significant habitat of endangered species and threatened species;
- Significant wetlands, woodlands and valleylands as well as significant wildlife habitat and Areas of Natural and Scientific Interest (ANSIs);
- Fish habitat;
- Natural heritage features; and
- Agricultural uses.

Water

This section includes statements about the protection of:

- Quality and quantity of water; and
- Sensitive surface and groundwater features.

Agriculture

This section includes statements about the long-term protection of Prime Agricultural Areas and Specialty Crop Areas. It also describes permitted uses that are compatible with agricultural operations, guidelines on types, sizes and intensities of agricultural land uses and new land uses in agricultural areas. Sub-sections include:

- Permitted uses;
- Lot creation and lot adjustments; and
- Removal of land from prime agricultural areas.

Mineral Petroleum

This section identifies a need to protect minerals and petroleum resources for long-term use. Sub-sections describe:

- Protection of long-term resource supply;
- Rehabilitation; and
- Extraction in prime agricultural areas.

Mineral Aggregate Resource

This section states that mineral aggregate resources shall be protected for long-term use. Guidelines are listed for:

- Protection of long-term resource supply;
- Rehabilitation;
- Extraction in Prime Agricultural Areas; and

- Wayside pits and quarries, portable asphalt plants, and portable concrete plants.

Cultural Heritage and Archaeology

This section includes guidelines for the conservation of:

- Significant built heritage resources and cultural heritage landscapes;
- Potential and significant archaeological resources; and
- Lands adjacent to protected heritage property.

The protection of natural heritage, water, agriculture, minerals and petroleum, mineral aggregate resources, cultural heritage and archaeology is included in the Highway 7&8 Transportation Corridor Planning and Class EA Study, through the inclusion of relevant environmental factors and criteria to be used in assessing planning alternatives during the study. A description of existing features is provided in subsequent sections of this report.

2.2 Protecting Public Health and Safety

The PPS states that:

> "Ontario's long-term prosperity, environmental health and social well-being depend on reducing the potential for public cost or risk to Ontario's residents from natural or human-made hazards. Development shall be directed away from areas of natural or human-made hazards where there is an unacceptable risk to public health or safety or of property damage".

Natural hazards include hazardous lands adjacent to shorelines or watercourses, beach areas and floodways, Special Policy Areas (as approved by the Ministers of Municipal Affairs and Housing and Natural Resources), institutional uses including hospitals, nursing homes day cares and schools, essential emergency services, or hazardous substances.

Human-made hazards include lands affected by mine hazards (i.e., oil, gas, and salt hazards) and contaminated sites.

The protection of public health and safety as described in the PPS will be accomplished through the application of relevant environmental factors and criteria in the evaluation of planning alternatives during the Highway 7&8 Transportation Corridor Planning and Class EA Study. Information on natural and human-made hazards is being collected as described in subsequent sections of this report.

3.0 NATURAL ENVIRONMENT

3.1 Fisheries and Aquatic Ecosystems

3.1.1 Methodology

A desktop review was completed for the analysis area using 2006 topographic maps. Existing fisheries and aquatic information was obtained from the Ministry of Natural Resources (MNR), Grand River Conservation Authority (GRCA), and Upper Thames River Conservation Authority (UTRCA). Due to the large analysis area, site-specific fish community and habitat data are not presented in this report. These data will be presented when the analysis area has been refined and more detailed information is required.

In order to characterize the aquatic recourses in the analysis area, the following documentation was reviewed:

- *The Upper Thames River Watershed Report Cards* (Maaskant *et al.*, 2001);
- *The Thames River Watershed Synthesis Report* (UTRCA, 2005);
- *Aquatic Species at Risk in the Thames River Watershed, Ontario* (Cudmore *et al.*, 2004);
- *Grand River Fisheries Management Plan* (MNR and GRCA, 1998);
- *Exceptional Waters: State of the Resource Report* (Scott and Imhof, 2005);
- *Water Quality in The Grand River: A Summary of Current Conditions (2000-2004) and Long-Term Trends* (Cooke, 2006); and
- *Grand River Fisheries Update* (GRCA, 2006).

3.1.2 Existing Conditions

The analysis area is divided by two watersheds: the Grand River watershed and the Thames River watershed. Watercourses on the west side of the analysis area flow southwest to the Thames River while watercourses on the east side of the analysis area flow southeast toward the Grand River. Watercourses within the analysis area are shown on **Exhibit 3.1**.

The fish community in the analysis area can be described according to thermal preference of the fish community found within a waterbody. Thermal designations for the watercourses within the analysis area are provided on **Exhibit 3.1**. The three major community types are defined below (Wright and Imhof, 2001):

- Coldwater – Fish community comprised primarily of fish species intolerant of water temperatures that exceed 22ºC in the summer and are usually found only in groundwater rich areas.
- Coolwater/Transitional Water – Fish communities comprised of species that can tolerate more variable water temperatures and conditions. This will include species that are coolwater tolerant and some species of salmonids that can tolerate maximum summer water temperatures up to 24ºC for brief periods of time. These communities are often found where occasional groundwater discharges occur.
- Warmwater – Fish communities comprised of species that are highly tolerant of wide temperature and flow fluctuations, and can withstand water temperatures in excess of 26ºC for prolonged periods of time.

Exhibit 3.1 – Aquatic Resources

Both the Grand River watershed and the Thames River watershed contain both high quality coldwater and warmwater fish habitat. **Exhibit 3.1** shows the thermal classification of fish habitat within the analysis area based on the MNR's Natural Resources and Values Information System (NRVIS) layer (2002).

Fish habitat and fish community are addressed in the following sections.

3.1.3 Grand River Watershed

The analysis area covers three subwatersheds within the Grand River watershed: Nith River (2GA02), Horner Creek (2GB05), and the Upper Grand River (2GA01).

The Grand River is the largest inland river system in southern Ontario and the largest tributary flowing into Lake Erie on the Canadian side. The Grand River is approximately 300 km long. It flows from the headwaters near Dundalk to Port Maitland, where it empties into Lake Erie. The Grand River watershed is about 6,800 km^2. Three major tributaries flow into the Grand River. They are the Speed/Eramosa, Conestogo, and Nith Rivers.

The Grand River has been designated a Heritage River by the Canadian Heritage Rivers System (CHRS). The Grand River is an extremely valuable resource with over 82 species of fish in the watershed. This number is more than 50% of all the fish species found in Canada. The Grand River is a high quality fishery supporting significant populations of sport fish such as northern pike (*Esox lucius*), smallmouth bass (*Micropterus dolomieu*), and walleye (*Sander vitreus*). The river also supports a seasonal run of migratory rainbow trout (*Oncorhynchus mykiss*) from Lake Erie upstream to the Caledonia dam (downstream of the analysis area).

Many of the Grand River tributaries contain high quality, self-sustaining coldwater salmonid populations. Brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) are found in various tributaries throughout the analysis area. The coldwater tributaries that support the native brook trout are fed primarily from groundwater discharge areas, both as diffuse seepages and by point source springs (MNR and GRCA, 1998).

Seven fish species and seven mussel species that are designated Species at Risk have been identified within the Grand River subwatersheds that are within the analysis area for this project. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Act* (SARA) lists the following fish species:

- Black Redhorse (*Moxostoma duquesnei*) - Threatened
- Silver Shiner (*Notropis photogenis*) - Special Concern
- Bigmouth Buffalo (*Ictiobus cyprinellus)* - Special Concern
- Redside Dace (*Clinostomous elonatus*) - Special Concern
- American Eel (*Anguilla rostrata)* - Special Concern
- Grass Pickerel (*Esox americanus vermiculatus)* - Special Concern
- River Redhorse (*Moxostoma carinatum)* - Special Concern

The listed mussel species are:

- Wavy-rayed Lampmussel (*Lampsilis fasciola*) - Endangered
- Rainbow Mussel (*Villosa iris*) - Endangered
- Round Pigtoe (*Pleurobema sintoxia)* - Endangered

- Kidneyshell (*Ptychobranchus fasciolaris)* - Endangered
- Round Hickorynut (*Obovaria subrotunda)* - Endangered
- Snuffbox (*Epioblasma triquetra)* - Endangered
- Mapleleaf Mussel (*Quadrula quadrula*) - Threatened

3.1.3.1 Nith River

The Nith River enters the Grand River at the town of Paris and forms the western boundary of the Grand River watershed. The Nith River and its main tributaries, Wilmot and Silver Creeks, are predominantly warmwater fisheries that support resident warmwater sport fish and migratory rainbow trout. However, within the analysis area the Nith River, Wilmot and Silver Creeks are designated as coolwater fisheries. This designation is supported by the gravelly deposits and sandy tills within the analysis area that would provide groundwater discharge. The New Hamburg Dam, located in the town of New Hamburg, is a stable warmwater fishery and has a fishway for fish migration.

Horner Creek flows into Whitemans Creek, north of Princeton, and Whitemans Creek enters the Grand River between Paris and Brantford. Only Horner Creek is located within the analysis area. Presently, the upper watershed is heavily drained for agricultural purposes. Horner Creek is designated a coolwater fishery and is well known as a high quality trout stream. There are also some warmwater headwater streams within the Horner Creek watershed.

3.1.3.2 Upper Grand River

The analysis area includes a very small portion of the middle reach of the Upper Grand subwatershed in the northeast corner. The middle reach within the analysis area is designated as a warmwater fishery.

3.1.4 Thames River Watershed

The Thames River is the second largest watershed in southern Ontario and one of Canada's most southern watercourses. It is approximately 273 km long and drains approximately 5,285 km^2.

The post-glacial landscape, the dynamic physical features, fluctuating water levels, pools and riffles, high nutrient levels, and the presence of both coldwater and warmwater streams contribute to the River's biological diversity (Cudmore *et al*., 2004). The Thames River has been designated a Heritage River by CHRS. The Thames River and its many tributaries are rich in aquatic life, with approximately 90 species of fish and 30 species of freshwater mussels. This assemblage constitutes 58% of all the fish species found in Canada.

The Thames River is divided into three major branches: North, Middle, and South. Subwatersheds of the North and South Branches in the Upper Thames watershed are located within the analysis area. The South Branch arises to the west of Tavistock, continues through Woodstock and then converges with the North Branch in London at the Forks of the Thames. The North Branch originates north of the former Town of Mitchell and drains in a southwesterly direction towards the Fork of the Thames in London. The Middle Branch arises southwest of Tavistock and joins the South Branch near Thamesford.

Above the Forks of the Thames (North, South and Middle Branches) the river is called the Upper Thames. The river below the Fork of the Thames is known as the Lower Thames. The river flows in a southwesterly direction to Lake St. Clair, which drains into Lake Erie.

To date, 72 of the 90 fish species recorded in the Thames River have been recorded in the Upper Thames watershed. Seven fish species and six mussel species that are designated Species at Risk are found in the Upper Thames subwatersheds within the analysis area. COSEWIC and the SARA lists the following fish species:

- Black Redhorse (*Moxostoma duquesnei*) - Threatened
- Silver Shiner (*Notropis photogenis*) - Special Concern
- Redside Dace (*Clinostomous elonatus*) - Special Concern
- Bigmouth Buffalo (*Ictiobus cyprinellus)* - Special Concern
- Northern Brook Lamprey (*Ichthyomyzon fossor)* - Special Concern
- Pugnose Minnow (*Opsopoedus emiliae)* - Special Concern
- Spotted Sucker (*Minytrema melanops)* - Special Concern

The listed mussel species are:

- Wavy-Rayed Lampmussel (*Lampsilis fasciola*) - Endangered
- Rayed Bean Mussel (*Villosa fabalis*) - Endangered
- Rainbow Mussel (*Villosa iris*) - Endangered
- Round Pigtoe (*Pleurobema sintoxia)* - Endangered
- Mudpuppy or Salamander Mussel (*Simpsonais ambigua)* - Endangered
- Mapleleaf Mussel (*Quadrula quadrula*) - Threatened

Four subwatersheds within the North Branch (2GD05) are located within the analysis area. These are: Avon River (2GD09), Trout Creek (2GD08), Black Creek (2GD10), and Whirl Creek (2GD11). The North Woodstock (2GB01) subwatershed in the South Branch of the Upper Thames watershed is also located within the analysis area.

3.1.4.1 North Branch

The North Branch of the Thames River is comprised of a variety of coolwater and warmwater streams. The North Branch watershed occupies two small portions of the southwest corner of the analysis area. Four main tributaries of the North Branch watershed are within the analysis area: Avon River, Trout Creek, Black Creek, and Whirl Creek.

The Avon River traverses the town of Stratford and vast agricultural land before entering the North Branch near St. Marys, outside the analysis area. The main channel of the Avon is designated a warmwater fishery. However, there are smaller headwater streams that are coolwater fisheries. Coldwater streams have also been identified in the Avon River watershed. There have been 34 species of fish recorded in the Avon watershed including smallmouth bass (*Micropterus dolomieu*) and largemouth bass (*Micropterus salmoides*).

Trout Creek is predominantly a warmwater system. Stream conditions are variable with some healthy coldwater streams that are known to support brook trout populations, along with degraded channelized watercourses upstream of Wildwood Reservoir (Maaskant *et al.*, 2001).

Black Creek originates in the Ellice Swamp, north of Stratford, and extends through the town of Sebringville before flowing into the North Branch of the Thames River. Black Creek is a warmwater fishery with known smallmouth bass (*Micropterus dolomieu*) and rock bass (*Ambloplites rupestris*)

populations. Much of the subwatershed's headwater area is comprised of degraded channelized watercourses.

The analysis area includes only a small portion of the Whirl Creek subwatershed in the northwest corner. Current information on fish habitat and community is not available for this subwatershed.

3.1.4.2 South Branch

The North Woodstock subwatershed is the only portion of the South Branch of the Thames River located within the analysis area. Coldwater streams are present in this subwatershed, some of which serve as nursery areas for game fish. Within the analysis area the main channel of the South Branch is designated a warmwater fishery, while the smaller headwater streams are coolwater fisheries.

3.2 Terrestrial Ecosystems

As part of the literature review and desktop analysis, the following existing documentation was reviewed:

- NRVIS (MNR, 2006a), including digital layers delineating environmentally designated features (i.e., Provincially Significant Wetlands [PSW], Locally Significant Wetlands [LSW], and ANSIs), general locations of Species at Risk (i.e., element occurrences for species designated Endangered, Threatened, or Special Concern by COSEWIC) and provincially rare species (i.e., element occurrences for species designated S1, S2 or S3 by the MNR), and MNR identified wooded areas; and,
- Natural Heritage Information Centre (NHIC) Database (MNR, 2006b), including Natural Area Reports (including the following area types: Wetland, Earth Science ANSI [ANSI-ES], Life Science ANSI [ANSI-LS], and International Biological Program site).

Correspondence was initiated with the MNR (Stone, 2007) GRCA (Cunningham, 2007) and UTRC (Annett, 2007) in letter requests for the following natural heritage data:

- Rare species data, including those with national status (Endangered, Threatened and Special Concern species designated by COSEWIC) and provincial status (designated by the MNR);
- Other (non-rare) species data including flora and fauna records;
- Natural Area designations (i.e., Crown Game Reserves, Migratory Bird Sanctuaries, National Wildlife Areas, Deer Wintering Areas, and Heronries);
- Ecological Land Classification (ELC) mapping;
- Wetland mapping;
- Floodplain mapping; and
- Other pertinent natural heritage data not identified in the data requests.

Locations of significant natural heritage designations are illustrated on **Exhibit 3.2**, and discussed in greater detail in the following section.

Exhibit 3.2 – Significant Natural Heritage Designations

3.2.1 Wildlife

The *Natural Heritage Reference Manual* (MNR, 1999) and the *Significant Wildlife Habitat Technical Guide* (MNR, 2000) guides identification of Significant Wildlife Habitat as defined by Section 2.1 of the PPS.

3.2.2 Wetlands

The Highway 7&8 analysis area contains a total of 31 wetlands evaluated under the Ontario Wetland Evaluation System (OWES), including eight PSWs and 23 LSWs as illustrated on **Exhibit 3.2**. Evaluated wetlands are summarized in the following sections based on information from the NHIC database.

3.2.2.1 Provincially Significant Wetlands

The Provincially Significant designation is assigned to wetlands and/or complexes of wetlands evaluated under OWES to represent a high level of wetland function and perceived value relative to other wetland systems throughout Ontario. PSW designations are authorized by the applicable MNR District Office, and are protected under the PPS. The following sections provided summaries of the eight PSWs identified for the Highway 7&8 analysis area.

3.2.2.1.1 Central Whitemans/Horner Creek Complex PSW

The Central Whitemans/Horner Creek Complex is a diverse wetland made up of four wetland types (1% bog, 1% fen, 90% swamp, and 8% marsh) occurring in eight individual wetlands. Wetland cover is treed deciduous, with Silver Maple (*Acer saccharinum*), Ash (*Fraxinus sp*.), Yellow Birch (*Betula alleghaniensis*), Red Maple (*Acer rubrum*), and poplar (*Populus sp*.) common throughout. Marsh communities are variable in cover, ranging from cattails (*Typha sp*.), broad- and narrow-leaved emergents, and forb dominated systems. Notably, communities with thick organic substrates support Tamarack (*Larix laricina*) and Black Spruce (*Picea mariana*).

The wetlands are primarily palustrine in type, with small quantities of riverine and lacustrine also occurring. Lacustrine types are associated with noted kettle lakes and bogs. Substrates are generally equivalent parts mineral (clay, loam, and silt) and organic types (MacMillan *et al.*, 1987).

3.2.2.1.2 Ellice Swamp PSW

Ellice Swamp is a large PSW made up of one wetland type (100% swamp) in 13 individual wetlands. The wetland is 100% palustrine with 100% organic substrates. Dominant vegetation forms include deciduous trees, tall shrubs, low shrubs and narrow-leaved, broad-leaved, and robust emergents. Swamp communities are dominated by spiraea species (*Spiraea sp*.), willow species (*Salix sp.*), dogwood species (*Cornus sp*.), soft maple (*Acer sp*.), poplar (*Populus sp.),* duckweed (*Lemna sp.*), and a variety of grasses, sedges and mosses.

3.2.2.1.3 Gads Hill South Complex PSW

This PSW is made up of ten individual wetlands and composed of two wetland types (95% swamp and 5% marsh). Gads Hill South complex is approximately 88% palustrine and 12% riverine. Bernard *et al.* (1994) report 37% clay/loam and 63% humic/mesic substrates. Swamp communities are dominated by Green Ash (*Fraxinus pennsylvanica),* poplar (*Populus sp.),* Silver Maple (*Acer saccharinum*), White Elm (*Ulmus americana),* Nannyberry (*Viburnum lentago),* Virginia Creeper (*Parthenocissus quinquefolia),*

Jewelweed (*Impatiens sp.*), Buckthorn (*Rhamnus cathartica*), willow species (*Salix sp.*), Yellow Birch (*Betula alleghaniensis*), Eastern White Cedar (*Thuja occidentalis)*, White Birch (*Betula pendula*), Sensitive Fern (*Onoclea sensibilis)*, Joe Pye-weed (*Eupatorium maculatum*), Skunk Cabbage (*Symplocarpus foetidus*), and Horsetail (*Equisetum arvense*). Marsh communities are dominated by dogwood species (*Cornus sp.*), willow species (*Salix sp.*), JoePye-weed (*Eupatorium maculatum*), spiraea species (*Spiraea sp.*), cattail (*Typha sp.*), goldenrod (*Solidago sp.*) and narrow-leaved emergents such as grasses and sedges.

3.2.2.1.4 Haysville Wetland Complex PSW

Drabick *et al.* (2003a) report that this PSW is comprised of 17 individual wetlands, which are composed of two wetland types (93% swamp and 7% marsh). Of the 17 wetlands, four are isolated, three are palustrine and ten are riverine. Dominant vegetation forms include deciduous trees, tall shrubs, low shrubs, narrow-leaved emergents, submergents, and herbs.

3.2.2.1.5 Little Lakes Swamp Complex PSW

This PSW is made up of seven individual wetlands, composed of two wetland types (85% swamp and 15% marsh). The Little Lakes Swamp complex is approximately 29% palustrine and 71% riverine. Moore and Robinson (1995) report 21% clay/loam and 79% humic/mesic substrates. Swamp communities are dominated by Green Ash (*Fraxinus pennsylvanica)*, Silver Maple (*Acer saccharinum*), White Elm (*Ulmus americana*), Black Willow (*Salix nigra*), Trembling Aspen (*Populus tremuloides*), Yellow Birch (*Betula alleghaniensis*), hemlock (*Tsuga sp.)*, Eastern White Cedar (*Thuja occidentalis*), Largetooth Aspen (*Populus grandidentata*), poplar (*Populus sp.)*, Balsam Poplar (*Populus balsamifera*), Red-osier Dogwood (*Cornus stolonifera*), Silky Dogwood (*Cornus amomum*), willow species (*Salix sp.*), Highbush Cranberry (*Viburnum trilobum*), Skunk Cabbage (*Symplocarpus foetidus*), Sensitive Fern (*Onoclea sensibilis)*, Virginia Creeper (*Parthenocissus quinquefolia)*, jewelweed (*Impatiens sp.*), Stinging Nettle (*Urtica dioica*), and Deadly Nightshade (*Atropa belladonna)*. Marsh communities support Reed Canary Grass (*Phalaris arundinacea*), Swamp Milkweed (*Asclepias incarnata)*, cattails (*Typha sp.*), jewelweed (*Impatiens sp.*), Horsetail (*Equisetum arvense*), dogwood species (*Cornus sp.*), willow species (*Salix sp.*), and a variety of free-floating plants and submergent plants.

3.2.2.1.6 New Hamburg Oxbow Wetland Complex PSW

The New Hamburg Oxbow Wetland Complex is made up of four individual wetlands, composed of two wetland types (62% swamp and 38% marsh). Wetlands are 96% palustrine and 4% isolated with substrates containing 87% clay/loam and 13% humic/mesic. The dominant vegetation forms include deciduous trees, free-floating plants, robust emergents, and narrow-leaved emergents.

3.2.2.1.7 Phillipsburg Swamp PSW

This PSW is made up of eight individual wetlands (six isolated and two palustrine) composed of two wetland types (99% swamp and 1% marsh). Drabick *et al.* (2003b) report 10% clay/loam and 90% humic/mesic substrate. Swamp communities are dominated by Silver Maple (*Acer saccharinum*), Yellow Birch (*Betula alleghaniensis*), Green Ash (*Fraxinus pennsylvanica)*, hemlock (*Tsuga sp.)*, White Oak (*Quercus alba*), White Pine (*Pinus strobes*), Eastern White Cedar (*Thuja occidentalis*), Canada Yew (*Taxus canadensis*), Wood Fern (*Dryopteris sp.*), jewelweed (*Impatiens sp.*), False Nettle (*Boehmeria cylindrical*), Sensitive Fern (*Onoclea sensibilis)*, Poison Ivy (*Toxicodendron radicans*), and dogwood species (*Cornus sp.*). Marsh communities are dominated by Green Ash (*Fraxinus pennsylvanica)*, willow

species (*Salix sp.*), Marsh Milkweed (*Asclepias incarnate*), Soft Rush (*Juncus effuses*), cattail (*Typha sp.*), duckweed (*Lemna sp.*), and pondweed (*Potamogeton sp.*).

3.2.2.1.8 Spongy Lake PSW

Spongy Lake wetland is a PSW composed of two individual isolated wetlands, and comprised of four wetland types (2% bog, 17% fen, 42% swamp, and 38% marsh) that are 100% isolated. Swamp communities are dominated by Yellow Birch (*Betula alleghaniensis*), Silver Maple (*Acer saccharinum*), White Birch (*Betula pendula*), White Pine (*Pinus strobes*), ash species (*Fraxinus sp.)*, Tamarack (*Larix laricina*), Eastern White Cedar (*Thuja occidentalis)*, dogwood species (*Cornus sp.*), and a variety of sedges, grasses and herbs. Marsh communities are dominated by narrow-leaved emergents including sedges, grasses, cattail (*Typha sp.*), and mosses. Narrow-leaved and robust emergents dominate fen communities. Bogs are dominated by Tamarack (*Larix laricina*), Leatherleaf (*Chamaedaphne calyculata*), blueberry (*Vaccinium sp.*), herbs, and moss. Open water communities contain mixed submergents and include unvegetated portions in depths greater than 2 m deep.

3.2.2.2 Locally Significant Wetlands

LSW are wetland units and/or complexes evaluated under OWES that did not meet the requirements for a Provincially Significant designation. However, these wetlands provide unique or specialized function within the context of the local landscape, including maintenance of critical ecosystem function, moderation of storm flows and water quality, protection for rare species, as well a number of social benefits. LSW are protected by various policies administered by the local planning authorities, including Municipal Official Plans (OP) and the *Conservation Authorities Act*.

A review of the analysis area identified 23 individual LSWs. Swamp and marsh wetland types are common throughout all LSWs. Fen and bog units rarely occur on this landscape and are more representative within PSW designations. Swamp units are dominated by deciduous cover including Silver Maple (*Acer saccharinum*), Ash (*Fraxinus sp*.), poplar (*Populs sp*.), Black Willow (*Salix nigra*), and Swamp White Oak (*Quercus bicolor*). Red-Osier Dogwood (*Cornus stolonifera*), shrub Willows (*Salix sp*.), Alder (*Ulnus sp*.) and Buttonbush (*Cephalanthus occidentalis*) are common in the understory and swamp thicket communities. Marsh communities vary in dominant species, with cattail (Typha sp.), sedge (*Carex sp.*), and other graminoids, and forb communities common throughout.

LSWs identified for the Highway 7&8 analysis area are listed as follows:

- Baden East Wetland Complex;
- Baden Southwest Wetland Complex;
- Berletts Corners North Wetland Complex;
- Gads Hill Swamp North;
- Haysville North Wetland Complex;
- Josephsburg South Wetland Complex;
- New Hamburg South Wetland Complex;
- New Prussia Southeast Wetland Complex;
- Nith River Wetland Complex II;
- Phillipsburg Northeast Wetland Complex;
- Plattsville North - Nith River Wetland Complex;
- Sebringville Woods;
- Shakespeare Hills/Avon Banks;

- Silver Creek;
- Silver Spring Creek - Hunsburger Creek Wetland Complex;
- St. Agatha West Wetland Complex;
- St. Agatha Wetland Complex;
- Stratford Complex;
- Upper Alder Creek Wetland Complex;
- Waldau Wetland Complex;
- Washington Creek;
- Wilmot Creek Wetland; and
- Zorra Swamp.

3.2.3 Forests

3.2.3.1 Interior Forest Habitat

Interior forest habitat is a sheltered environment away from the influence of forest edges and open habitats. The presence of forest interior is a sign of woodland health, and is directly related to the woodland's size and shape. Large woodlands with round or square outlines have the greatest amount of forest interior. Narrow, linear woodlands are less likely to support interior forest habitat.

Wildlife populations in southern Ontario are often healthier in regions with relatively more forest cover, and where forest fragments are grouped closely together or connected by corridors of natural habitat. Experts believe that 25 to 30% forest cover is required to support high flora and fauna richness attributes associated with historical forest cover (Landowner Resource Centre, 2000).

Most authors recognize the interior forest habitat located more than 100 m away from the forest edge (Riley and Mohr, 1994). The 100 m rule has been adopted by most planning level studies, however tolerance of edge disturbance should be considered on a species by species basis. The *Significant Wildlife Habitat Technical Guide* (MNR, 2000) has adopted an "area-sensitive species" concept to treat species-specific tolerances to edge effects, and to use breeding bird observations as evidence of suitable habitat availability.

An estimate of interior forest habitat within the analysis area was identified by applying the 100 m rule to all woodland identified by the MNR (2007a) as illustrated on **Exhibit 3.2**. A total of 7671.7 ha of forest was identified for the analysis, 1173.5 ha of which was identified as interior forest.

3.2.4 Rare Species

A review of the NHIC database identified a total of 26 significant plant and wildlife species in the Highway 7&8 corridor analysis area, including seven species of national concern (ranked special concern, threatened or endangered by COSEWIC) and 19 provincially significant species (according to Sranks and MNR status posted on the NHIC database). **Exhibit 3.3** provides a summary of significant species by organism type, and are mapped approximately on **Exhibit 3.2** as element occurrences. A complete species list appears in **Appendix C**.

Exhibit 3.3 Summary of Significant Species				
Organism Type	**Nationally Significant Species (COSEWIC)**		**Provincially Significant (Srank/MNR rank)**	
	No.* of Species	**No. of EO****	**No. of Species**	**No. of EO****
Breeding Birds	1	1	3	6
Herptiles	1	1	0	0
Odonata	0	0	1	1
Vascular Plants	3	4	12	12
Fish	1	1	3	6
Molluscs	1	1	0	0
TOTAL	7	8	19	25

* No. – number
**EO – element occurrences

3.2.5 Designated/Special Areas

The Highway 7&8 analysis area contains five ANSI-LS and five ANSI-ES (**Exhibit 3.2**). All ANSIs are summarized in the following sections. Summaries are based on information obtained from the NHIC database.

3.2.5.1 Little Lakes Bog and Swamp Forest ANSI-LS

Little Lakes Bog and Swamp Forest is a 135 ha mixture of swamp forest that is dissected by a hydro corridor, the Avon River flowing through the forest, and three kettle lakes. The ecosystem complex is made up of seven community types consisting of open water, floating sphagnum mat, cattail pockets, tamarack swamp, silver maple swamp, hemlock-cedar swamp, and beech-maple forest. One of the lakes is divided in half by fill, and one lake is separated from the other two by Highway 7&8 and a railroad corridor.

3.2.5.2 Phillipsburg Forest ANSI-LS

Phillipsburg Forest covers an area of approximately 310 ha consisting mainly of black maple-ash-hickory forest. The landform is a floodplain area on a kame moraine, spillway, and undrumlinized till plain. The forest makes an upland progression to sugar maple-hemlock, beech-maple, and oak forest. Some rare plant species are present in Phillipsburg Forest including Green Dragon (*Arisaema dracontium*), Shaggy False Gromwell (*Onosmodium hispidissimum*), and White Trout Lily (*Erythronium albidum*).

3.2.5.3 Phillipsburg Swamp ANSI-LS

Phillipsburg Swamp covers an area of approximately 310 ha comprised mostly of a mature silver maple swamp, which is divided into a section of spring swamp and a section of perennial swamp. The swamp is composed of beech-maple upland wood and hemlock-yellow birch communities. The area has been disturbed by logging and dumping, with most of the disturbance occurring in the eastern section.

3.2.5.4 Spongy Lake Bog ANSI-LS

Spongy Lake Bog is an 80 ha bog located in a geological kettle. Some examples of representative bog types within Spongy Lake Bog include tamarack fen, tamarack-black spruce bog, water willow shrub

carr, white cedar swamp, and cedar-red maple swamp. A small portion of this area consists of upland maple-beech forest.

3.2.5.5 St. Agatha Beech-Maple Forest ANSI-LS

St. Agatha Beech-Maple Forest is a 95 ha length of maple-beech forest on undrumlinized till plain, which is divided by a hydro corridor. Narrow-leaved Spleenwort (*Asplenium pycnocarpon*) is a rare species that has been found on this site.

3.2.5.6 Baden Hills Kames ANSI-ES

Baden Hills Kames ANSI is located 1 km east of the village of Baden in Wilmot Township. It is a late Wisconsinan/Port Huron Stadial glacial deposit. These hills stand up as domes about 61 m high and are composed of sand and gravel. Spongy Lake to the north is a kettle lake and serves as a typical complement to the Baden Hills.

3.2.5.7 Harmony Cut ANSI-ES

Harmony Cut ANSI covers an area of approximately 0.41 ha. This ANSI contains the Type Section of the Late Wisconsinan Port Bruce Stadial Stratford Till, and Tavistock Till. Stratford Till is overlain by Tavistock Till at the ANSI. Stratford Till represents a weak Huron ice advance, while Tavistock Till is a strong ice advance from the northwest.

3.2.5.8 Seebach Hill Spillway ANSI-ES

The Seebach Hill Spillway is approximately 500 ha. The ANSI contains Late Wisconsinan, Port Bruce Stadial, Milverton Moraine (Wartburg Till), Elma Till, Stratford Till, and a spillway.

3.2.5.9 Wartburg Road Cut ANSI-ES

The Wartburg Road Cut covers an area of approximately 0.41 ha. The ANSI contains the Late Wisconsinan, Port Bruce, and Stadial and Wartburg Tills. Wartburg Till appears to represent a minor ice advance deposited by either the Georgian Bay and/or Huron ice lobe. The Wartburg Till forms the Milverton Moraine.

3.2.5.10 Easthope Moraine ANSI-ES

The Easthope Moraine ANSI report is not currently available on the NHIC database (2006b).

3.2.5.11 Ellice-Huckleberry Marsh ANSI-LS

The Ellice-Huckleberry Marsh is a 610 ha complex. Vegetation communities include closed and semi-open mature deciduous swamp forest; semi-open shrub wetland, heath, and old field. Special features include rare plants (*Bartonia virginica*, *Betula pumila*) and birds (Golden-winged Warbler, Yellow-breasted Chat). Site disturbances include past logging, some draining for agriculture, and planting of black spruce and tamarack. The existing bog is partially in plantation and peat removal is in progress. This location is the headwater area for tributaries of the Nith and Thames Rivers.

3.2.5.12 Gads Hill Moraine ANSI-ES

The Gads Hill Moraine ANSI report is not currently available on the NHIC database (2006b).

3.2.6 International Biological Program Sites

Three sites within the analysis area were inventoried as part of the International Biological Program during the late 1960's and early 1970's. The studies were part of an international initiative developed by the International Council of Scientific Union and the International Union of Biological Sciences focusing on the productivity of biological resources, environmental change, and human adaptability to environmental change. The three sites documented below corresponded with the specially designated areas discussed in Section 3.2.5. International Biological Program sites are noteworthy for a number of reasons including their relatively large areas of natural cover and biodiversity in the landscape, and their contributions to scientific study.

3.2.6.1 Ellice Huckleberry Marsh

The Ellice Huckleberry Marsh covers a total area of approximately 791.2 ha, which is dominated by 368 ha of wet mesic closed deciduous mature deciduous swamp. Wet mesic semi-open deciduous swamp forest comprises 174 ha of the total marsh followed by 162 ha of wet semi-open swamp peatland heath, and 54.7 ha of wet semi-open mixed swamp scrubland.

3.2.6.2 Gads Hill Agreement Forest

The Gads Hill Agreement Forest is a mesic forest complex measuring approximately 280 ha in area and consisting of successional lowland deciduous, mixed forest, and swamp. Landform character is generally flat in relief, described as a broad basin of modified moraine lake, with predominately poorly drained clay substrates and scattered organic deposits (Hay, 1971). The forest includes areas of unusually mature trees, and is considered an important regional example of climax beech/maple forest.

3.2.6.3 Spongy Lake Bog and Sand Hills

The total area of the Spongy Lake Bog and Sand Hills area is 47.3 ha within a kame moraine complex. Within this complex is a kettle depression with a small shallow lake and flat peat basin with high sand hills on all sides of the small lake. Seven distinct communities are represented within the diverse complex including lowland coniferous, mixed and deciduous forests, thickets, marshes, and aquatic communities. Disturbances are generally considered light to moderate, and are mainly due to cutting and grazing. This ecosystem has been described as a good example of communities that are demonstrative of sub-boreal habitats, including tamarack fen, water willow carr, and white cedar swamp (Walsh, 1970).

3.3 Geology and Hydrogeology

3.3.1 Methodology

Assessment of the analysis area hydrogeological conditions was conducted by way of a desktop study. The desktop study included review of published information including:

- Ontario Geological Survey mapping (Karrow, 1993);
- Ministry of the Environment (MOE) water well records (MOE, 2006);
- Ontario Base Mapping (MNR, 2006c); and

- Available wellhead protection information (Perth and Oxford Counties) and historical consulting reports.

A Geographic Information System (GIS) platform enabled spatial data sets to be overlaid so that relations among different variables could be detected and sensitive areas identified.

A conceptual understanding of the local hydrogeology was developed from historical reports including the *Perth County Groundwater Management Study* (Waterloo Hydrogeologic, 2003). This conceptualization was refined through analysis of water well records, delineated capture-zones, geological mapping, and local drainage patterns. **Exhibit 3.4** portrays the physiography including the major landforms and surface topography of the analysis area. **Exhibit 3.5** shows the regional surficial geology, location of MOE water wells, high water use municipal wells, and wellhead protection areas (WHPA) for some selected municipal supply wells. To assist in this analysis two geological cross-sections, Transects A and B (their locations are on **Exhibit 3.5**), were created and are shown on **Exhibits 3.6** and **3.7**. The refined conceptual understanding of the local and regional hydrogeology was then used to highlight areas of sensitivity and/or significance to the proposed road construction activities.

3.3.2 Physiography and Topography

The landforms within the area of investigation are shown on **Exhibit 3.4** and are described in this section.

The landforms have been shaped by a cover of glacial deposits that overlay Devonian and Silurian age limestone bedrock. The glacial landforms were formed from clay drift, resulting in low slopes and subdued landforms. In addition, the ice commonly bordered shallow, temporary ponds, which modified the landforms through wave action and through filling depressions with lacustrine silt. Bedrock topography has had little influence on the surficial landforms.

Surficial topographic relief is minimal throughout the analysis area, with the exception of moraine ridges cross-cutting various parts of the area. The topographic relief is largely the result of glacial depositions such as moraine, eskers and kames, and erosion (river valleys) during the Quaternary period.

Relief within the area ranges from approximately 427 m Above Sea Level (ASL) in the middle, north and northeast extents to 299 mASL in the southeastern reaches and along the river valley. The higher elevations correspond to the moraine, kame and esker features. The area is drained by a number of major watercourses such as the Avon and Nith Rivers, and numerous other permanent and intermittent streams.

3.3.3 Geology

The distribution of subsurface materials influences the rate and direction of groundwater movement in the analysis area. Although the characteristics of the underlying bedrock are important in understanding regional scale aquifers and groundwater protection, the shallow overburden sediments are most relevant to this study, given their thickness and the relatively shallow impacts associated with highway construction and improvements. Details of the subsurface geologic and hydrogeologic conditions were evaluated through the development of two representative transects using the MOE Well Record database across the analysis area. Transect A is shown on **Exhibit 3.6**. It portrays a north to south cross-section along the west side of the analysis area. Transect B is shown on **Exhibit 3.7**, and portrays a north to south cross-section along the east side of the analysis area.

Exhibit 3.4 – Physiography

Exhibit 3.5 – Surficial Geology

Exhibit 3.6 – North-South Cross-Section along Transect A

Exhibit 3.7 – North-South Cross-Section along Transect B

The transects depict the extensive till units overlying bedrock throughout most of the analysis area. The following sections describe the geology of the area of investigation in terms of bedrock and surficial geology.

3.3.3.1 Bedrock Geology

Regionally, the bedrock is comprised of nearly flat lying Paleozoic (Devonian and Silurian) limestones, dolostones, and shales underlying the overburden sediments throughout the analysis area. Water well information data in the analysis area was used to interpret the position of the bedrock surface. Bedrock is encountered in most of the wells at a depth of about 50 - 80 m. Although nearly flat, there is a regional slope (<0.2%) of the bedrock surface to the south, dropping from 325 mASL to 295 mASL. No exposed bedrock was encountered across the analysis area.

3.3.3.2 Surficial Geology

Above the bedrock are unconsolidated Quaternary age soil/sediments of varying depths, deposited during a complex sequence of glacial advances and retreats that have occurred over the past million years. The most common materials resulting from these glaciations are till, surficial sand and gravel outwash, ice-contact deposits, and glaciolacustrine sediments deposited within glacial lakes. The lateral distribution of surficial soils is shown on **Exhibit 3.5**. The distribution and thickness of overburden is shown on **Exhibits 3.6** and **3.7**. The term 'overburden' is used to group the unconsolidated soil deposits lying on the competent bedrock. Within most areas, the thickness of overburden materials is substantial, and may be over 80 m thick.

Till is a low permeable unsorted mixture of clay, silt, sand, gravel and stones in varying proportions. It forms the major component of the overburden in the analysis area. The Gads Hill Moraine northeast of Stratford is capped by silty to sandy tills that form part of the regionally extensive Stratford Till. The Stratford Till is shown in light green on **Exhibit 3.5**. This till occurs at the surface over much of the western part of the analysis area. It underlies the younger till (silty clay till) north of Shakespeare and east of the analysis area. The Easthope Kame Moraine north of Shakespeare is the topographic high point of the area and is also capped by the silt to clayey till. Sometimes sandy ice-contact deposits occur between the till sheets. The core sediment of the moraine is composed of sand and gravel materials. To the east of the end moraines, the till surface drops down to the Nith River, which lies in an area filled with outwash sand and gravel. In places, till contains isolated lenses and thin layers of sand, silty sand and gravely sand which serve as a shallow overburden aquifer for local residential water supply.

The eskers and kames are illustrated on **Exhibit 3.5** as ice-contact stratified and glaciofluvial deposits (orange and pale orange colour). Eskers are sand and gravel deposits that are formed from meltwater channels within or below a glacier. Readily identifiable eskers trend northwest-southeast, and are found along the Nith River basin. Kames are ice-contact deposits that are typically laid down at the front of melting glaciers. The most well developed kames within the analysis area are Easthope Kame Moraine located north of Shakespeare, west of Nith River and the second series is located in the northeastern most corner, east of Baden.

Glaciolacustrine sediments are composed of laminated clay and silt and have been surficially deposited over silty and sandy till. These deposits are considered to be locally thin and discontinuous. On the surficial geological map, these deposits are light blue and are mainly found in the western part of the analysis area. Although thin and discontinuous, some pockets can reach up to 10 m in thickness.

Long narrow stretches of modern alluvial and organic deposits are found along the surficial rivers/streams/creek, coloured brown on **Exhibit 3.5**. These materials are relatively thin and overlay the till surface.

Of interest to this study, which will be dealing with the near surface overburden, is the presence of a desiccated soil layer at surface called the weathered zone. Typically in Ontario the upper 3 to 5 m of the overburden is subject to significant weathering mechanisms such as freeze-thaw cycles, thermal fluctuations, geochemical dissolution of some minerals by fresh rainwater, compaction and disruption, and post glacial stress release. The net result is a slightly enhanced permeability created by more loose soils and preferential pathways such as fractures in more clayey soils.

3.3.4 Hydrogeology

Groundwater within the analysis area supports vegetation, animals, and humans. People living in the rural areas obtain their drinking water from wells, and numerous industries rely on groundwater for commercial and industrial use. Aquifers supply farmers with water for irrigation and to develop their products for commercial distribution. Aquatic habitat, in both streams and wetlands, is dependent on specific groundwater conditions. Certain fish species require a specific thermal regime (see Section 3.1.2), which may be influenced by groundwater upwelling, and wetland vegetation can be highly sensitive to changes in groundwater quality.

The analysis area includes regionally important groundwater recharge areas as well as discharge areas commonly associated with wetlands, rivers, and streams. Hydrogeologically sensitive areas are identified on the basis of surficial geology, groundwater recharge and discharge areas, and the locations of water wells.

3.3.4.1 Water Supply Aquifers

Due to the heterogeneity of overburden deposits, it is difficult to characterize a single regional overburden aquifer. However, multiple discontinuous aquifers of varying lateral extent exist throughout the analysis area. Unconfined systems, such as the surficial sand and gravel deposits to the northeast, can provide sufficient yield for private and municipal water supply wells. In contrast, confined or semi-confined systems within silty material can supply only enough for a single household. Within the analysis area, over 60% of drilled wells are completed in bedrock, indicating that the bedrock is an important regional aquifer. Within the bedrock, aquifers exist at specific depths where the rock is characterized by a well developed network of fractures. Bedrock aquifers are generally of large lateral extent, and provide sufficient yield for the municipal water supply.

3.3.4.2 Recharge and Discharge Areas

Most of the Perth County, which covers a major part of the analysis area, is considered a bedrock recharge area (Waterloo Hydrogeologic, 2003). However, regionally significant recharge occurs through the surficial sand and gravel deposits in the northwest reaches, as well as in area of thin drift over bedrock. The Easthope and Gads-Hill Moraine are also recharge areas, although the low permeability capped soils limit the amount of recharge. Recharge also occurs in areas of lacustrine or outwash sands overlying the low permeability tills. Generally, the surficial sand accepts significant recharge and acts as a storage reservoir feeding the downward leakage through the silt and clay below. Where creeks cut into these sediments, there is lateral flow and some local discharge occurs from these horizontally layered deposits.

Groundwater discharge areas are predominantly limited to wetlands and river and stream valleys. This is expected since in many of these areas groundwater is providing baseflow to these water bodies (Waterloo Hydrogeologic, 2003). Local variations to this pattern occur along the hummocky crest of the moraine, eskers, and kame areas. Here, the presence of topographical depressions lined with low-permeability material creates the necessary conditions for perched water tables, which give rise to numerous wetlands, streams and isolated ponds. These features receive only limited groundwater discharge on a seasonal basis.

3.3.4.3 Groundwater Flow

Groundwater flow directions are important with respect to the capture areas for municipal wells, and for the supply to local wells, wetlands and streams. Similar to much of Ontario, most of this area is a recharge area, with a strong downward component of groundwater flow to the bedrock aquifers below. Groundwater flow in the bedrock is predominantly lateral towards regional discharge zones such as the Avon, Thames and Nith Rivers. The *Perth County Groundwater Management Study* (Waterloo Hydrogeologic, 2003), which covers part of the analysis area, identified regional groundwater flow in bedrock from northeast (415 mASL) to southwest (220 mASL). A bedrock groundwater divide occurs near the Easthope Moraine along a line running north of Shakespeare towards Gads Hill (**Exhibit 3.4**). This groundwater high separates flow in the bedrock towards the Nith River watershed in the east and Avon River watershed in the south.

Groundwater flow patterns are more complex in the overburden. The surficial till and fine grained lacustrine sediments covering most of the analysis area inhibit rapid groundwater movement. Under this condition, groundwater flow in most areas will be downward through the low permeability sediments. The groundwater table typically is a subtle reflection of the topographic surface, providing some lateral hydraulic gradient. Where the water table lies in the upper more weathered zone (typically in the upper 3 to 5 m) of the soil, groundwater will flow slowly in a lateral direction. Groundwater flow rates are not great in this respect as these soils are usually of low permeability. Where more permeable sand lenses exist, they will conduct groundwater laterally, provided there is an outlet (e.g., a pumping well or watercourse). This also happens in the horizontally layered fine-grained glaciolacustrine deposits in the western part of the analysis area, as previously described.

3.3.4.4 Water Wells

Examination of the water well database reveals a total of 2,718 reliably located wells on record within the analysis area (MOE, 2006). Of these, 1,090 are screened in the overburden and 1,628 are screened in bedrock. Of the 1,090 overburden wells, 152 are dug wells, screened mainly within the shallow overburden units of till. Dug wells are typically of large diameter, drilled in low permeability soils, and rely on the well storage to provide enough water for single family use.

Of the 1,628 bedrock wells, 1,408 are finished in the upper 30 m of the bedrock surface. This is because the upper bedrock layers have usually undergone the most physical weathering and show evidence of significant vertical joints and fractures, often enhanced by millennia of dissolution. The remainder are found at greater depths. **Exhibit 3.5** shows that most bedrock wells are in confined aquifers, protected by low permeability overburden aquitards. Where there is only thin drift, such as in eskers, kames and moraine areas, the number of bedrock wells are lower as the bedrock aquifers respond as unconfined systems and are not as well protected.

A total of 42 municipal and three communal supply wells operate within or around the analysis area. Wells operate on a continuous or intermittent basis depending on seasonal demand. Of these wells, 19 are located in the eastern part near New Hamburg, Philipsburg, Baden and St. Agatha area, and 26 wells in the western part surrounding the Stratford area. All of the municipal wells throughout the Perth County pump water from the bedrock (Waterloo Hydrogeologic, 2003). Some municipal wells that are located in Kitchener-Waterloo in the northeast part (eskers and kame areas) are drilled in overburden. As shown in **Exhibit 3.5**, capture zones and WHPAs have been mapped for some selected wells. Wells outside the analysis area have been included in this analysis because their WHPAs extend into the study domain.

3.4 Surface Water

The analysis area is divided by the Grand River watershed and the Thames River watershed. Watercourses on the west side of the analysis area flow southwest to the Thames River while watercourses on the east side of the analysis area flow southeast toward the Grand River.

3.4.1 Grand River Watershed

3.4.1.1 Nith River

The Nith River flows primarily through lands that are under heavy agricultural use and are extensively drained. Some gravel deposits provide groundwater discharge, but the system through the analysis area show evidence of poor water quality and sedimentation.

3.4.1.2 Horner Creek

Horner Creek courses through an area that is heavily drained for agricultural purposes, however some localized deposits of sand and gravel are present that contribute small amounts to baseflow.

3.4.1.3 Upper Grand River

This area is primarily a headwaters area and exhibits groundwater discharge that generates substantial baseflow.

3.4.2 Thames River Watershed

3.4.2.1 Avon River

Land use in this area is mainly agriculture, with tile drainage present. Majority of this watercourse has been altered (UTRCA, 2007).

3.4.2.2 Trout Creek

Trout Creek traverses through lands that are mainly agriculture. Approximately half the area is artificially drained.

3.4.2.3 Black Creek

This watercourse travels through mainly agricultural lands. The majority of the area is artificially

drained.

3.4.2.4 Whirl Creek

Whirl Creek is located in an area that is predominantly agriculture, with the majority of the area being artificially drained. Nearly the entire creek has been channelized.

3.4.2.5 North Woodstock Subwatershed

Land use in the North Woodstock subwatershed is mainly agriculture. Over half the area has retained its natural drainage system. The majority of this area has had some alterations carried out.

3.5 Air Quality

The current air quality in the analysis area can be generally characterized with air quality monitoring data from MOE and Environment Canada (EC) monitoring stations. The station closest to the analysis area is located in Kitchener (West Avenue/Homewood Avenue). Other applicable stations in the vicinity of the analysis area include Guelph (Exhibition Street/Clark Street) and London (900 Highbury Avenue) (**Exhibit 3.8**). The contaminants, summarized from these stations, include carbon monoxide (CO), nitrogen dioxide (NO_2), primary fine particulate matter (PM2.5), benzene, and 1,3-Butadiene. Data for coarse particulate matter (PM10), formaldehyde, acetaldehyde, and acrolein were not available. The contaminants shown were selected because they are directly associated with transportation emissions and are those that will be studied in the dispersion modelling at a later stage in the EA process.

Exhibits 3.9, 3.10, and **3.11** provide the mean, 90^{th} percentile, and maximum values of measured concentrations from the monitoring stations identified in **Exhibit 3.8**. These data are extracted from the MOE (2005) *Air Quality in Ontario Report* and represent conditions over the year 2005. The mean values are more representative of typical conditions, 90^{th} percentile values (value of concentration which is exceeded only 10% of the time) are more representative of credible worst-case conditions, and maximum values are more representative of rare peak events.

In the case of PM2.5, elevated levels are commonly related to regional photochemical processes. According to the MOE (2005), transboundary air pollution (mainly from United States) is one of the largest contributors to Ontario's smog events in the summer. Lake breeze convergence (from Lake Huron and Lake Erie) in the Kitchener to Stratford area can also increase PM2.5 levels under south-westerly wind conditions.

The mean and 90^{th} percentile values in **Exhibits 3.9** and **3.10** meet the provincial ambient air quality criteria (AAQC). As expected, the maximum values in **Exhibit 3.11** for PM2.5 exceed the AAQC, and the maximum values for the other contaminants meet the AAQC. It should be noted that the Kitchener monitoring station stopped monitoring CO in Year 2004, therefore Year 2003 CO concentrations from Kitchener are used in **Exhibits 3.9 - 3.11**. The current AAQC are listed in **Exhibit 3.12**.

Exhibit 3.10 includes a summary of the concentrations of the two measured transportation related air toxic chemical species, benzene and 1,3-butadiene, which belong to the broader group called volatile organic compounds (VOCs). Since VOCs are difficult to measure, there are only a few monitoring stations in Ontario that regularly measure the ambient concentrations of these contaminants. The data for these compounds in **Exhibit 3.10** are derived from the *National Air Pollution Surveillance Network Annual Data Summary for 2004* (Environment Canada, 2006). Acrolein and acetaldehyde are two other transportation related VOC compounds of interest but were not available in the analysis area.

Exhibit 3.8
Air Quality Monitoring Stations

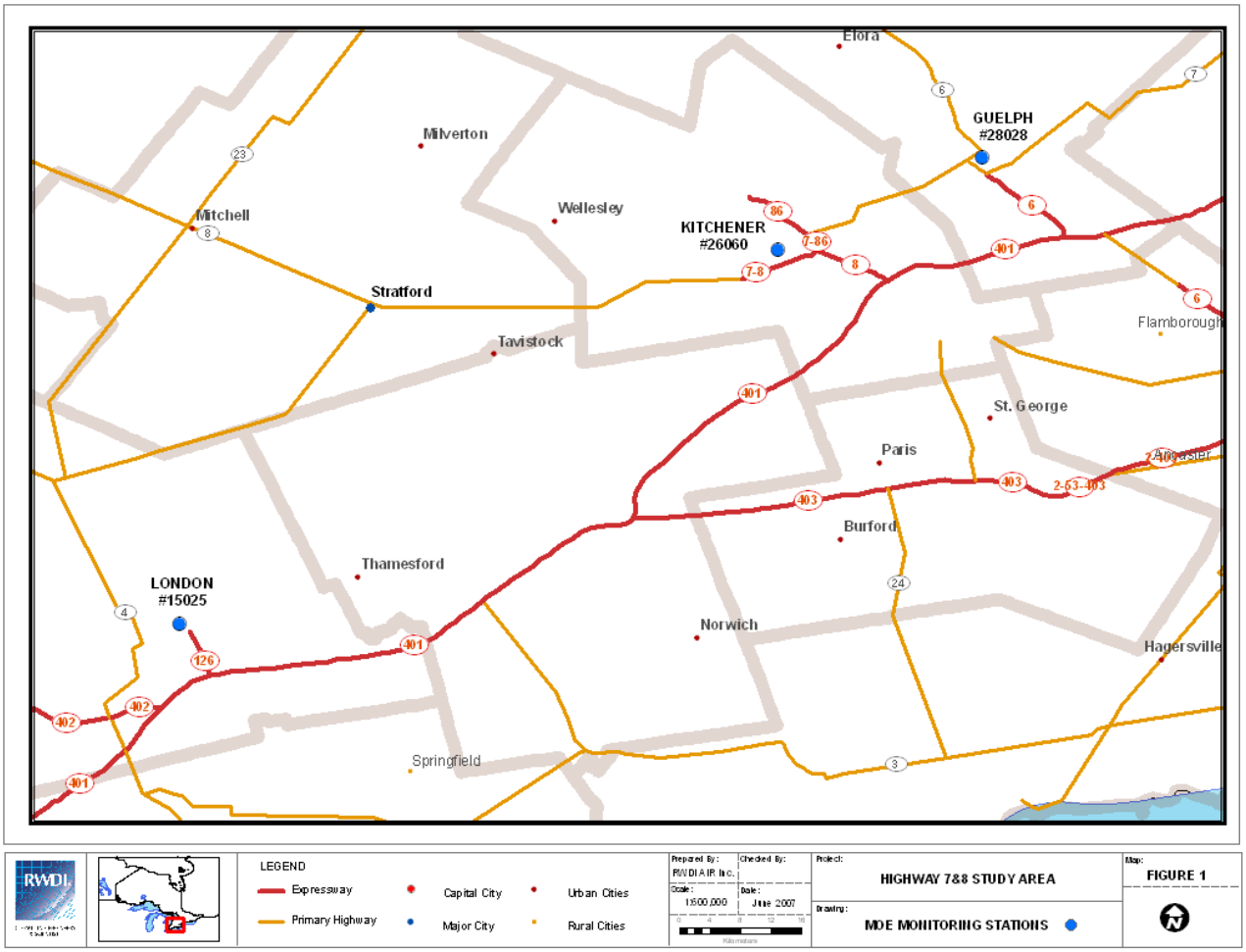


Exhibit 3.9
Mean Value of Concentrations of Transportation Related Contaminants for 2005

Contaminant	Averaging Period	Units*	MOE Station		
			Kitchener (#26060)	London (#15025)	Guelph (#28028)
CO	1-hour	ppm	0.56	0.17	not available
NO_2	1-hour	ppb	12.9	14.1	not available
$PM_{2.5}$	1-hour	µg/m	9.5	11.9	8.8

*ppm, ppb, and ($\mu g/m^3$) stand for parts per million, parts per billion, and microgram per cubic metre, respectively.

Exhibit 3.10 90th Percentile of Concentrations of Transportation Related Contaminants for 2005					
Contaminant	**Averaging Period**	**Units**	**MOE Station**		
			Kitchener (#26060)	**London (#15025)**	**Guelph (#28028)**
CO	1-hour	ppm	0.82	0.32	not available
NO_2	1-hour	ppb	27	28	not available
$PM_{2.5}$	1-hour	$\mu g/m^3$	24	24	22
Benzene	24-hour	($\mu g/m^3$)	1.4	1.5	not available
1,3-Butadiene	24-hour	($\mu g/m^3$)	0.1	0.1	not available

Exhibit 3.11 Maximum Value of Concentrations of Transportation Related Contaminants for 2005					
Contaminant	**Averaging Period**	**Units**	**MOE Station**		
			Kitchener (#26060)	**London (#15025)**	**Guelph (#28028)**
CO	1-hour	ppm	3.94	2.4	not available
	8-hour	ppm	2.66	1.24	not available
NO_2	1-hour	ppb	68	69	not available
	24-hour	ppb	50	51	not available
$PM_{2.5}$	1-hour	$\mu g/m^3$	73	71	66
	24-hour	$\mu g/m^3$	48	46	46

Exhibit 3.12: Provincial Ambient Air Quality Criteria		
Contaminant	**Averaging Period**	**Current AAQC**
CO	1-hour 8-hour	30 ppm 13 ppm
NO_2	1-hour 24-hour	200 ppb 100 ppb
PM_{10}	24-hours	50 $\mu g/m^3$
$PM_{2.5}$*	24-hours	30 $\mu g/m^3$
Benzene	not available	not available
1,3-Butadiene	not available	not available
Formaldehyde	24-hours	65 $\mu g/m^3$
Acetaldehyde	24-hours	500 $\mu g/m^3$
Acrolein	not available	not available

Source: Canadian Council of Ministers of the Environment (2000); MOE (2001).
*Canada Wide Standard for $PM_{2.5}$ established for the year 2010 based on the 98th percentile ambient measurement annually averaged over three consecutive years.

3.6 Summary of Significance/Sensitivity of Natural Environmental Conditions

Both the Grand River and Thames River are significant resources in the analysis area with respect to the natural environment, including aquatic and terrestrial ecosystems, groundwater and surface water. These systems provide enormous biological species diversity, as well as drinking water, recreational activity and livelihood for the surrounding population.

The protection of water quality and quantity, flora and fauna communities, including Species at Risk, is of primary importance to this study.

3.6.1 Aquatic Resources

Coldwater streams are considered the most sensitive aquatic resource in the analysis area. Coldwater streams provide habitat for fish species that are intolerant of disturbance such as habitat fragmentation, changes in water chemistry, or changes in thermal regime. Coldwater fish species often have very specific habitat requirements including forested riparian cover, clean water quality, and baseflow sufficient to maintain flow rates and coldwater temperatures. The absence or impairment of any one of these conditions can undermine the viability of the fish populations. In particular, coldwater fish are dependant on groundwater upwellings or spring fed streams to aerate incubating eggs. Because of this need important areas of groundwater discharge, including wetlands and headwater streams, that contribute to fish habitat must be protected.

Warmwater streams are also sensitive but typically provide habitat for fish species that are more tolerant to environmental disturbance. Warmwater fish species, particularly in urbanized areas, can often withstand changes to habitat without any significant influence on the community.

Field investigations are required to confirm locations of some aquatic features as some of the map features are dated. Field investigations to record/assess fish habitat conditions in various portions of these watercourses will also be required as corridor alternatives are refined.

3.6.2 Terrestrial Resources

Exhibit 3.13 provides a summary of the key terrestrial features and land designations identified for the analysis area.

Exhibit 3.13
Summary of Key Terrestrial Features and Land Designations

Feature and/or Land Designation	Applicable Policy Documents/Policy Implications
PSW	• Protected under the PPS.
LSW	• Protected under the *Conservation Authorities Act*. • Municipal OP policies may assess impacts of development and public infrastructure projects on LSW and unevaluated wetlands.
ANSI	• Protected under the PPS.
Interior Forest Habitat	• High quality habitats with relatively minimal anthropogenic disturbance. • Potential for high incident of rare or uncommon wildlife.
Species at Risk	• Protected under the PPS, *Species at Risk Act*, and the *Endangered Species Act*.
Significant Woodlands	• Protected under PPS.
Significant Wildlife Habitat	• Protected under PPS.

The proximity to infrastructure of any of these features/land designations may affect their function. For example, reductions in surface water or groundwater contribution to wetlands would compromise the biodiversity of both wildlife and vegetation. Fragmentation of interior forest habitat would compromise

the ability of certain birds and wildlife species to carry out life processes. The removal of their habitat would lead to a reduction in abundance and biodiversity.

All of the features listed above have been identified within the analysis area. Most are protected under the PPS and other legislation, such as *GRCA Wetland Policy, Significant Wildlife Habitat Technical Guide* (OMNR, 2000) and the *Natural Heritage Reference Manual* (OMNR 1999). Others, such as interior forest habitat will be examined during field investigations to determine size, species composition and other details that will contribute to the impact assessment.

3.6.3 Hydrogeology

Three hydrogeological indicators are used to determine which areas are most sensitive to the potential impacts of highway construction and operation. They are:

1. Proximity to groundwater recharge areas;
2. Proximity to groundwater discharge areas; and
3. Proximity to water wells set in shallow, unconfined aquifers.

Recharge areas are the water source for the groundwater system. Therefore the proximity of infrastructure to such areas may affect water resources that are used by humans and/or support the natural environment. The proximity to a discharge area is also significant because they show evidence of groundwater upwelling that supports aquatic habitat. Reductions in upwelling in groundwater fed wetlands could reduce vegetation diversity by starving those species that require the most moisture. In extreme cases, disruption by human activities could cause wetlands to dry up unseasonably, and affect the hydroperiodicity of certain species. Given the reliance of so many animal species on wetland habitat, animals may be displaced or unable to survive. Similarly such disruption may redirect groundwater discharge, which could lead to flooding of low lying areas. Reduced discharge into particularly sensitive reaches of streams could also impact fish habitat and spawning grounds.

The proximity of water wells set in shallow, unconfined aquifers are significant for two reasons. First, the building of infrastructure may temporarily lower the water levels of nearby shallow wells. Nearby water wells set in the same shallow aquifer could be affected. Another long-term effect could be the permanent lowering of the water table caused by permeable bedding of buried services such as storm sewers. Second, these wells are sensitive to inadvertently introduced contaminants entering the groundwater system. Shallow dug wells relying on tile joints to allow water entry are particularly susceptible to contamination due to the short travel distance necessary to reach the aquifer, and the absence of any extensive aquitards to intercept the contaminants.

4.0 SOCIO-ECONOMIC ENVIRONMENT

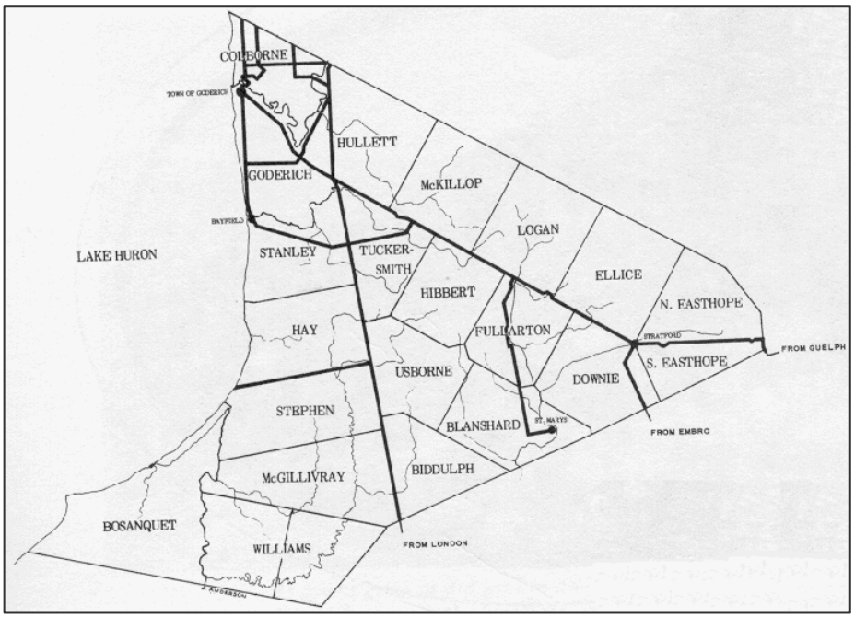
4.1 Land Use Policies, Goals, Objectives

4.1.1 First Nation Land Claims

There are no First Nation Reserves in the analysis area. The First Nations with settlements closest to the analysis area include the Chippewas of the Thames, Munsee-Delaware (near London), and the Mississaugas of the New Credit and Six Nations (near Brantford).

The analysis area is located within the Huron Tract which encompasses 1.1 million acres (**Exhibit 4.1**). The land was purchased in 1827 from the Chippewas of Chenail Ecarte, the Ausable River, and St. Clair.

Exhibit 4.1
Map of the Huron Tract



Source: Huron County (1998)

The Department of Indian and Northern Affairs Canada has indicated that there are several land claims that may be relevant to the analysis area, namely:

- Stoney Point Indian Reserve (court file #T-702-85);
- Chippewas of Kettle and Stoney Point (court files #24085/96, #13182/92, #T-863-95 and #T-3077-94); and
- Walpole Island First Nation (court file #00-CV-189329).

The protection of the natural environment (e.g., fisheries and wildlife) is important to the continued and long-term use of the lands for traditional activities.

4.1.2 Provincial Land Use Planning/Goals/Objectives

4.1.2.1 Provincial Policy Statement

With respect to the socio-economic environment, the PPS establishes the provincial interest and direction in transportation systems and planning through the following policies:

> "1.6.5.1 Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs."
>
> "1.6.5.3 Connectivity within and among transportation systems and modes should be maintained and, where possible, improved including connections that cross jurisdictional boundaries."
>
> "1.6.6.4 When planning for corridors and rights-of-way for significant transportation and infrastructure facilities, consideration will be given to the significant resources in Section 2: Wise Use and Management of Resources."
>
> "1.7.1 Long-term economic prosperity should be supported by:
> e) planning so that major facilities (such as airports, transportation/transit/rail infrastructure and corridors, intermodal facilities, sewage treatment facilities, waste management systems, oil and gas pipelines, industries and resource extraction activities) and sensitive land uses are appropriately designed, buffered and/or separated from each other to prevent adverse effects from odour, noise and other contaminants, and minimize risk to public health and safety."

The PPS also establishes the need to protect Prime Agricultural Areas, and to avoid where possible encroachment of infrastructure, including transportation, in these areas:

> "2.3.4.1 Lot creation in prime agricultural areas is discouraged and may only be permitted for:
> d) infrastructure, where the facility or corridor cannot be accommodated through the use of easements or rights-of-way."

Section 7.1 of the *Environmental Protection Requirements for Transportation Planning and Highway Design, Construction, Operation and Maintenance* report (MTO, 2006c) expands upon the previous policy:

> "Transportation planning and highway design, construction, operation and maintenance activities shall be done in a manner that avoids lot creation and lot adjustments on Prime Agricultural Lands and Prime Agricultural Areas where possible and practical (Provincial Policy Statement, s.2.3.4.1). Where avoidance is not practical then highways may be located in Prime Agricultural Lands and Prime Agricultural Areas where it has been demonstrated through an environmental assessment that:
> 1. There is no reasonable alternative location which avoids Prime Agricultural Lands and Areas;
> 2. Consideration has been given to lower priority agricultural lands (lower capability lands) within the Prime Agricultural Lands and Areas;

3. The detrimental impacts from the location, design, construction operation and maintenance of a new highway on surrounding agricultural communities, existing operations and lands are minimized to the extent feasible; and
4. Consideration has been given to Nutrient Management and Minimum Distance Separation requirements of affected farming operations (*Nutrient Management Act*, s. 6(2)).”

4.1.2.2 Growth Plan for the Greater Golden Horseshoe

Part of the analysis area falls within the GGH Plan Area. The following policies within the plan address transportation objectives:

“3.2.2 Transportation – General
1. The transportation system within the GGH will be planned and managed to –
e) provide for the safety of system users”.

“3.2.4 Moving Goods
3. The planning and design of highway corridors, and the land use designations along these corridors, will support the policies of this Plan, in particular that development is directed to settlement areas, in accordance with policy 2.2.2.1(i).”

While there are no Urban Growth Centres, as defined by the Growth Plan within the analysis area, the community of New Hamburg is depicted conceptually as a Built-Up Area. The proposed Highway 7&8 improvements will create better linkages between Urban Growth Areas such as Downtown Kitchener and Uptown Waterloo, and communities to the west.

4.1.3 Municipal Land Use Planning Policies/Goals/Objectives

4.1.3.1 Methodology

The approved OPs (with revisions as documented in the most recent office consolidations) were obtained from each of the municipalities which have portions of their respective jurisdictions within the analysis area, including:

- County of Perth;
- City of Stratford;
- Regional Municipality of Waterloo and Township of Wilmot; and
- County of Oxford.

The land uses as represented in these OPs were assembled for the analysis area and are provided in **Exhibit 4.2**. To provide greater clarity and consistency across the plans, some consolidation of land use designations have been made. Various industrial designations, for example, are represented as simply industrial. The complete land use detail of the plans has been assembled and is available as a database for future use in this study, as required.

A preliminary inventory from secondary sources of institutional and community features, such as cemeteries, schools, churches, health care facilities, and recreational/community facilities, as well as the road network, rail and pipeline corridors are illustrated in **Exhibit 4.3**.

Exhibit 4.2 – Municipal Land Use

Exhibit 4.3 – Community Facilities

The following sections provide a description of existing and planned land uses within the analysis area, as defined by each of the relevant municipal jurisdictions.

4.1.3.2 County of Perth

The central and western parts of the analysis area are located in the County of Perth, specifically within the Townships of Perth East and Perth South. The County of Perth OP was adopted by Council on December 11, 1997 and was approved by the Ministry of Municipal Affairs and Housing (MMAF) on June 12, 1998 and the Ontario Municipal Board on March 29, 1999.

There are a number of Settlement Areas consisting of villages and hamlets within the analysis area. Villages are Settlement Areas with a broad range of land uses and activities, including commercial uses, industrial operations, and institutional uses that serve the local community and surrounding rural areas. In comparison, hamlets are characterized as compact groupings of non-farm related development. While primary land uses in hamlets are single-detached residential uses, some hamlets provide very limited amounts of commercial, industrial, institutional, and recreational development.

Villages within Perth East include Shakespeare, located along Highway 7&8, Gads Hill, Sebringville, and Wartburg. Kinkora and Sebastopol are the only hamlets in the Township of Perth East. The hamlets of St. Pauls Station and Avonton are located within the Township of Perth South.

The City of Stratford is the only serviced urban area situated in the County of Perth. While the County of Perth OP does not apply to the City of Stratford, it does designate lands on the outskirts of Stratford as Urban Fringe and Infill Areas. The Urban Fringe applies to specific lands along public roadways that have existed for several decades as strip or ribbon development, including an area along Highway 7&8 to the east of Stratford. It is the intent of the OP to prevent the spread of non-farm related development beyond the limits of the Urban Fringe designation (**Exhibit 4.2**).

Infill Areas are small concentrations of residential uses that have developed in agricultural areas of the County. The OP permits a limited amount of new residential development to occur within these lands provided that it minimizes the impact on surrounding agricultural lands and farming operations. There is one small area designated as Infill Area to the west of Stratford.

The remaining lands within the analysis area are designated as agriculture.

4.1.3.3 City of Stratford

The City of Stratford is located in the western part of the analysis area. The City of Stratford OP was adopted by Stratford Council on January 25, 1993 and approved with modifications by the Minister of Municipal Affairs and Housing on November 28, 1994. Highway 7&8 is the main thoroughfare for the City approaching from the east, and is designated as an arterial road. Within the city limits, Highway 7&8 is known as Ontario Street. Land use designations adjacent to Ontario Street include Commercial, Industrial, and Residential.

Ontario Street terminates within the Downtown Core designation, which is intended to maintain the downtown as the City's centre for retail and service trade and government services, while increasing the diversity and number of residential opportunities. Areas to the west and north of the downtown core are predominantly residential. Crossing diagonally through the City is a Parks and Open Space System that includes the Avon River and Lake Victoria.

The City of Stratford Northeast Secondary Plan was prepared in April 2004 for the area to the east of Romeo Street and north of Devon Street. The predominant land use is low density residential, with a distribution of medium density uses adjacent, or with direct accessibility, to arterial and collector roads.

4.1.3.4 Region of Waterloo

The eastern part of the analysis area falls within the Region of Waterloo. The Region of Waterloo OP was approved by the MMAF on November 23, 1995 and further approved and amended on September 30, 2006. This part of the Region also falls entirely within the Township of Wilmot (refer to Section 4.1.3.5).

Within the Regional OP, New Hamburg is designated as a Township Urban Area and a Community Core Area. Township Urban Areas are designated to provide employment opportunities and accommodate the majority of the population and household growth as forecasted for the Region. Similarly, Community Core Areas are intended to be the primary focus of area municipalities, including enhanced transportation facilities, and medium and high-density developments.

To the northeast of New Hamburg are lands designated Agricultural Resources and Future Township Urban Area. These areas are anticipated to accommodate growth beyond the year 2016. The Regional OP also identifies eight Rural Settlement Areas. The remainder of the analysis area within the Region of Waterloo is designated as Agricultural Resource Area.

4.1.3.5 Township of Wilmot

The Region of Waterloo approved the Township of Wilmot OP with modifications on July 7, 2004. New Hamburg is designated as an Urban Area in the Township of Wilmot OP, as is Baden. The lands abutting Highway 7&8 to the north between New Hamburg and Baden to the east are also designated as Urban Area. The OP directs future residential, industrial and commercial growth within the Township to the Baden and New Hamburg Urban Areas (**Exhibit 4.2**).

Within the New Hamburg Urban Area, the majority of the land adjacent to Highway 7&8 is designated as Urban Residential and General Industrial, with pockets of Light Industrial, Highway Commercial, and Urban Core. Recent approval of residential development has added over 600 new units within the Urban Residential designation. As of November 2006, the Town had received applications for two additional draft plans of subdivision totalling 186 units. The Township has recently constructed a new multi-use recreational facility on 65 acres of land at the east end of New Hamburg.

To the north of New Hamburg along the Nith River are lands designated Major Recreation, which permit conservation areas, major public parks, privately owned recreation areas, appropriate heritage features, fairgrounds, golf courses, camping facilities, and recreational trailer parks. Lands adjacent to the New Hamburg Urban Area to the northeast are identified as Future Land Use Area on Map No. 5 of the OP. Section 2.3 of the OP explains that the Future Land Use Area is not to be considered as a land use designation on such lands, and that the land use designation for such properties in the OP will remain Agricultural Resource Area.

The Baden Urban Area is located north of Highway 7&8. Abutting the highway are Major Recreation, General Industrial, and Urban Residential designations. The remainder of the Urban Area is comprised primarily of lands designated Urban Residential, along with Urban Core and Light Industrial. Recent approved developments in Baden will add over 1,000 new residential units to lands within the Urban Residential designation.

There are nine rural settlement areas in the Township of Wilmot within the analysis area that provide for residential, associated commercial, institutional, recreational and open space land uses outside the Urban Areas. The Rural Settlement Areas are listed below:

- Lisbon;
- St. Agatha;
- Phillipburg;
- Foxboro Green;
- Petersburg;
- Luxemburg;
- Shingletown;
- Wilmot Centre; and
- Haysville.

The remainder of lands within the Township are designated as Agricultural Resource Areas, which permits farming, small-scale on-farm business activities, farm related non-residential uses, mineral extraction, and forestry as the primary activities.

4.1.3.6 County of Oxford

The County of Oxford comprises a small part of the analysis area to the southeast. The County's OP was adopted by Council on December 13, 1995, and was approved by the MMAF on August 20, 1996.

Two of Oxford's eight area municipalities fall within the analysis area: the Township of East Zorra-Tavistock; and the Township of Blandford-Blenheim (see **Exhibit 4.2**). Within the Township of East Zorra-Tavistock, Tavistock is designated as a Serviced Village. Serviced Villages permit a full range of land uses. Tavistock is predominantly designated Residential, with lands to the west and the south designated Industrial. At the centre of Tavistock is the Village Core designation, which represents areas that have historically functioned as a downtown pedestrian shopping district and are intended to be the most intensive and dominant business area within the settlement.

All remaining areas in East Zorra-Tavistock are designated as Agricultural Reserve.

Within the Township of Blandford-Blenheim is Plattsville, a Serviced Village at the southeastern edge of the analysis area. Like Tavistock, it is predominantly Residential and contains a Village Core. Much of the remaining lands are designated Open Space, although two small Industrial designations lie alongside the village core. Similar to East Zorra-Tavistock, the remaining areas within Blandford-Blenheim are designated as Agricultural Reserve and Open Space. There are no areas designated for Future Urban Growth within the analysis area.

4.2 Land Use/Community

The focus of the land use investigation at this phase of the study was to assemble readily available secondary source land use information from the municipal jurisdictions within the study analysis area. This includes:

- Existing population within analysis area;
- Existing and planned land uses;

- Locations and characteristics of tourist related facilities/features;
- Location of municipal services, including water supply plants, water pollution control plants, and waste management facilities;
- Location of recreational and community features/resource use;
- Location of educational facilities;
- Location of health and safety facilities and services; and
- Location of aggregate and mineral resources.

4.2.1 First Nation Reserves

There are no First Nation Reserves within the analysis area. However, the analysis area is located within the Huron Tract which encompasses 1.1 million acres, as described in Section 4.1.1.

4.2.2 First Nation Sacred Grounds

Given the history of the area in relation to aboriginal land uses, there is some potential for First Nation sacred grounds within the analysis area. Additional information will be sought through consultation with First Nations during the study.

4.2.3 Urban and Rural Residential

Urban and rural residential areas within the analysis area have been described in Section 4.1.3. Population data from the 2006 census for municipalities that fall into the analysis area are presented in **Exhibit 4.4**.

Exhibit 4.4
Analysis Area Municipalities: 2006 Population

Municipality	2006 Population (persons)
Perth County	
Township of Perth East	12,041
Township of Perth South	4,132
City of Stratford	30,461
Subtotal - Perth County	*46,634*
Region of Waterloo	
Township of Wilmot	***17,097***
Oxford County	
Township of East Zorra-Tavistock	7,350
Township of Blandford Blenheim	7,149
Subtotal - Oxford County	*14,499*
Total	**78,230**

Source: Statistics Canada (2007)

4.2.4 Commercial/Industrial

Within the City of Stratford, commercial uses are located primarily along Ontario Street, with additional pockets along Downie Street, Lorne Avenue East, Erie Street north of Lorne Avenue West, and Highway 8. Industrial uses in Stratford are centered around Romeo Street South and Erie Street south of Lorne Avenue West. In the New Hamburg and Baden Urban Areas, industrial uses are located adjacent to Highway 7&8 and extend as far north as the railway tracks. Shakespeare also has a cluster of several businesses (mostly tourist-oriented) on the existing Highway 7&8.

There are no known commercial and industrial uses that are not agriculture related outside of these areas. This information will be confirmed and updated during the Business Impact Assessment for the Highway 7&8 Transportation Corridor Planning and Class EA Study.

4.2.5 Tourist Areas and Attractions

4.2.5.1 County of Perth

Within the County of Perth, and the entire analysis area, the Stratford Festival is the premier destination for tourists. The Festival is North America's largest classical repertory theatre and attracts audiences of more than 600,000 each year from across Ontario and the bordering States. It is reported that the Festival generates more than $170 million for the Stratford economy (Stratford Festival, 2007). Plays are shown at four theatres in the City: Festival Theatre; Avon Theatre; Tom Patterson Theatre; and the Studio Theatre.

Other tourist attractions in Stratford include the City's extensive park lands along the Avon River, part of which plays host to Art in the Park, the Stratford-Perth Museum at 270 Water Street, and The Fairgrounds in Stratford, which hosts the Stratford Farmers Market every Saturday, along with a fall fair and a rodeo in September. The Stratford Summer Music Festival, located at numerous venues in the City, takes place over a four-week period in late summer. On the outskirts of Stratford is the Brocksden County School Museum at 2719 Perth Line 37 (**Exhibit 4.3**).

Many visitors to the Stratford Festival travel through Shakespeare on their way to Stratford and visit the village's collection of antique stores and other gift shops. The Fryfogel Inn is also a tourist destination.

4.2.5.2 Region of Waterloo

There are several tourist attractions in this part of the Region including Castle Kilbride in Baden (a National Historic Site) and the 19th Century home of James Livingston, Canada's Flax Mill King. In New Hamburg, the Heritage Water Wheel on the Nith River is distinguished as the largest operating waterwheel in North America. New Hamburg is also known for its Fall Fair, which features a demo derby and a children's carnival.

4.2.5.3 County of Oxford

No tourist attractions in the County were identified within the analysis area.

4.2.6 Community Facilities/Institutions

4.2.6.1 County of Perth

There are four community centres in the analysis area:

- Kiwanis Community Centre, located at 111 Lakeside Drive, Stratford;
- Community Centre located on Galt Street in the Hamlet of Shakespeare;
- Sebringville Community Centre, located on Huron Road, just northwest of Stratford; and
- North Easthope Community Centre, located at 2198 Line 40, just north of Shakespeare.

Public library service in Perth County is provided by two libraries, the Perth County Library and the Stratford Public Library. Numerous churches are located in this area, and cemeteries include the Avondale Cemetery, the Lingelbach Cemetery and the Wartburg Cemetery (**Exhibit 4.3**).

The analysis area within the County of Perth is served by Avon Maitland District School Board and Huron Perth Catholic District School Board. A total of 20 schools, including 17 elementary and three secondary, are found in this portion of the analysis area. Out of the total, 15 schools are located in the City of Stratford**,** four within or in the vicinity of rural Perth East communities of Kinkora, Wartburg, Shakespeare and Amulree, and one near St. Pauls in rural Perth South. Avon Maitland District School Board also provides adult education for Perth County residents through its Centre for Employment & Learning located in Stratford.

Conestoga College, a post-secondary institution specializing in technology and advanced learning, has one campus within the analysis area located in the City of Stratford at 130 Young Street.

Perth District Health Unit provides community health services for the county residents, including health education, promotion and disease prevention**.** One of the unit's offices is located in Stratford at 653 West Gore Street.

The Stratford General Hospital, located in the City of Stratford at 46 General Hospital Drive, provides general and specialized short-term care, diagnostic, long-term treatment, emergency and outpatient services. Three local ambulances are on 24-hour call to deliver emergency care to patients. There are also a wide variety of medical clinics, nursing services, nursing homes, physiotherapy clinics and medical laboratories that act as support agencies to the hospital. Other health services available in Stratford include The Canadian Red Cross Society, The Victorian Order of Nurses, Community Care, Home Care programs, and Meals on Wheels.

4.2.6.2 Region of Waterloo

Community facilities in the Township of Wilmot include:

- Churches (in New Hamburg and St. Agatha);
- Local community centres (two in St. Agatha, one in New Hamburg and one in Haysville);
- The New Hamburg Arena;
- Wilmot Community Pool;
- The New Hamburg Municipal Building; and
- Centennial Hall in Baden.

A new multi-use recreational facility that will serve the entire population of the Township of Wilmot is located at the northeast corner of the intersection of Highway 7&8 and Nafziger Road.

Public library service in the Township of Wilmot is provided by the Waterloo Regional Library. The Waterloo Regional Library has two locations in the analysis area, the Baden Branch Library and the New Hamburg Branch Library. The Headquarters of the Waterloo Regional Library are also located in the Township of Wilmot, in Phillipsburg. The New Hamburg Toy Library is located in New Hamburg.

There are three cemeteries in the Region of Waterloo. They are Mount Hope Cemetery, Parkview Cemetery, and Waterloo Cemetery.

The Waterloo Region District School Board and Waterloo Catholic District School Board serve the analysis area within the Waterloo Region. A total of six schools, including five elementary and one secondary, are found in this portion of the analysis area. The schools are located in the following communities of the Township of Wilmot: New Hamburg (three schools); Baden (two schools); and St. Agatha (one school).

No hospitals have been identified within the analysis area in the Region of Waterloo. One nursing home, Nithview Home, is located at 200 Boullee Road, New Hamburg. The delivery of ambulance service in the Township of Wilmot is the responsibility of the Region of Waterloo Emergency Medical Services (EMS) Division of Public Health. Out of the eight ambulance stations operated by the Region of Waterloo EMS, one is located in the analysis area on 99 Foundry Street, Baden.

4.2.6.3 Oxford County

Community facilities in the Township of East Zorra-Tavistock include four churches, a Public Library, and the Tavistock and District Recreation Centre (Tavistock Arena and Memorial Hall). In the Township of Blandford Blenheim are the Plattsville Library and the Plattsville Memorial Community Arena and Pavilion.

The analysis area within Oxford County is served by Thames Valley District School Board and English Language #38 Catholic District School Board. A total of two schools (both elementary) are found in this portion of the analysis area, one in Tavistock (Township of East Zorra-Tavistock) and another one in Plattsville (Township of Blandford Blenheim). There are no post-secondary education facilities in the analysis area.

Ambulance services in the Township of East Zorra-Tavistock and the Township of Blandford-Blenheim are provided by the Oxford County Public Health Department (Oxford County Board of Health). There are no EMS stations in the analysis area. The closest stations are located in Hickson (Township of East Zorra-Tavistock) and Drumbo (Township of Blandford-Blenheim).

The Townships are served by the Woodstock General Hospital located in Woodstock, Township of Blandford-Blenheim. Three nursing homes were identified in the Village of Tavistock: Bonnie Brae Health Care Centre; PeopleCare Tavistock; and The Maples Home for Seniors.

4.2.7 Municipal Infrastructure/Public Service

4.2.7.1 County of Perth

In the analysis area within the County of Perth, municipal water supply and wastewater treatment services are provided in the City of Stratford. The Perth East population is on private wells and septic systems, with the exception of the Hamlet of Shakespeare, serviced by a municipal well water supply system. The Township of Perth East Public Works Department oversees the Shakespeare Water Supply System. In the fall of 2004, a Class EA for the village of Shakespeare wastewater services was completed and the Township has been in the process of securing funding for the project. The majority of the population of Perth South is on private wells and septic systems. However, just outside the analysis area, in the village of St. Marys, the population is serviced by a municipal well water supply system.

Waste management services in the Township of Perth East, including the Hamlets of Shakespeare, Nithburg, Sebastopol, Sebringville, Wartburg, Kinkora and Gads Hill, are provided by the Township of Perth East Public Works Department. The Public Works Department oversees curbside garbage and

recycling collection (which is contracted out to Bluewater Recycling Association) and is responsible for the operation and maintenance of two landfill sites, Ellice Landfill Site and South Easthope Landfill Site. The South Easthope Landfill Site is located in the analysis area (west of Sebastopol on Line 29), and the Ellice Landfill Site is just north of analysis area, at Line 52 and Road 126.

Waste management services in the Township of Perth South are provided by the Township of Perth South Sanitation Department. Curbside garbage and recycling collection is contracted out to Bluewater Recycling Association. The Department is responsible for the operation and maintenance of the Downie Ward Landfill Site, which serves the population in the analysis area and is located on Perth Road.

The City of Stratford is serviced by a municipal water supply system that derives water from groundwater resources. Water towers are located in the south end of the City in the vicinity of Walnut Street and Dufferin Street, and in the north end of the City, off Forman Avenue. The City also has its own Water Pollution Control Plant, which is located on West Gore Street, in the southwest portion of the City. The operation of the sewage treatment plant is contracted to the Ontario Clean Water Agency.

Waste management services, including curbside garbage and recycling collection, in the City of Stratford are provided by the City's Engineering and Public Works Department. The City operates its own landfill site, which accepts only garbage generated within the city boundaries. The Stratford Landfill Site is located on Romeo Street in the southeast part of the City.

Fire prevention and fire protection services in the analysis area within Perth County are provided by the Perth East Fire Department and the Stratford Fire Department. The Perth East Fire Department operates three fire stations in the Township of Perth East. Out of these stations, two are located in the analysis area, one in Sebringville and another one in Shakespeare. The third station is located outside the analysis area, in Milverton. The City of Stratford has its own Fire Department. The Stratford Fire Department operates two fire stations located on Erie Street and on McCarthy Road. The Township of Perth South does not have its own fire department and receives fire services from surrounding municipalities. The Township portion that falls into the analysis area is serviced by the Perth East Fire Department.

Police services in the analysis area within Perth County are provided by the Ontario Provincial Police and the Stratford Police Department. The Township of Perth East and the Township of Perth South receive police services from the Ontario Provincial Police. The Stratford Police Department serves the population of the City of Stratford. The Department is located in downtown Stratford on George Street.

4.2.7.2 Region of Waterloo

In the Township of Wilmot portion of the analysis area**,** municipal water supply services are provided to the population of New Hamburg, Baden, St. Agatha and Shingletown. The water is treated and supplied by the Region of Waterloo to the distribution system owned and operated by the Township of Wilmot and then delivered to the service areas. Wastewater services are provided to the areas of New Hamburg and Baden. The Baden/New Hamburg Waste Water Treatment Plant is located just south of New Hamburg, at Tye Road and Concession Road. The rest of the population is on private wells and septic systems.

Waste management services in the Township of Wilmot are provided by the Waste Management Division of the Region of Waterloo. This division provides collection, recycling and waste reduction programs and operates the Regional and rural solid waste disposal facilities. There are no waste disposal facilities in the analysis area portion of the Township of Wilmot. The closest facilities include the Wilmot Waste Transfer Station (located north of New Dundee) and the Waterloo Waste Management Centre (located in the City of Waterloo east of the Wilmot Township boundary).

The analysis area within the Region of Waterloo is served by the Township of Wilmot Fire Department. Out of the three Fire Stations operated by the department, two are located in the analysis area, in the areas of Baden and New Hamburg. The third station is located outside the analysis area, in New Dundee. The Waterloo Regional Police District includes the cities of Kitchener, Cambridge, and Waterloo, and the townships of Woolwich, Wilmot, Wellesley and North Dumfries. The Waterloo Regional Police Service has one substation (Division 1A) that is located in New Hamburg and serves the entire Township of Wilmot.

4.2.7.3 Oxford County

Two thirds of the County residents are on municipal water systems and the rest are on private wells. The municipal water and sewage systems in the Township of East Zorra-Tavistock and the Township of Blandford-Blenheim are operated and maintained by the Water and Wastewater Office in the County's Department of Public Works. The County maintains well supply systems and wastewater treatment plants in Tavistock (Township of East Zorra-Tavistock) and Plattsville (Township of Blandford-Blenheim).

Waste management services became a County responsibility on January 1, 2002. All residents of Oxford County receive weekly curbside collection. Municipal staff collects recycling in Woodstock and South West Oxford. The remaining portion of the County, which includes the Township of East Zorra-Tavistock and the Township of Blandford-Blenheim, is contracted out to Waste Services Inc. All of the garbage collected goes to the County of Oxford Landfill. The landfill site is located outside the analysis area, in the Township of South-West Oxford. Within the Village of Tavistock, the sewage treatment facility is located in the southeast part of town.

Fire services in the analysis area within Oxford County are provided by the Township of East Zorra-Tavistock Fire Department and the Township of Blandford-Blenheim Fire Department. The Township of East Zorra-Tavistock Fire Department operates three fire stations. One fire station is located in the analysis area, in the Village of Tavistock. The other two stations are located outside the analysis area, one in Hickson and another one in Innerkip. The Township of Blandford-Blenheim Fire Department has four stations, one in each of the four villages of the Township.

Police services in the Township of East Zorra-Tavistock and the Township of Blandford-Blenheim are provided by the Oxford Community Police Service. One of the three police divisions operated by the Oxford Community Police Service is located in the analysis area, in Tavistock.

4.3 Noise Sensitive Areas

The main types of Noise Sensitive Areas (NSAs) in the analysis area are residential land uses. A noise assessment study will be carried out in accordance with the MTO/MOE Noise Protocol during the study. The noise assessment study will analyze existing noise conditions and compare them to future noise levels expected from Highway 7&8 under a 'do nothing' and the 'Recommended Plan' scenario.

In the vicinity of existing Highway 7&8, traffic is a major source of noise. Noise levels from the existing highway fluctuate and depend on the topography, seasonal traffic volumes, percentage of truck traffic and the frequency of Highway 7&8 users entering and exiting roads, and entrance ways along the highway.

4.4 Land Use/Resources

4.4.1 First Nations Treaty Rights and Interests and Use of Land and Resources for Traditional Purposes

First Nations land use and community interests will be confirmed during consultation as part of this study. Typically, they relate to the traditional uses (e.g., hunting and fishing) of these areas, as well as the lands themselves, as a potential resource to the communities.

As previously mentioned, the Department of Indian and Northern Affairs Canada has indicated that there are several land claims that may be relevant to the analysis area, and they consist of:

- Stoney Point Indian Reserve (court file #T-702-85);
- Chippewas of Kettle and Stoney Point (court files #24085/96, #13182/92, #T-863-95 and #T-3077-94); and
- Walpole Island First Nation (court file #00-CV-189329).

Additional information will be collected regarding the nature of these claims during this study.

4.4.2 Agriculture

The PPS sets out the following policies with respect to protection of agricultural resources:

- Prime Agricultural Areas shall be protected for long-term use for agriculture. Specialty Crop Areas shall be given the highest priority for protection followed by Classes 1, 2 and 3 soils, in this order of priority; and
- Planning authorities shall designate Specialty Crop Areas in accordance with evaluation procedures established by the Province, as amended from time to time.

The PPS policies also include the following:

> "When planning for corridors and rights-of-way for significant transportation and infrastructure facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources."

The following definitions are important to understanding the direction set out in the PPS.

- Prime Agricultural Area is where Prime Agricultural Lands predominate. This includes areas of prime agricultural lands and associated CLI Class 4 to 7 soils, and additional areas where there is a local concentration of farms which exhibit characteristics of ongoing agriculture. Prime Agricultural Areas may be identified by the Ontario Ministry of Agricultural and Food using evaluation procedures established by the Province as amended from time to time, or may also be identified through an alternative agricultural land evaluation system approved by the Province (CLI found in **Appendix D**).
- Prime Agricultural Land includes specialty crop areas and/or CLI Classes 1, 2 and 3 soils, in this order of priority for protection.
- Specialty Crop Area are areas designated using evaluation procedures established by the Province, as amended from time to time, where specialty crops such as tender fruits (peaches, cherries, and plums), grapes, other fruit crops, vegetable crops, greenhouse crops, and crops from agricultural developed organic soil lands are predominantly grown, usually resulting from:

- Soils that have suitability to produce specialty crops, or lands that are subject to special climatic conditions, or a combination of both; and/or
- A combination of farmers skilled in the production of specialty crops, and of capital investment in related facilities and services to produce, store, or process specialty crops.

Existing background data sources were reviewed to provide a summary of the physical resources features and characteristics associated with the analysis area. These published data sources include the following:

- Soil survey information for Perth County , Oxford County and the former Waterloo County;
- OPs for the upper tier municipalities in the analysis area (agricultural policies and planning CLI mapping of Soil Capability for Agriculture;
- Surficial geology mapping; and
- Aerial photography and NTS 1:50,000 topographic mapping.

Based on a review of these data, an accurate description and understanding of the distribution of prime agricultural resources in the analysis area was obtained.

As part of the second phase of study, background mapping will be collected to determine the historic distribution of agricultural land use systems and artificial tile drainage. Also, during the next stage of data collection, reconnaissance level investigations of the study area will be completed to field verify the Agricultural Resource Areas.

4.4.2.1 Specialty Crop Areas

From a provincial perspective, the main areas of the Province that are recognized as Specialty Crop Areas include the following:

- Portions of the Niagara Escarpment (including Meaford/Thornbury area and southern extent of the Regions of Niagara and City of Hamilton);
- Holland Marsh;
- Essex/Leamington area;
- Kent County;
- Portions of Prince Edward County; and
- Southern portions of Brant County and the former regions of Haldimand/Norfolk.

These areas are recognized as the primary fruit and vegetable growing regions in the Province, owing to the unique microclimate and/or soil characteristics that allow for commercial cultivation of these crops.

However, to a lesser extent, specialty crops may be grown in other portions of the Province. In an effort to identify potential specialty crop areas, the Upper Tier Official Plans (i.e., Perth County, Oxford County and Region of Waterloo) have been reviewed. No specialty crop areas were designated in municipal OPs.

Specialty crop areas have not been identified in the OPs for the municipalities in the Highway 7&8 analysis area. However, it is reasonable to anticipate that smaller areas of specialty crop production and individual specialty crop operations exist in the analysis area. The identification of these features will be an important study assignment associated with future agricultural land use and field investigations planned for future phases of the study. Site-specific information on specialty crop areas will be obtained through consultation with local landowners and farmers in the analysis area.

4.4.2.2 Prime Agricultural Areas

Much of the analysis area is designated Prime Agricultural Area. This is not an unexpected finding as this portion of southern Ontario is well regarded as the heartland for agricultural production. In the County of Perth for instance, over 90% of the County's total land area is classified as having CLI Classes 1-3 soil capability for agriculture. A similar composition occurs in the Region of Waterloo and County of Oxford, which is known as the dairy capital of Canada.

However, it is noted that portions of the analysis area are comprised of lower capability agricultural soils. These isolated pockets of lower capability land tend to be associated with river and valley systems, undulating topography associated with kames and kettles, and wetland areas.

4.4.2.3 Agricultural Soils and Soil Capability for Agriculture

Agricultural soils in the analysis area are generally found on loamy limestone till materials in areas where the melting ice has left deposits of considerable depth that have not been subsequently modified to any appreciable extent by water. Till deposits show a lack of sorting and stones (ranging in size from fine grit to large boulders) are scattered irregularly through the matrix of sand, silt, and clay in varying proportions.

Agricultural soils in Perth County are generally comprised of the following soil series:

- Huron clay loam – well-drained soil developed on heavy textured limestone till;
- Perth silt loam – imperfectly drained soil developed on heavy textured limestone till; and
- Harriston silt loam – well-drained soil developed on medium textured limestone till.

These soil series are good quality general purpose agricultural soils, with few significant constraints for agricultural production. Artificial drainage is often required for the imperfectly drained soils and nutrient enhancement may be needed, depending on the type of crop planted.

In relative terms, small inclusions of lower capability soils such as the Waterloo sandy loam (well drained sandy loam associated with irregular and/or steep topography), alluvial (bottom land soils associated with watercourses) and muck (poorly drained organic soils) occur in the eastern portion of Perth County in the analysis area.

Although different soil series are encountered in the Region of Waterloo, the same general trend is found. Soils with deep beds overlying medium-textured till deposits and/or lacustrine deposits are common. On lands east of the Nith River, coarse and medium textured soils formed on outwash and lacustrine deposits are prevalent. These soils tend to be well-drained and low in inherent fertility.

The analysis area includes a small portion of the northeastern corner of the County of Oxford. The main soil series in this area is the Honeywood silt loam, a well-drained silty alluvial deposit developed over calcareous loam till. The silt loam is almost free of small stones. These soils are capable of producing a range of cereal grains, hays and pasture land but soil erosion is a concern with this soil series.

The distribution of soil capability for agriculture throughout the analysis area has been mapped on **Exhibit 4.5**

Exhibit 4.5 – Agricultural Soil

4.4.3 Parks and Recreational Areas

No provincial parks or conservation areas were identified within the analysis area. The County of Perth OP identifies recreational uses east of Perth Road 107 between Highway 7&8 and Perth 43 Line. Recreational features in the County include the Thistledown Equestrian Centre, located at 2547 Perth Line 43 in Shakespeare, the Stratford Country Club, the Stratford Municipal Golf Course, and the Little Lakes Golf Centre. Within the City of Stratford, approximately 115 acres of formal parkland and nearly 60 acres of natural area are present. Community parks in the New Hamburg area include Fountain Park and WJ Scott Park. MTO provides a small park/picnic area on Highway 7&8 just west of Shakespeare.

Within the Region of Waterloo are a number of recreational features. The Township of Wilmot OP identifies Major Recreation Areas in Foxboro Green, to the north of Baden, and adjacent to Petersburg along Highway 7&8. The former is the Foxwood Golf Club, a 27-hole public facility.

In the County of Oxford, the Village of Tavistock contains two parks, and the Tavistock Golf Course immediately to the south. The Plattsville Community Park offers one ball diamond with field lights. There is also a community park with a baseball diamond and other recreational areas in Shakespeare.

Within the City of Stratford there are six recreational areas containing baseball diamonds:

1. Anne Hathaway Park;
2. Dufferin Park;
3. Stratford Recreational Centre;
4. Optimist Recreational Park;
5. Packham Park; and
6. Stratford Educational and Recreation Centre.

While some of these parks provide one diamond without any additional services, several areas, such as the diamonds located at Packham Park, provide services such as washroom facilities and food vendors.

4.4.4 Aggregate and Mineral Resources

The County of Perth OP identifies Mineral and Petroleum Resources and Aggregate Licenses. There are a number of licensed pits or quarries to the north of Highway 7&8 in the vicinity of Shakespeare. Another licensed pit or quarry is located to the north of Stratford.

The Region of Waterloo OP identifies Mineral Aggregate Resource Areas. Two such areas are located to the east of Baden along Highway 7&8. A large Mineral Aggregate Resource Area is located south of Highway 7&8 along the eastern edge of the analysis area, and a small area is located to the west of the Nith River.

The County of Oxford OP identifies mineral aggregate resources. There is an existing aggregate license to the southwest of Plattsville at the edge of the analysis area. To the west of this licensed area is an identified natural gas pool.

A field visit conducted in February and April of 2008 determined there are several active pits/quarries within the study area. The following locations are provided below, and are shown on **Exhibit 4.2**.

1. Perth County, Perth South Township, Perth 26 Line, northwest and northeast of Perth 111 Road.
2. Perth County, City of Stratford, Lorne Avenue East, between Downie Street and County Road 111.

3. Perth County, Perth East Township, southeast corner of County Road 109 and Perth 37 Line.
4. Perth County, Perth East Township, northeast of the Town of Shakespeare on County Road 59.
5. Perth County, northwest of the City of Stratford, east of Perth Line 36.
6. Perth County, north of the City of Stratford, west side of Mornington Road, just northwest of Vivian Street.
7. Perth County, Perth East Township, north of Highway 7&8, east of County Road 109 and southeast of Perth 37 Line.

4.5 Major Utility Corridors

4.5.1 Utilities

There are no major hydro transmission corridors or pipelines within the analysis area.

Buried gas lines exist at various locations within the highway right-of-way throughout the analysis area. Most of the gas lines exist along the 2-lane and 4-lane sections between Stratford and Waterloo Road 1. Within the section of Highway 7&8 holding the Class II staged freeway/expressway, in the New Hamburg area, Union Gas has limited presence.

Rogers has a Fiber Optics Transport System within the corridor between Stratford and Waterloo Road 1. This plant is both overhead and buried. Although there are no lines within the corridor between Waterloo Road 1 and Waterloo Road 51, there are various locations where it crosses the highway.

The presence of utilities along the Class II expressway/freeway corridor is limited. Kitchener-Wilmot Hydro do have overhead transmission lines crossing Highway 7&8 at various locations. There is also an overhead line that parallels the highway on the south side between Waterloo Road 5 and the former intersection at Waterloo Road 6.

4.5.2 Railways

The Goderich-Exeter Railway corridor runs parallel to Highway 7&8 from Stratford easterly to Kitchener. The railway is generally located 400 m to the 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 eight to ten trains per day. The volume of rail traffic consists of both freight and passenger trains, travelling from destinations such as Sarnia and Chicago (from the west), and Toronto (from the east). Via Rail and Amtrack use this track for their passenger service.

4.6 Contaminated Property and Waste Management

4.6.1 Methodology

A preliminary environmental review of the analysis area was conducted to determine the presence of any actual and/or potential environmental issues associated with contaminated lands. The review consisted of a desktop survey that included the following secondary source information:

- Orthophotography for a 424 km^2 area of the central part of the analysis area;
- Historical aerial photographs from 1966 (central and western portions of analysis area) and 1971 (northeastern portion) (National Air Photo Library, 1966; 1971);

- *Preliminary Environmental Review of Contaminated Property and Waste Management, Secondary Source Group4 Water Investigation Highway 7 and 8 from New Hamburg to Stratford, Ontario*, (URS Canada Inc, 2006);
- Ecolog ERIS (2008) report ; and
- Electronic city directories.

The Ecolog ERIS search area, as shown on **Exhibit 4.6**, was an elliptical area centered on the Village of Shakespeare, with an area of approximately 300 km^2 overlying the central part of the analysis area. The Ecolog ERIS report included a search of the following databases for this area:

Exhibit 4.6 – Potential Contaminant

- Anderson's Waste Disposal Sites;
- Automobile Wrecking & Supplies;
- Chemical Register;
- Coal Gasification Plants;
- Compliance and Convictions;
- Occurrence Reporting Information System;
- Private Fuel Storage Tanks;
- Ontario Regulation 347 Waste Receivers Summary; and
- Waste Disposal Site Inventory.

Mappable records were found for all datasets excluding Coal Gasification Plants. Records indicated that one such facility was formerly located in Stratford; however, no location information for this facility was provided in the Ecolog ERIS databases.

Based on the secondary source investigations including use of electronic city directories, and aerial photographs, the following land uses were identified. General locations for the following features are shown on **Exhibit 4.6**.

4.6.2 Waste Disposal Sites

Waste disposal site areas are delineated areas of suspected existing and former waste disposal sites. The Anderson's Waste Disposal Site Inventory provides estimated positions of former waste disposal sites from 1860 to present that may be missing from the Ontario MOE Waste Disposal Site Inventory. The database also identifies certain auto wreckers and scrap yards. A total of 11 records were found in the Ecolog ERIS survey area.

- Level of Environmental Concern: High
- Data sources: Ecolog ERIS
- Years: 1860-present
- Spatial Accuracy: Various Methods (moderate) verified with orthophotography where possible (high).

The Provincial Waste Disposal Sites database is based on the Ontario Ministry of Environment, Waste Management Branch inventory of known existing and former waste disposal sites in the Province of Ontario. A total of four records were found in the analysis area.

- Level of Environmental Concern: High
- Data sources: Ecolog ERIS
- Years: 1970-2002
- Spatial Accuracy: Lot and Concession (low) verified with orthophotography where possible (high).

A total of eight waste disposal site areas were identified in the orthophotography coverage area, ranging from 0.25 - 5 ha.

- Level of Environmental Concern: High
- Data sources: Aerial Photographs
- Years: Aerial photos from 1966, 1971, 2006
- Spatial Accuracy: Archive aerial photos and orthophotography (high).

4.6.3 Automobile Fuel or Repairs

This category includes automobile service garages and gasoline service stations, which frequently use aboveground or underground storage tanks (ASTs or USTs, respectively) for petroleum storage. Approximately 90 records were found in the analysis area, of which approximately 75 were located in built-up urban areas of Stratford.

- Level of Environmental Concern: Moderate to High
- Data sources: Electronic City Directories
- Years: 2002-2005
- Spatial Accuracy: Postal Code (moderate)

4.6.4 Automobile Wrecking/Scrapyard

The information from this dataset provides known locations that are involved in the scrap metal, automobile, wrecking/recycling, and automobile parts & supplies industry. One record was found in Ecolog ERIS survey area.

- Level of Environmental Concern: High
- Data sources: Ecolog ERIS
- Years: 2002-2005
- Spatial Accuracy: Unknown (moderate) verified with orthophotography where possible (high).

In addition, a total of five areas of existing and suspected former scrap yards and auto wrecking yards were identified in the orthophotography coverage area, ranging from 1 - 3 ha.

- Level of Environmental Concern: High
- Data sources: Aerial Photographs
- Years: Aerial photos from 1966, 1971, 2006
- Spatial Accuracy: Archive aerial photos and orthophotography (high).

4.6.5 Coal Gasification Facility

The review showed the location of one former coal gasification facility identified in the Ecolog ERIS report. Although no geocoding information was provided by the Ecolog report, supplemental information from the 2006 investigation indicated that the facility was located in the vicinity of the intersection of Wellington Street and St. David Street in Stratford. No sources of information were provided to verify the location.

- Level of Environmental Concern: High
- Data sources: Ecolog ERIS/URS
- Years: all prior to data collection in 1988
- Spatial Accuracy: Unknown

4.6.6 Drycleaning Facilities

Exhibit 4.6 includes listed drycleaning facilities that may use or store solvents on-site. Five records were found in the analysis area, of which four were located in built-up urban areas of Stratford.

- Level of Environmental Concern: Moderate to High
- Data sources: Electronic City Directories
- Years: 2002-2005
- Spatial Accuracy: Postal Code (moderate)

4.6.7 MOE Spills Reporting

This database identifies approximate locations of spills and occurrences within Ontario that have been reported to the MOE. Approximately 135 records were found in the analysis area, of which approximately 115 were located in built-up urban areas of Stratford. The 2006 report indicated that 17 of these spills were of a quantity and nature to be a potential concern.

- Level of Environmental Concern: Moderate
- Data sources: Ecolog ERIS
- Years: 1988-2002
- Spatial Accuracy: MOE Municipal Address (moderate)

4.6.8 Petroleum Wells

The Oil, Gas and Salt Resource (OGSR) Library, in conjunction with the Ministry of Natural Resources, maintains the Ontario Petroleum Data System (OPDS), which is a database of existing and former petroleum wells. Information was also available from the County of Oxford. A total of thirteen records were found.

- Level of Environmental Concern: Moderate
- Data sources: OPDS and County of Oxford GIS
- Years: unknown
- Spatial Accuracy: unknown

4.6.9 Underground Storage Tanks

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks from 1989-1996. A total of 19 records were found in the analysis area, of which approximately 11 were located in built-up urban areas of Stratford.

- Level of Environmental Concern: High
- Data sources: Ecolog ERIS
- Years: 1988-2002
- Spatial Accuracy: Municipal Addresses (moderate)

In addition, the County of Oxford GIS database listed four records of registered underground storage tanks.

- Level of Environmental Concern: High

- Data sources: County of Oxford GIS
- Years: Unknown
- Spatial Accuracy: Unknown

4.6.10 MOE Registered Waste Receivers

A total of five records of registered receivers of regulated wastes, as defined by O. Reg 347 were identified by registration number, company name and address. All five records were located in built-up urban areas of Stratford.

- Level of Environmental Concern: moderate to high
- Data sources: Ecolog ERIS
- Years: 1986-2005
- Spatial Accuracy: Municipal Addresses (moderate)

4.6.11 Quarries and Aggregate Pits

Existing and suspected former aggregate extraction, some of which may use backfill materials of unknown quality are delineated in the quarries and aggregate pits database. A total of 22 areas were identified in the orthophotography coverage area, ranging in area from approximately 1 to 200 ha.

- Level of Environmental Concern: Low to Moderate
- Data sources: Aerial Photographs, MNR Ontario Base Mapping
- Years: Aerial photos from 1966, 1971, 2006, mapping 1983
- Spatial Accuracy: OBM mapping (moderate) verified by GLL with archive aerial photos and orthophotography where possible (high).

4.6.12 Heavy Industrial Land Uses

A total of four areas of suspected existing and former heavy industrial land uses were identified in the orthophotography coverage area, ranging in size from 3 - 24 ha. These areas are not shown on **Exhibit 4.6** given their area (i.e., size) relative to the overall analysis area.

- Level of Environmental Concern: High
- Data sources: Aerial Photographs
- Years: Aerial photos from 1966, 1971, 2006
- Spatial Accuracy: Archive aerial photos and orthophotography (high)

4.6.13 Light Industrial Land Uses

A total of fours areas of suspected existing light industrial land uses were identified in the orthophotography coverage area east of the urban built-up area of Stratford.

- Level of Environmental Concern: Low to moderate
- Data sources: Aerial Photographs
- Years: Aerial photos from 2006
- Spatial Accuracy: Orthophotography (high)

4.7 Landscape Composition

Landscape composition is typically described in terms of landscape features including vegetation, notable views from the highway, and views from sensitive viewer groups to the highway.

The landscape composition in most of the analysis area is dominated by rural farmland. The built-up areas are concentrated in New Hamburg on the east, Shakespeare in the middle and Stratford in the west.

Outside the built up areas, many of the rural residences are set back a distance from the existing Highway 7&8, in which case the highway does not dominate their view.

The topography is relatively flat west of Shakespeare and gently rolling towards New Hamburg and the existing Highway 7&8 is on a long tangent throughout most of the analysis area. The flat topography and long sections of straight highway make the views from the highway somewhat unremarkable.

4.8 Significance/Sensitivity of Socio-Economic Environment

At this stage of the study process, general and preliminary land use constraints have been identified. Potential displacement of existing residences, businesses or institutional uses is recognized as the highest land use constraint to corridor development. Consequently, existing developed urbanized areas pose significant land use constraints, as do developed areas of villages and hamlets, clustered rural residential development and existing community institutional features. Isolated residences, industrial development, recreational use or other special area uses are also recognized as significant land use constraints.

The next level of significance for land use impact is undeveloped, but fully serviced areas and approved Plans of Subdivision. This recognizes the investment in infrastructure and the anticipated development potential of these areas.

The identification and protection of specialty crop areas and prime agricultural lands are important in the analysis area, as supported by Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) policies regarding agriculture. As per the PPS, the following priority will be given to agricultural resource lands within the analysis area:

- Specialty crop areas;
- CLI Class 1 soils;
- CLI Class 2 soils;
- CLI Class 3 soils; and
- Other soils.

Recreational trails pose a moderate constraint to corridor development. Further investigation will be conducted to identify existing and planned trails during the study.

Areas containing significant aggregate resources also present a moderate constraint in terms of the potential disruption/displacement of an active extraction activity, as well as the need to protect identified areas containing this non-renewable resource. The resource can be extracted prior to corridor development if required. Potential adverse impacts on active aggregate business operations will be considered.

Based on the size of the analysis area and diversity of land uses noted, the potential for environmental issues related to contaminated properties has been assessed from a broad perspective only. However,

several areas with potential for environmental contamination have been identified based on this preliminary review. Further review and site inspections will be completed once the alternatives have been generated to determine if these sites are of concern and to identify other potential sites of environmental concern.

5.0 CULTURAL ENVIRONMENT

5.1 Cultural Heritage - Built Heritage and Cultural Landscapes

The main purpose of the Stage 1 Built Heritage Study is to identify recognized resources within the analysis area through the collection of listings in existing heritage inventories. A previous report covering a portion of the analysis area, *Description of Man-Made Heritage in the Environment: Preliminary Report* (Dilse, 1981), provides a detailed inventory of built heritage resources within roughly one and a half concessions north and south of Highway 7&8 from just east of Stratford to east of New Hamburg. No other equally comprehensive inventories exist for any of the constituencies within the current analysis area. This section provides a summary of the Stage 1 Built Heritage Study carried out in the analysis area.

5.1.1 Methodology

Municipal clerks, planners, and archivists in each of the jurisdictions were contacted to ascertain what kinds of heritage registers had been compiled, and to gain access to those listings. The sites on those inventories were then mapped. The structures determined to be significant in the Dilse (1981) report were also reviewed, updated, and mapped. Longitude, latitude and UTM coordinates were collected for each building or resource located in the field using a hand held Global Positioning System (GPS).

Since the main emphasis was on obtaining and contextualizing existing registers, an independent survey is not provided at this stage of the analysis. The understanding is that surveys of the present route of Highway 7&8 and of any alternate routes will occur when various transportation options have been defined. However, a considerable amount of time was spent on field investigations to:

1. Determine which listings were within the analysis area;
2. To clarify addresses and to determine mapping coordinates;
3. To photograph relevant structures; and
4. To get a sense of how essential a more comprehensive survey would be, in order to provide a valid portrayal of the extent and importance of built heritage within the analysis area.

To procure the information required for accurate mapping, municipal addresses provided in the inventories, street maps, interactive internet maps, historic atlases, and field surveys were used. The latter helped to confirm locations in the field and determine that some of the identified structures and bridges had been demolished or heavily altered since being listed on their respective inventories.

5.1.2 History of the Area

The analysis area falls within Perth, Oxford and Waterloo Counties. The historical review summarized in this section focuses on the origin and early settlement of the communities and townships within these counties. A short description of the founding of a selection of major and minor centres throughout the analysis area is also provided. This is meant to provide a summary of the general history of the area in an effort to contextualize the built heritage resources that exist within.

5.1.2.1 The Canada Company and the Huron Tract

Much of the analysis area falls within the Huron Tract (**Exhibit 4.1**). The Tract consisted of one million acres of (then) relatively uncleared land that was purchased by the Canada Company from the Crown in 1828 for three shillings and sixpence per acre. The Crown had purchased the lands from the Chippewa on

April 26, 1825 (Lee, 2004). The Canada Company was headed by John Galt, a Scot who had come to Canada in 1820 to head a committee for the Revision of the War Claims of 1812. Galt and his advisors envisioned the formation of a company empowered to purchase lands at a nominal cost and sell them through a system of deferred payment. By doing so, the company would facilitate settlement in the Region and, hopefully, earn a profit at the same time. A portion of the Company's profits were to be used for the construction and maintenance of public works (e.g., roads, bridges, and schools) (Kearsley, 1962).

Highway 7&8 once formed part of one of the earliest roads constructed by the Canada Company, first named the Goderich Road and later the Huron Road. The road was opened in 1828 and connected two major planned centres established by the Canada Company: Goderich, on the shore of Lake Huron; and Guelph. The road, which extended from Wilmot Township to Goderich, was originally a native trail and early sleigh road (Lee, 2004). It was surveyed by Deputy Provincial Surveyor John McDonald and travels the general course of modern Highway 8. The Company actively worked to promote travel between the two centres and to encourage settlement along the roadway. In so doing, they offered financial grants or assistance to individuals who would erect inns along the route, and often funded the construction of schools, and prepared town plans for communities in strategic locales. Several historic properties along Highway 7&8, and within the analysis area, were established as Canada Company projects. One of these is the Fryfogel Inn, east of Shakespeare.

5.1.2.2 Perth County

Perth County was originally part of the Huron Tract (**Exhibit 4.1**). It became a formal municipality in 1850, with a government based in Stratford (Johnston, 1902). Sebastian Fryfogel and Andrew Sebach, along with their families, are credited with being the first permanent residents of Perth County. Fryfogel erected a log cabin along the Huron Road in 1828 or 1829 where he offered meals and accommodations to travellers (McNichol, 1967).

5.1.2.2.1 Ellice Township

Ellice Township (now in the Municipality of Perth East) was named in honour of one of the director's of the Canada Company, Edward Ellice. The township was surveyed and opened for settlement in 1828 (Johnston, 1902). The first settler (and second in Perth County) was Andrew Sebach of Bavaria, who came to Canada in 1828 with a family of five and settled along the Huron Road on Lot 31, Concession I, west of Sebringville. He received a grant from the Canada Company to open a tavern for accommodating settlers and prospectors, which he opened on his lot (H. Belden & Co., 1879). The first settler to locate in the rear of the Huron Road was George Brunner in 1832. Settlement in the more remote portions of the township was slow. Several of the more prominent smaller centres to emerge included Sebringville, Kinkora, Wartsburg, and Gads Hill.

Sebringville was named for John Sebring who was responsible for building the Canada Company's mill at Stratford. After settling on the Ellice side in September 1834, Sebring constructed a saw mill a year later, followed soon after by a grist mill. The saw mill was in use until 1878 when it was torn down and replaced by John Pearson (H. Belden & Co., 1879). Sebring then went on to erect a saw and grist mill in Egmondville for the Canada Company (which was later purchased by the Van Egmond family). Many families joined Sebring in 1835 in what was then known as the Black Creek Village (DTHBC, 2002). The first store in Sebringville was established in 1842 (H. Belden & Co. 1879). Several German families established the Evangelical Association in 1840 and held regular religious services (Johnston, 1902). Sebringville prospered with the construction of the railway and by 1879 the community boasted more than 40 businesses (including hotels, a tannery, cooperage, wagon and blacksmith shops, as well as an

office of the Montreal Telegraph Company) and a population of over 400 (H. Belden & Co., 1879; DTHBC, 2002).

Gads Hill (Gadshill), at one time covered by dense swamp, was founded by Henry Ratz who built a saw mill at this location subsequent to the construction of a gravel road to Mornington (Johnston, 1902). The Town's location along a major roadway that was in proximity to Stratford led to a measure of commercial importance. By 1879, the population exceeded 100 persons and contained several steam saw, stave, and shingle mills, in addition to a number of minor industries. Daily mail was serviced through Stratford and a station of the Stratford and Huron Railway (H. Belden & Co., 1879). The first post office was opened in 1865 with W. B. Crinkley serving as postmaster (Johnston, 1902).

Richard Coulton, a school teacher who built the first building in 1857, is widely credited with being the founder of Wartburg, originally named Totness (Johnston, 1902; McNichol, 1967). Many of the settlers to the area were Lutherans. The Canada Company granted an application for the site for the Evangelical Church of St. John in 1856. It was for this reason that, in 1869, the Rev. Mr. Schaffarnock petitioned to have the name Totness changed to Wartburg, in honour of the town in Germany where Martin Luther served a ten month prison sentence. Wartburg served as the seat of government for several years (Johnston, 1902).

To the west, the community of Kinkora was settled by Irish families. In 1844, James Hearsnep, John Stock, James Keagan, the Heishons, and Crowleys formed what was called 'St. Patrick's Settlement'. William Hearsnip was appointed first postmaster when Kinkora opened its post office in 1857 (Johnston, 1902). Some of the community's earliest businessmen were Ed Brown, who operated a blacksmith shop, Joseph Stock, who owned the saw mill, and John Daly who was a cheesemaker (McNichol, 1967).

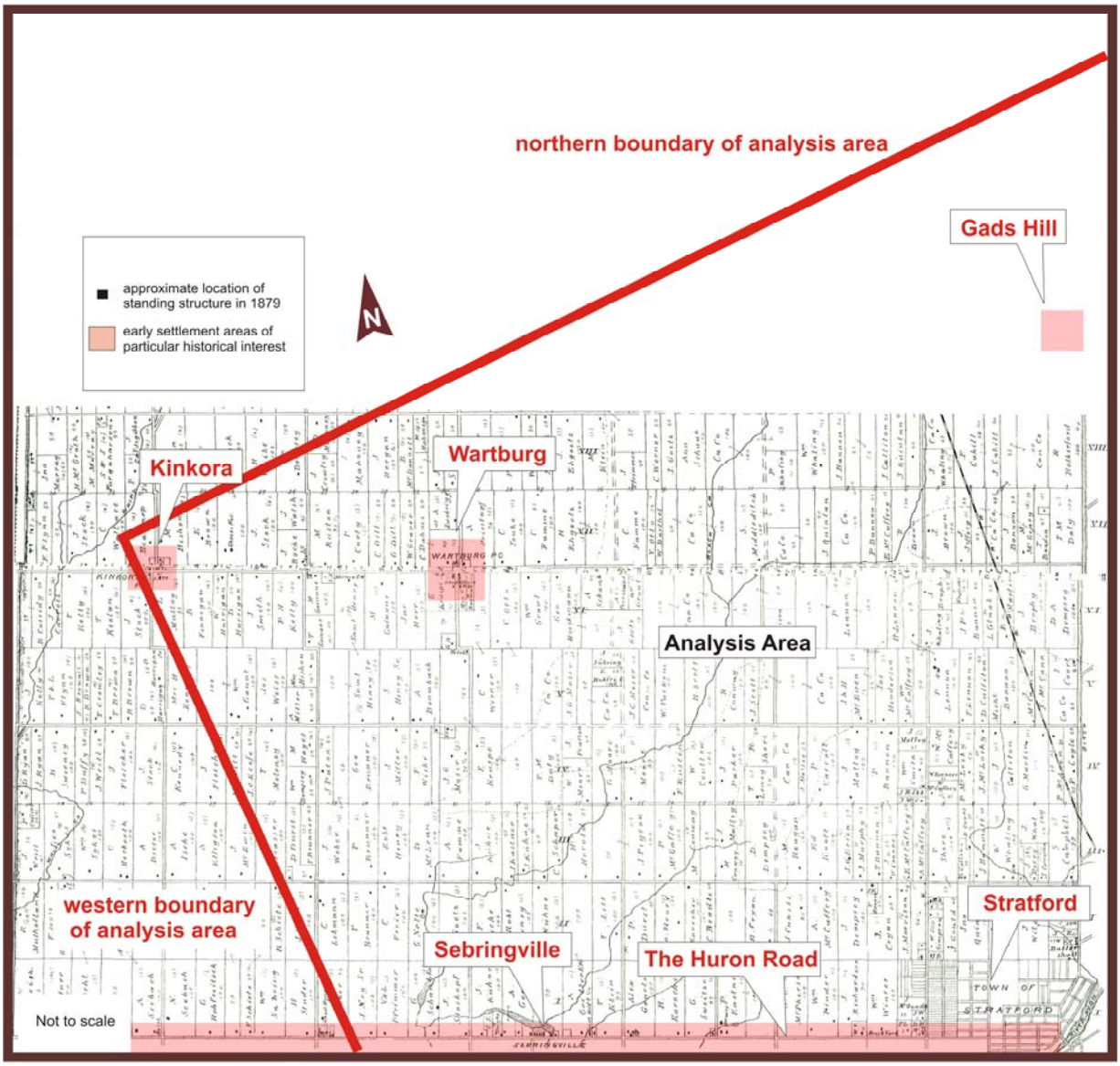
The 1879 map of Ellice Township (**Exhibit 5.1**) demonstrates that the majority of lots were settled by that time and, with the exception of a few lots within the vicinity of Black Creek and the Ellice Swamp, the concession roads were typically open. The crossroads communities of Kinkora and Wartburg appear to have contained schools and churches, while early industries (mills and brickyard) are shown along Highway 8 in Sebringville and Stratford. These small historic centres, now largely rural crossroad communities, played important roles in the early social and economic lives of Ellice Township residents. In general, the historic structures are situated adjacent to the concession roads.

5.1.2.2.2 Downie Township

The Township of Downie (now in the Municipality of Perth South) was surveyed in two parts, divided by the Stratford and St. Mary's Road (Highway 7 and 19). The northwest section was referred to as the township proper or square, while the Gore encompassed the southeast, wedged between what were known as South Easthope and Zorra townships. Survey of the township along the first concession began in January of 1829. The Gore was completed by 1835 while the township proper was finished in 1839 (DTHBC, 2002). Like other townships in the Region, Downie was named in honour of a director in the Canada Company, in this case Robert Downie (Johnston, 1902).

Although there were other settlers in the townships of Perth County, the general settlement of Downie was the first and most rapid. The population rose from just a handful in 1832 to more than 1,800 by 1844 (DTHBC, 2002). The earliest settlement coincided with the founding of 'Little Thames' or Stratford as it was to become known. Most of the settlers arrived from Germany and Britain and leased their land from the Canada Company for roughly two hundred and fifty dollars per 100 acres. Most settlers could not afford to pay such a large sum up front, so they would lease the land and make yearly payments until receiving full title and deed (DTHBC, 2002).

Exhibit 5.1
Map of Ellice Township in 1879



Source: H. Belden & Co., 1879

The railway came to Downie Township in 1857 when the Buffalo, Brantford and Goderich Railway Company constructed a line from Stratford to Goderich. That company would later go bankrupt and its assets were granted to the Buffalo and Lake Huron Railway.
The Grand Trunk Railway also opened a line in 1857, which ran from Stratford to Sarnia (DTHBC, 2002).

St. Paul's Station emerged as a prominent centre in Downie. Established as a stop on the main line of the Grand Trunk Railway and benefiting from its central location in the township, St. Paul's experienced a degree of prosperity in the mid to latter part of the 19th century (H. Belden & Co., 1879). It received its name officially in 1875 when it was granted a post office with Charles Wilson serving as first postmaster (DTHBC, 2002). A large white-brick town hall was built in 1877, which was used not only for municipal meetings, but Sunday school classes and religious services as well (H. Belden & Co., 1879).

The community of Avonton, to the northwest of St. Paul's Station, was established in 1857 by Presbyterian families. Settlers took advantage of its location on the Avon River to construct mills. Sam Inman, one of these settlers, erected a saw mill and carding mill on Lot 17, Concession VII in 1854. The first log buildings were constructed on Lots 15 and 16, Concessions VI and VII, respectively.

Later houses were built from stone brought in from St. Mary's. Archibald Shiells opened a store and in 1863 became the settlement's first postmaster (DTHBC, 2002).

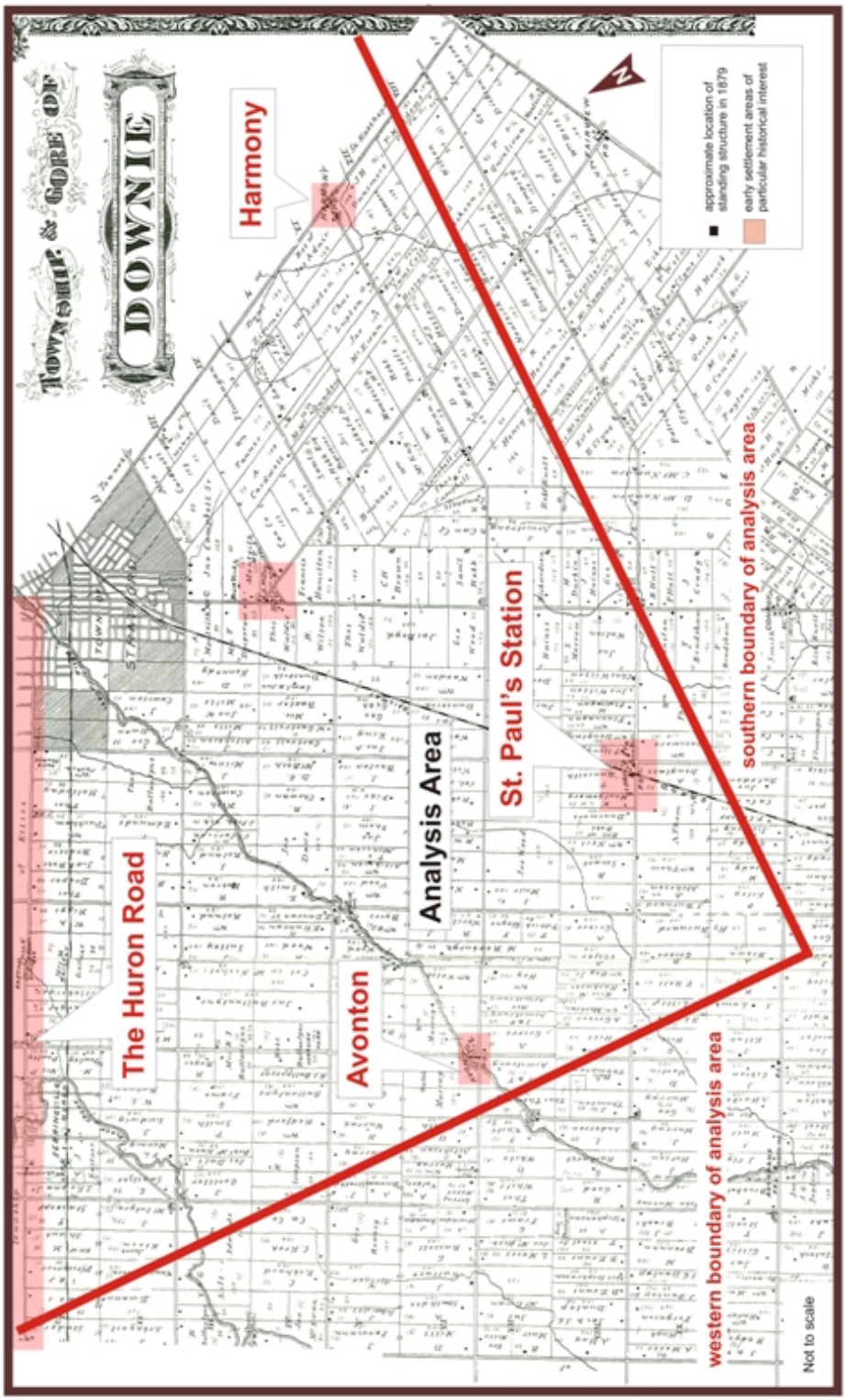
The community of Harmony came into existence when a Methodist missionary named Cleghorn lost his way while traveling from Shakespeare to West Zorra. He is said to have come upon a settler's house where he remained for some time. Services were held at the house attracting backwoodsmen with an interest in religious exercise, who formed the foundation of a small congregation known as 'Harmony'. The society continued to hold worship each week in private houses or the local school until a frame building was constructed in 1864 ministered by John S. Fisher. The church was founded on Lot 1, Concession VII (Johnston, 1902). It was replaced with a brick structure in 1874 (DTHBC, 2002). The community was provided a post office in 1867 with Edmond Corbett holding position of postmaster from that year until 1875 (DTHBC, 2002). By 1879, Harmony had within its limits an Orange Lodge, saw mill, blacksmith, wagon shop, and general store serving a population of about 75 individuals (H. Belden & Co., 1879).

The historic atlas map for Downie Township (**Exhibit 5.2**) shows that most lots were settled by 1879 and virtually all of the concession roads were open. The Grand Trunk Railway opened a line through the township in 1857, resulting in the growth of the City of Stratford and the emergence of stations like St. Paul's in the central portion of the township. The majority of historic buildings are situated adjacent to the concession roads.

5.1.2.2.3 North Easthope Township

David Bell settled on Lot 21, Concession 1 in June of 1832 and is credited as being the Township's original pioneer (H. Belden & Co., 1879). The first wave of settlement came in a group of families from Perthshire, Scotland, after whom the county was subsequently named (which is now located in the Municipality of Perth East). Another party from Perthshire arrived in 1833. Many of these families located along the 2nd and 3rd Concession lines, east of Bell's settlement (H. Belden & Co., 1879). Settlement slowed somewhat after 1834 (H. Belden & Co., 1879). The first school house in the township was built on Lot 21, Concession II although school had been previously taught in Mr. Linton's house on Lot 27, Concession I (H. Belden & Co., 1879). The school house on Lot 21 was also used for religious services and township meetings (H. Belden & Co., 1879).

Exhibit 5.2
Map of Downie Township in 1879



Source: H Belden & Co., 1879

The earliest settlement in the township emerged in proximity to the Village of Shakespeare, originally named Bell's Corners, after David Bell, its founder. The community's first post office came in 1848 and operated out of the hotel. By 1879, 415 persons made the community their home and were served by two large general stores, two groceries, three hotels, and two Canadian Express offices (Walker & Miles, 1876).

A number of smaller communities, mostly crossroads centres, emerged in the township north of Shakespeare. One of these, Amulree, contained a hotel, blacksmith shop and steam mill by 1879, in addition to a church, school, shops and a cheese factory (H. Belden & Co., 1879). Many of the community's earliest settlers were of Scottish descent (Johnston, 1902) and, because of this, the community inherited its name from a small place of the same name in Perthshire, Scotland. Lisbon, along the eastern boundary, was a small postal village settled first by Lorenz Hohl in 1854 (Wilmot Historical Committee, 1967). Hampstead, originally called Grant's Corners, was settled at least by the early 1840s when a schoolhouse was known to exist at the main intersection (H. Belden & Co., 1879). Historic maps also indicate that by the late 19th century, a cheese factory was in operation.

As with the townships previously described, the lots within North Easthope Township were almost entirely settled by 1879 (**Exhibit 5.3**) and the concession roads were open. Structures are typically shown very close to the roadways.

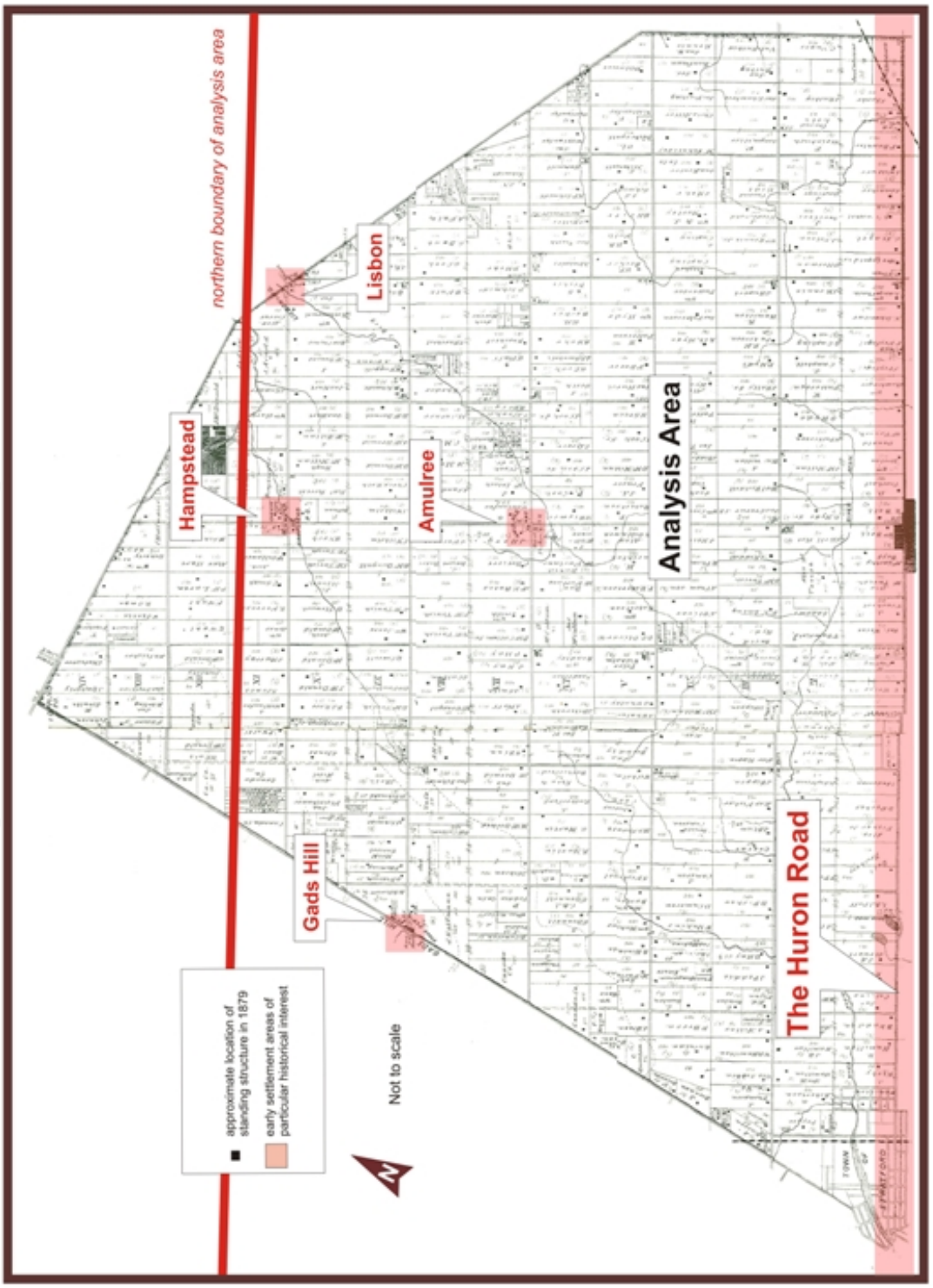
5.1.2.2.4 South Easthope Township

The former Township of South Easthope (now in the Municipality of Perth East) can lay claim to the county's first and one of its most notable settlers. Born in Berne, Switzerland, Sebastian Fryfogel immigrated to America in 1806 where he lived for 21-years before arriving in Canada in 1827. While living in Waterloo he was persuaded by Colonel Van Egmond to open a tavern on the Huron Tract where the Canada Company was offering substantial cash bonuses to persons who could keep such taverns for six months. Mr. Fryfogel moved into the tavern on Lot 14, Concession I on Christmas Day, 1829 (some reports say 1828) (H. Belden & Co., 1879). The second settler to the township was Andrew Riddell from Berwickshire, Scotland. Arriving around 1831-32 and settling less than a mile from Sebastian Fryfogel, Riddell, most notably, held all of the elective and appointed offices of the township at one time or another. Andrew Helmer who had worked in the tract since 1829 under Colonel Van Egmond, married the Colonel's daughter and settled in 1832 (H. Belden & Co., 1879).

Settlement progressed gradually and occurred mainly along Huron Road and the eastern corner of the Township. The remainder witnessed no real settlement until 1842 when Douglas MacTavish of Perthshire, Scotland and his five sons with their families arrived, occupying nearly 1,200 acres of land (H. Belden & Co., 1879). At that time there were two schools in the township: an English school on Lot 10, Concession I and a German school at Sebastapol (H. Belden & Co., 1879).

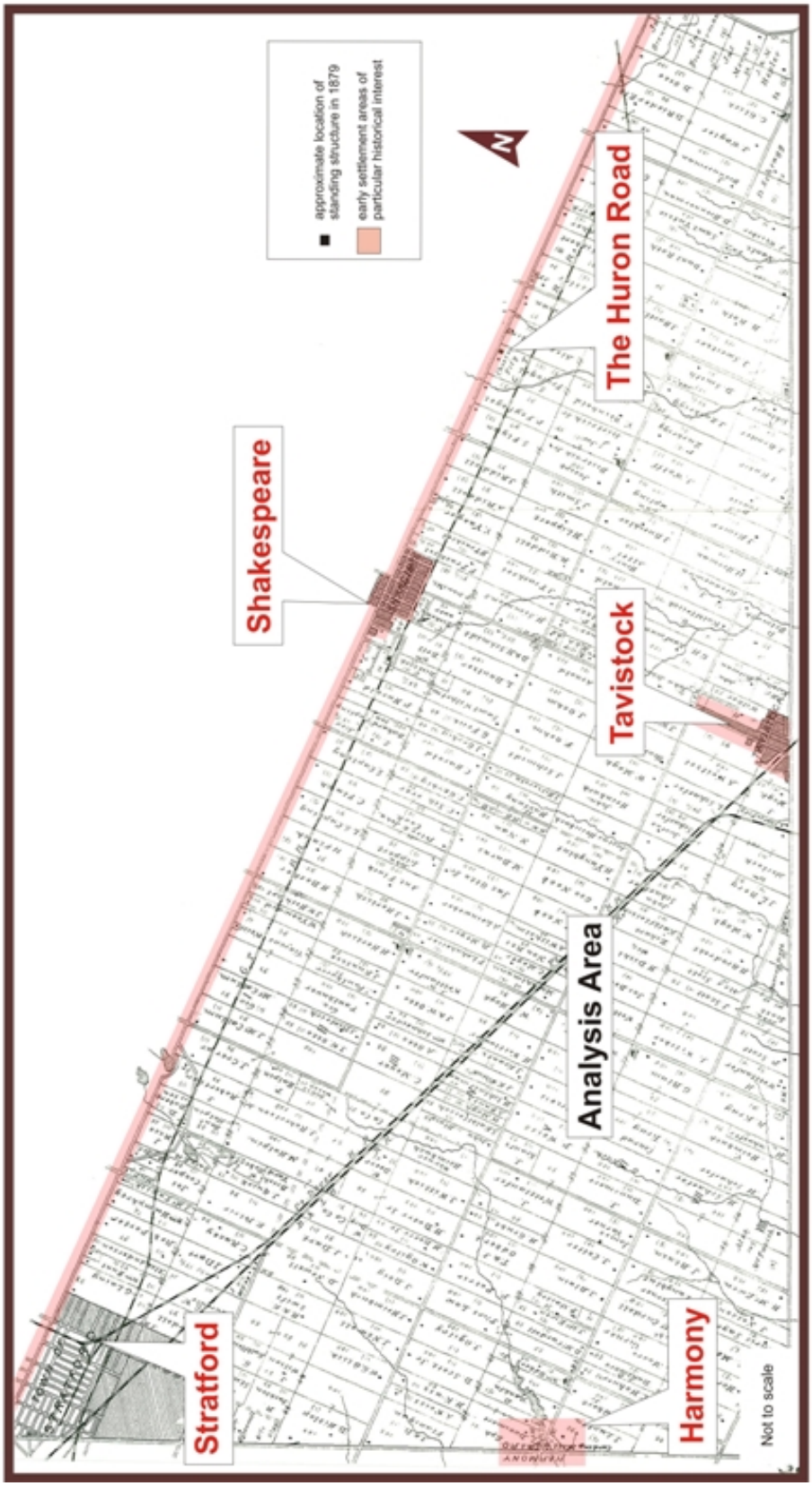
The 1879 map of South Easthope Township (**Exhibit 5.4**) illustrates structures on most lots by that time, mainly in proximity to the concession roads. Town centres are shown for the settlement areas described above.

Exhibit 5.3
Map of North Easthope Township in 1879



Source: H. Belden & Co., 1879

Exhibit 5.4
Map of South Easthope Township in 1879



Source: H Belden & Co., 1879

5.1.2.2.5 City of Stratford

By 1832, the Canada Company had surveyed enough of the Huron Tract to open it to settlement. In expectation of the increased number of settlers, a number of extra taverns and inns had been constructed along the tract for their accommodation, including one on the 'Little Thames' at the eastern limits. An Irishman named William Sargint was hired by the Company to build and keep the new tavern. English names had already been chosen for the other locations in Guelph, named for the royal family, and Goderich, for the British prime minister. The location of Sargint's inn and subsequent settlement was to be called Stratford-upon-Avon, named for the birthplace of Shakespeare. This also led to the renaming of the 'Little Thames' River to the Avon River. Sargint's inn, appropriately named 'The Shakespeare Inn', also serving as a store and used for early religious services, was destroyed by fire in 1849 (Johnston, 1902). In 1833, John Corry Wilson Daly was hired to set up a Canada Company office in Stratford in order to contract and supervise the construction and operation of a dam, grist mill, saw mill, general store, and distillery (Bart-Riedstra and Riedstra, 1999). J. J. E. Linton arrived the same year as Daly's hiring by the Company. Linton opened a private school and is credited as being the first school teacher in the county (Johnston, 1902). In 1832, a town plan was developed and laid out by Deputy Provincial Surveyor John McDonald in 1834 (Lee, 2004).

The first wave of settlement consisted mainly of settlers from the British Isles and Germany, where the Canada Company had advertised extensively. This coincided with a general increase in immigration to Canada between the years 1832 to 1837 (Bart-Riedstra and Riedstra, 1999). The second wave of settlers to the area peaked between 1842 and 1847, the latter year being significant because of the famine in parts of Europe and Ireland. By 1850, the population of Stratford numbered around 900 (Johnston, 1902). Like in others parts of the region, the Scottish immigrants were mainly from the Lowlands and Perthshire in the Highlands, while the Germans came from Hesse, Hanover, Alsace, and Bern Canton in Switzerland. Immigration continued into the 1860s, represented significantly by Germans from Eastern Europe, Mecklenburg, Prussia, and Saxony (Bart-Riedstra and Riedstra, 1999). Progress was slow during the 1830s with only a few independent businesses emerging. During that decade a foundry was built by John Sharman, and William May opened a cabinet making shop. Stratford's social institutions progressed more rapidly. A log school built in 1836 was replaced by a brick one in 1855. In 1838, St. Andrew's Presbyterian Church was organized with a frame building being constructed in 1840.

Incorporating parts of several townships, Stratford ceased to be a unified entity until Perth County was created in 1850, with Stratford serving as its capital. Upon completion of the construction of a courthouse and jail in 1853, Stratford was incorporated as a village in 1854. Stratford purchased stock in the Northern Gravel Road which opened 16 km to Mornington and brought important increased trade. Investments and improvements to several leading streets enhanced its position as a bustling village. The completion of the Grand Trunk and Buffalo and Lake Huron Railways in 1857 assured Stratford's commercial supremacy in Perth County. This was augmented with the construction of the Port Dover and Stratford and Huron Railways in 1875 (Johnston, 1902). The Grand Trunk Railway also built and operated a number of its locomotive repair shops within the town, providing abundant employment opportunities (Leitch, 1980). The movement of goods both to and from Stratford led to greater prosperity for many, which in turn led to a steadily increasing population. By 1864 the population of Stratford reached 3,600 (Johnston, 1902).

5.1.2.3 Oxford County

Oxford County was settled even before it was established as a municipality and had formal boundaries (Dawe, 1980). In 1793 it drew the attention of the Lieutenant Governor of Upper Canada, John Graves Simcoe, who was led here by native guides who showed him the way through Oxford County as they

traveled from Brantford to the Thames River and what now is Beachville (Dawe, 1980). Simcoe's surveyor Augustus Jones surveyed the district along the Thames River, where settlement would initially grow. Settlement elsewhere in the county was somewhat slower. Zorra and Nissouri Townships witnessed settlement by immigrants mainly from the highlands of Scotland, while German settlers arrived and began settling in the rear of Blandford in East and West Zorra (Walker and Miles, 1876).

5.1.2.3.1 Blandford Township

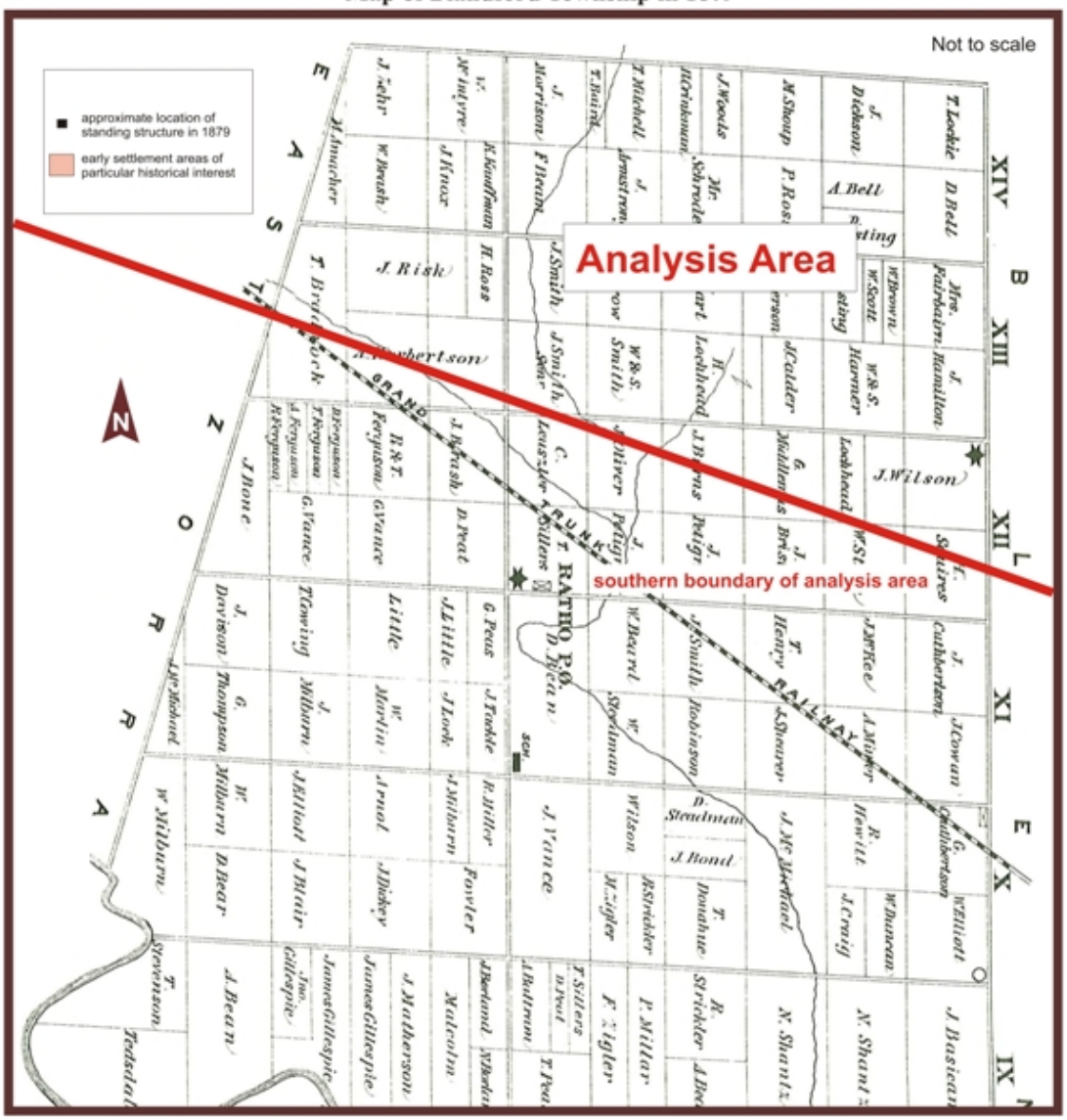
Settlement in Blandford Township (now in the Municipality of Bladford-Blenheim) was initially stalled by the fact that the government had made a decision in 1799 to withhold its land for sale, so that it could be used in the future to help finance the construction of schools throughout the province (Dawe, 1980). Into the first three decades of the 1800s, Blandford was set aside as 'School Reserves'. By 1829, the township contained an estimated 16,000 acres of school reserves, 8,000 acres in Crown and Clergy Reserves, and less than 5,000 acres were available to the government for sale (Dawe, 1980). The available lands were quickly depleted as they were granted to retired military officers in payment for their loyalty. Nonetheless, when these military men arrived on their properties in Blandford, many found there to be squatters on their lands (Dawe, 1980). For the most part, these earliest settled properties were in the southern portion of the township, in the vicinity of what would become Woodstock.

Only a small portion of Blandford falls within the analysis area. This particular portion of it was first settled by Scottish families, many of whom established homesteads in the vicinity of Ratho (to the south of the analysis area) by the mid 1800s. By the mid 1870s most of the area appears to have been settled (**Exhibit 5.5**) and accessible by opened concession roads. While structures are typically not shown on individual lots, a church is illustrated on the property of J. Wilson on the 12th Concession, along the southern analysis area boundary.

5.1.2.3.2 Blenheim Township

Plans to create Blenheim Township (now in the Municipality of Bladford-Blenheim) began in July of 1793, even before Oxford was established as a County (Dawe, 1980). Lieutenant Governor Simcoe granted Thomas Watson and Effingham Lawrence of Borden Town, New Jersey, the right to promote settlement in the township. Watson's nephew Thomas Horner would play a key role in the development of the township, establishing milling sites on Horner's Creek in 1793 (Dawe, 1980). Both Smith's Creek and Horner's Creek were popular locales for early settlement, as they provided many excellent mill sites. Watson was afforded the Township lands as repayment for his service to Simcoe when he was a prisoner in Borden Town during the Revolutionary War (Dawe, 1980). By 1794 the earliest settlers were moving into Blenheim Township, assisted by the completion of survey lines and the opening of roadways. Lieutenant Governor Simcoe ordered the survey of three concessions and a suitable site was chosen for the construction of a mill. The mill was completed in 1795 but broke down before it was in operation. A saw mill that Horner subsequently built was destroyed by fire in 1809; an inauspicious beginning for the early years of Blenheim Township (Walker and Miles, 1876).

Exhibit 5.5
Map of Blandford Township in 1879



Source: H Belden & Co., 1879

Although settlement occurred early along Horner's Creek and within the southern concessions of Blenheim, it was more delayed in the remaining portions of the Township. However, by the mid 19th century Plattsville, too, had been established as a milling centre (Dawe, 1980). By the year 1876, Plattsville was the largest and most important village in Blenheim Township with a population of nearly 500 people (Walker and Miles 1876). Situated on Nith River (formerly Smith's Creek), the community boasted two general stores, two large flouring mills, a saw mill, foundry, a large cabinet factory, as well as several mechanics of various specialties (Walker and Miles, 1876). Mr. A. Tew, a former Warden of the County, is considered to be one of the driving forces behind the commercial and economic prosperity of Plattsville (Walker and Miles, 1876).

All of the lots within the analysis area appear to have been settled by 1876 (**Exhibit 5.6**) and the concession roads were open by that time. Because the historic atlas map lacks detail, the approximate location of buildings is not known.

5.1.2.3.3 East Zorra Township

The Townships of East (now in the Municipality of East Zorra-Tavistock) and West Zorra were surveyed by Shubal Parke in 1820 and organized in 1822 by a warrant issued by Charled Ingersoll and Peter Teeple. At this time there were only 145 acres cleared in the entire area, 39 of which were cultivated (RCT, 1968). The first lot sold was on the ninth concession, along the western boundary (RCT, 1968).

Tavistock was first settled by a former Prussian soldier, Henry Eckstein, who arrived in 1848, and was responsible for the construction of the first hotel and several commercial buildings in the centre. He may have arrived via an old stage road that is reported to have existed before 1829 and connected the town to Punkeydoodles Corners, Haysville and Galt (RCT, 1968). Eckstein and other early settlers originally established homesteads in Sebastapol, a smaller centre to the north of the Tavistock town core and eventually encompassed by the ever growing village. Sebastopol once contained a number of commercial and industrial buildings, including a cider mill (RCT, 1968). Tavistock thrived with the arrival of the Buffalo and Lake Huron Branch of the Grand Trunk Railway and many of the families living in Sebastopol relocated to the railway peripheries by the mid-to-late 1800s (RCT, 1968). In 1867 Tavistock is said to have contained four general stores, two shoe shops, one harness shop, two wagon shops, two blacksmith shops, a tannery and three hotels, in addition to a steam-flouring mill, grist mill and flax mill (RCT, 1968). Caleb Caistor is said to have established a tavern on the east side of Highway 59, south of Tavistock (**Exhibit 5.7**).

By 1876 most of the lots were settled. However, the historic atlas map does not provide details regarding the location of buildings. It is likely that homesteads were erected close to the concession roads.

5.1.2.4 Waterloo County

Waterloo County history can be traced back partly to the 1795 conveyance of what was then Blocks 1, 2, and 3 of Haldimand Tract (later Dumfries, Waterloo, and Woolwich Townships) and partly to initial land grants made by the Crown to Mennonite settlers.

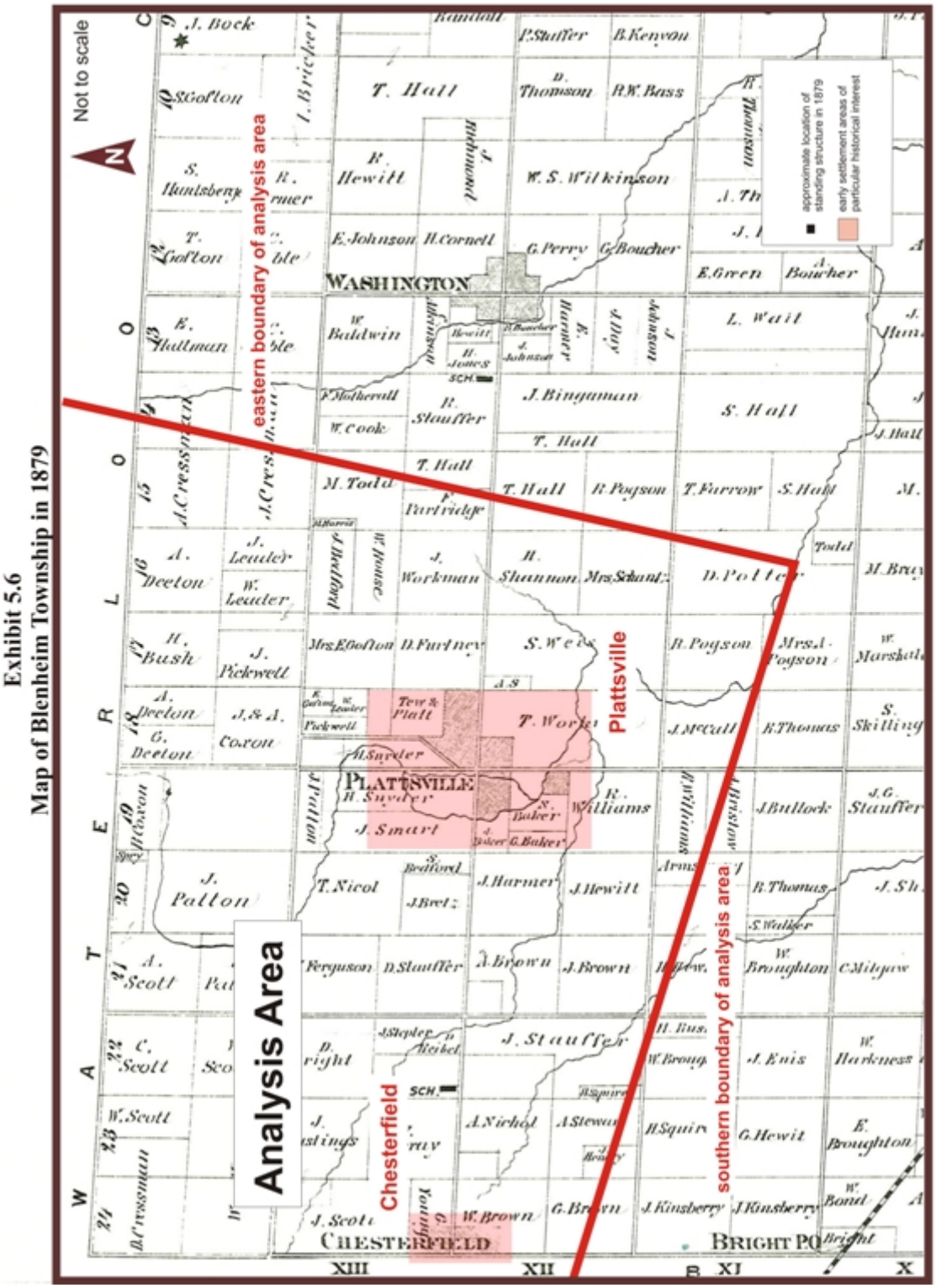
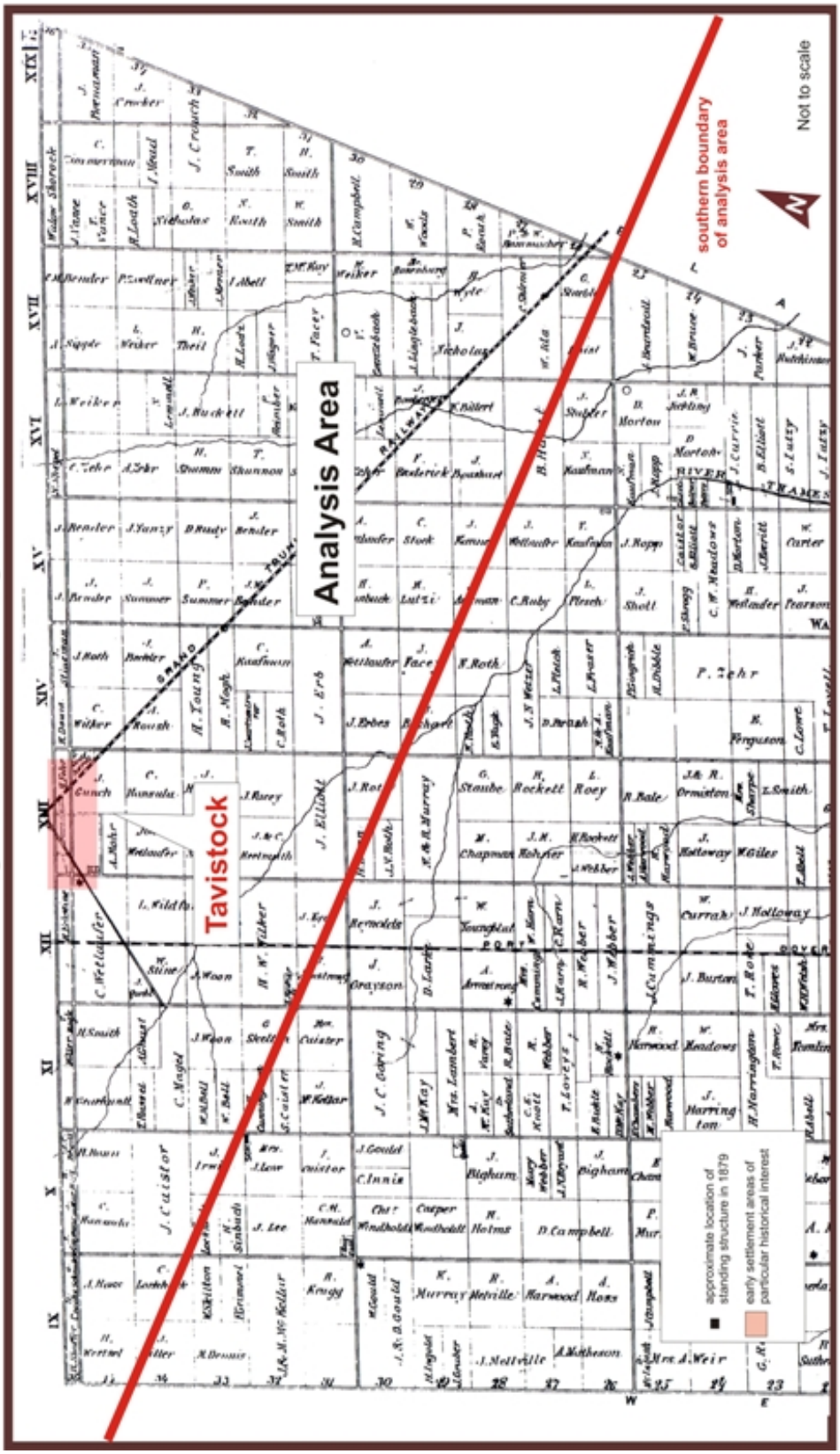


Exhibit 5.6
Map of Blenheim Township in 1879

Source: H Belden & Co., 1879

Exhibit 5.7
Map of East Zorra Township in 1879



Source: H Belden & Co., 1879

5.1.2.4.1 Wilmot Township

Wilmot Township (formerly known as the German Block) would not be settled until much of the land in the adjoining Waterloo Township had already been populated, largely by Pennsylvania German Mennonite families from Pennsylvania and overseas. The founder of Wilmot's first community was Christian Nafziger (Wilmot Historical Committee, 1967). Coming to America in 1820, Nafziger was charged with finding a suitable location for an Amish Mennonite colony. He was aided in his search by Jacob Erb of Waterloo Township and other Niagara area Mennonites (Hayes, 1997). Pleased with the prospect of securing settlement, the government promised a free grant of 50 acres to each settler, with any excess of that sold at a low rate (H. Parsell & Co., 1881). The first stream of immigrants began to arrive in 1824, mainly from the low countries of Europe (H. Parsell & Co., 1881; Hayes, 1997). A second group arrived in 1826 as the Amish continued to spread over the northern two thirds of the Township, "almost to the exclusion of others" (H. Parsell & Co., 1881). The influx of Anglo-Saxons did not commence until about 1830, and was confined mainly to the southern third of the township (H. Parsell & Co., 1881).

The opening of Huron Road attracted settlers from various regions. Samuel and Jacob Reichard were granted 100 acres of land by the Canada Company for clearing two miles of road. They built a saw mill on Lot 5, Concession 1 in 1828 (Young, 1888). In 1830, John Millar from Scotland purchased land and began a saw milling operation at the site of what would come to be known as New Dundee. Many English immigrants settled further west along the road. William Hobson was responsible for surveying parts of the road and eventually purchased land on Smith's Creek (Nith River) where he opened a large hotel (Hayes, 1997).

Wilmot Township is peppered with large and small historic centres, all of which were important to the founding Amish populations and continue to be of importance today. These centres include Philipsburg and St. Agatha on Erb's Road, Petersburg, Baden on Snyder's Road, and both New Hamburg and Wilmot Centre on Bleams (historically Bleem's) Road. Baden's first European occupants arrived in the 1820s and 30s. Baden's mid-century growth and success is attributable to the work of several prominent businessmen, including James Livingston of J. & J. Livingston, a prominent flax mill. Livingston built the majestic estate of Castle Kilbride at 60 Snyder's Road. The community also grew with the construction of the Grand Trunk Railway. St. Agatha was settled in 1840 to service the Mennonite community on the east half of Erb's Road. It once incorporated a post office, store and tavern and, in 1856, also became a stop on the railroad line (Hayes, 1997). Petersburg was settled by German Lutherans in the 1830s and 1840s, and like St. Agatha, grew in importance as a station on the Grand Trunk Railway (Hayes, 1997). The hamlet of Wilmot Centre was formerly the Township's seat of government, where school and religious services were held at least as early as 1849 (Wilmot Historical Committee, 1967). Settlement south of Bleams Road, in what is now called 'Block A', was assisted by the Canada Company when they paid to have the Dundas Road cut through the first and second concessions (H. Parsell & Co., 1881). The emergence of Haysville in 1832 followed the construction of the roads and by 1833 land was being cleared on the east side of the Nith River. This was followed by the establishment of mills and hotels, and later a post office (Hayes, 1997).

New Hamburg is the largest community in Wilmot Township and was founded in 1831 when William Scott built a cabin and constructed a saw mill on Smith's Creek (Nith River). In the early 1830s he was followed by others and by 1847, the community had grown to incorporate several businesses, including a blacksmith shop, wagon repair, and foundry. Both New Hamburg and Baden are known for housing some of the earliest earthenware potteries in southwestern Ontario.

The first settler to the area of Haysville, south of New Hamburg, arrived in 1832 following the cutting and construction of the Dundas Road between the first and second concessions of Wilmot by the Canada Company (H. Parsell & Co., 1881). William Hobson, a native of Northern Ireland, took up land just east of what is now Haysville. Hobson and another settler named Edward Everett settled on the east side of Nith River and both opened hotels in addition to attending to the necessity of clearing the land (H. Parsell & Co., 1881). Formerly called Wilmot, the town is named for a miller from Northern Ireland named Robert Hays (Hayes, 1997). Hays erected a saw and grist mill here in 1836, and by 1837 a post office was established in the community.

A smaller town that should be noted lies along the northern boundary of the analysis area. Berlett's Corners is essentially a crossroads community and was founded by Christian Snyder from Pennsylvania in 1837. The town contained a school, hotel, cheese factory and several businesses, as well as an early cemetery associated with the Evangelical Lutheran Protestant Mission established there (Wilmot Historical Committee, 1967). The cemetery still exists today.

The town curiously named Punkeydoodle's Corners at one time contained a one-and-a-half storey hotel, blacksmith shop, cider mill, as well as stables to quarter settlers' teams. The original farm was purchased by Noah Roth at the turn of the century. The buildings were torn down shortly after the purchase leaving only Roth's farm buildings to suggest any history of the settlement (Wilmot Historical Committee, 1967).

The historic atlas map for Wilmot Township provides little detail about both landowners and the location of early structures (**Exhibit 5.8**). This is likely due to the fact that owners were charged a subscribers fee to be listed in the atlas. Many chose not to pay and are subsequently not named. However, Tremaine's 1861 map of the township does show that most lots were indeed settled by that time.

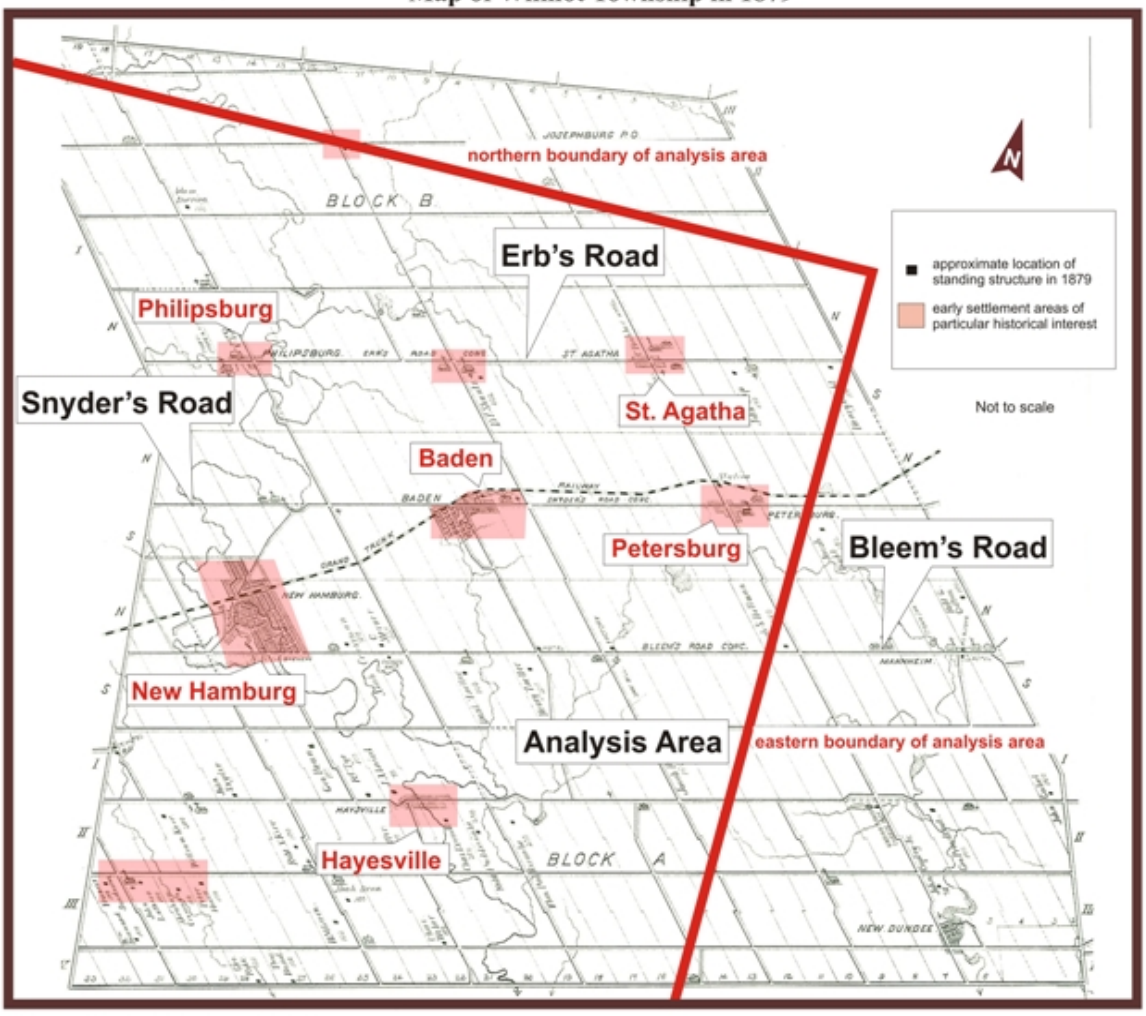
The major roadways within the Township (e.g., Snyder's Road, Erb's Road, and Bleem's [now Bleams Road]) are particularly significant historically as locales of first settlement.

5.1.3 Late Nineteenth and Twentieth Century Developments

5.1.3.1 Geographical Characteristics and Demographic Change

The analysis area has rich agricultural soils and a climate well suited to farming. In spite of the many historical and contemporary boundary lines partitioning the analysis area, the land itself has a reasonably uniform geological past and geographical present. As a result of the composition of their bedrock and subsequent glacial action. The Stratford Till plain to the west and the Waterloo Hills in the east contain some of the highest grades of soils for farming in Ontario, as well as the headwaters of creeks feeding several major river systems: the Grand; Thames; and Maitland. The same natural resources and inducements to settlement that attracted the Germans and Swiss, low and highland Scots, the English and the Irish to this area in the 19th Century kept many of their descendants here into the following Century, and they invited new immigrant families after the Second World War, particularly from the Netherlands.

Exhibit 5.8
Map of Wilmot Township in 1879



Source: H Belden & Co., 1879

From the time that this area was first completely settled until present, gradual changes have taken place in the number and distribution of people, as well as how this population uses their land. By the 1880s, most of the acreage suitable for agricultural purposes had been taken up and improved. The first farmers engaged largely in mixed farming. They grew large quantities of wheat and also other crops for feed, kept orchards and gardens producing fruit and vegetables both for sale and home consumption, and raised livestock and poultry. Family units were relatively self-sufficient, especially when supported by services and craftsmen (e.g., flour and gristmills, sawmills, blacksmiths, tanners, shoemakers, carpenters, and farriers) in nearby villages. This pattern of self-reliance did not mean, however, that land, farms, and communities could forever support the peak populations counted in the censuses of 1860 and 1870. Almost before all these lands were occupied, the area was losing population. Between 1881 and 1891, rural Ontario lost 188,000 people who moved to Canada's western provinces or mid-western American states where agricultural prospects seemed brighter. In this decade, the number of Ontario-born residents of western Canada alone increased by 50,648 (Watson, 1947). This outward pull was not only from the new frontiers. Urbanization of Ontario towns and cities drew many away from the countryside to industrial, retail, and professional opportunities. The improvement of roads and growth of railways facilitated these human transitions. Even before the end of the nineteenth century, Ontario's population was changing from a rural concentration to an urban one. In 1901, 59.7% of the Province was rural as compared to 40.3% urban. By 1961, the reverse was dramatic, 20.8% of Ontario's population was rural, and 79.2% urban (Econ of Ontario, 1966).

The population of South Easthope Township in Perth County reflects this downward movement of numbers during the five census decades (between 1871 and 1921): 1871 – 2,275 persons; 1881 – 2,244; 1891 – 2,149; 1901 – 2,097; 1911 – 1,457; and 1921 – 1,376 (Hagarty, 2000). However, a comparison of the number of hectares (even in the first three census periods of this span) shows an increase: 1871 – 6,406 ha; 1881 – 7,104 ha; 1891 – 7,836 ha (Census of Canada, 1871; 1881; 1891). The farmers of South Easthope were increasing their arable lands while depending on fewer labouring hands.

Owing to the need for greater economic efficiency caused by the rising costs of labour, transportation, and mechanization, the trend towards fewer and larger farms continued throughout the 20th Century and into the 21st. The average size of farms in Ontario rose from 38.9 ha in 1881 to 48.2 ha in 1931 (Skinner, 1964). In 1961, Perth County's 4,122 farms had an average size of 50.2 ha (Mid-Western Ontario, 1966). In the decade between 1951 and 1961, the number of farms in Waterloo County dropped by 7.7%, from 2,638 to 2,435 ha, and in Perth County by 5.4%, from 4,357 to 4,122 ha. In the same period, farm size increased in Waterloo by 3%, and in Perth by 5.7% (Mid-Western Ontario, 1966). More recent statistics from Wilmot Township confirm the continuing movement towards fewer, but larger farms. In 1986 there were 337 farms in Wilmot with a total area of 22,038 ha, or an average of 65.4 ha per farm. In 1996 there were 307 farms, 21,362 ha, and an average size of 70 ha. The 2001 figures were 271 farms, 21,789 ha, and an average size of 81 ha, exactly double the size of most original Crown grants (Region of Waterloo, 2003).

On the whole, the population of the analysis area mirrors its founding families. For example, in Wilmot Township, of a population of 14,866 in 2001 (13,150 Canadian born), 6,315 claimed German ethnic origin. For Blandford-Blenheim's population of 7,630 (6,980 Canadian born), 3,085 claimed Canadian ethnic origin. East Zorra-Tavistock's population of 6,980 included 6,350 Canadian born, and 2,515 who claimed Canadian ethnic origin (Statistics Canada, 2001).

In all three counties, however, the sixth most numerous ethnic group were those of Dutch ancestry. Canada was in the business of recruiting agricultural labour after the Second World War, and the Netherlands had a matching surplus. Significant numbers of Dutch immigrants came to townships in the analysis area not only because of the strength of the dairy industry, but also because of the area's well-

established community organizations (e.g., farm clubs, agricultural societies, fairs, and churches). Many Mennonite churches exist in this part of Ontario, and their tolerant outlook exemplified a society that was attractive to the liberal Dutch (Yates, 1965).

A more recent influx of Dutch and European farmers, however, is seen by many residents in the analysis area as more representative of change than of continuity. Many farms and dairy quotas in the analysis area have been purchased in the last decade by immigrant entrepreneurs with deep reservoirs of capital and technical expertise, and the resulting intensification of the movement towards very large-scale farms is affecting the social configuration of the countryside and its built heritage. Numerous long-time family homesteads are now occupied by non-farming tenants, and often families occupying farmhouses that have been in their families for generations no longer work the land (Hastings, 2007; Stock, 2007). In 1986, a survey in Oxford County found that 23% of farmers were engaged in some form of off-farm work. By 1990, this figure had risen to 33% (Community Futures, 1992).

5.1.3.2 Land Use Change – Agricultural Specialization

Wheat was the first and foremost crop planted by Ontario's pioneer settlers. It fed their families, and when the mills and markets were established, it could be sold to provide ready cash. Once the western prairies were opened up for the growing of wheat, however, Ontario could no longer compete for world markets, especially after the depression of 1883-96. The McKinley tariff of 1890 placed a prohibitive rate of 48.4% on imported agricultural commodities, virtually closing the US market to Ontario grain growers. In two years after the tariff the total area of barley farmed in Ontario decreased by 81,787 ha, and wheat by 242,811 ha (Watson, 1947).

The farmers of Waterloo, Perth, and Oxford Counties adapted to this market change by moving from a wheat-based economy to livestock and dairy production. Lands that once primarily grew wheat were diversified to grow more hay, forage and feed grains, which enabled farmers to increase livestock production. The introduction of the silo in the last decades of the nineteenth century made it possible to store silage for winter-feed, thereby enabling farmers to raise larger dairy herds. Skills in breeding and animal husbandry were promoted by fall fairs (Reeds, 1959), encouraged by local agricultural societies, and later by professional representatives of the Ontario Department of Agriculture. In 1916 the Holstein-Friesian Association of Canada, the only Canadian organization authorized to register Holstein cattle, boasted six members from Downie Township. By 2001 this figure had grown to 50 (Robinson, 2002; Holstein Canada, 2007). The raising of high quality dairy herds led to an increase in the production of milk and cream. Surplus to the needs of the farm family was sold to local factories for cheese production. According to the 1881 census, the number of cheese factories in Perth, Oxford and Waterloo Counties was already between 65 and 83 (Cartwright, 1965). Ingersoll's celebrated versifier, James McIntyre, is best known for his "Ode to a Mammoth Cheese". Less often heard is his "Oxford Cheese Ode" (1884) which contains this verse celebrating Oxford's dairy farmers (Cartwright, 1965):

> "And since they justly treat the soil,
> Are well rewarded for their toil,
> The land enriched by goodly cows,
> Yields plenty now to fill their mows,
> Both wheat and barley, oats and peas,
> But still their greatest boast is cheese."

The coming of the railroad into this area (the Buffalo and Lake Huron Railway through Tavistock and Stratford in 1856, the Grand Trunk from Berlin through Stratford in 1858, and the Stratford and Huron northbound in 1877) facilitated the transport of livestock to markets, and later of liquid milk, to

processing and distribution points. In 1886 the Grand Trunk Railway installed a cold storage plant at Ingersoll, and the next year began operation of a refrigerated train from Stratford, via Ingersoll and Woodstock, to Toronto (Cartwright, 1965). These improvements enabled the already successful local dairying industry to sell more of its fluid milk to large urban markets, thus reducing the supply to local cheese manufacturing concerns. The development of cold storage facilities on steamships in 1897 diverted more fluid milk from the cheese industry. By 1911 cheese production had peaked, and except for an increased demand during the World War II, dairy farmers in Waterloo, Perth and Oxford Counties sold most of their fluid milk to dairies, creameries, and concentrated milk plants (Cartwright, 1965). In 1992, 612 dairy farms in Oxford County earned a gross revenue of $98,000,000 (Community Futures, 1992). Perth County is a serious rival. In 2005, Oxford claimed 379 milk production units, and Perth 424 (Waterloo County had 279 production units) (Dairy Farmers of Ontario, 2005). The prominence of dairy farming in the agricultural economy of Waterloo, Perth, and Oxford Counties attests to the successful adaptation of farmers to market forces, and a closer alignment of their agricultural production to the nature of local soils and climate (Reeds, 1959).

A further example of a major agricultural activity in the analysis area made possible by increased grain crop production in the 20th Century is the pig industry. The ample food supply came from both new strains of corn (and later soybeans) developed for hog feed, and also from skim milk which dairy farmers could divert to feed swine (Reeds, 1959). Local branches of the Hog Producers Marketing Board were established in the 1950s to encourage new skills in hog-husbandry and to improve industry control (Robinson, 1999). Between 1941 and 1976, the largest source of farm revenue in South Easthope Township came from hog production (Hagarty, 2000). Again, industry efficiency dictated operational growth, which translated into larger farm units, and larger barns designed with adequate insulation, ventilation, and odour and pollution controls. In the 2006 Census of Agriculture numbers of pig production by county, only Huron County (at 711,745 pigs) outnumbered Perth's production (664,508) in Ontario, while Oxford County raised 470,360 pigs, and Waterloo County raised 142,531 (OMAFRA, 2006.

5.1.3.3 Urban Development

The movement from rural areas towards urban centres has affected the many small villages dotting the analysis area, as well as the more urban communities. While most of the villages that appeared on early maps still have a definable presence, almost all have lost the industrial and commercial centres that generally brought them into existence. They carry on today mainly as residential communities occupied by retired farmers or commuters.

In contrast, three communities within the analysis area have grown towards town and city status. The City of Stratford, a separate municipality geographically surrounded by Perth County, is the largest urban unit, with a population of 30,461 (Statistics Canada, 2001) New Hamburg, an unincorporated entity in Wilmot Township's Ward 3, has a population of 6,756, according to Statistics Canada (2001). The unincorporated village of Tavistock in the Township of East Zorra-Tavistock is a modest settlement in that part of the analysis area located in Oxford County. The entire population of East Zorra-Tavistock is 7,000.

5.1.3.3.1 Stratford

Stratford's dominance in this part of Southwestern Ontario is linked to its historic position as a railway town. With three main lines converging there by 1877, and several more anticipated in succeeding decades, Stratford's economic future was in the transporting, warehousing, forwarding, manufacturing, financing, and insuring of goods. This future was consolidated when the Grand Trunk Railway took over

the Buffalo and Lake Huron Railway and, beginning in 1871, moved its motive shops from Brantford to Stratford. As a centre for locomotive repair, Stratford benefited for many decades from a secure and technologically skilled labour force. But when the Canadian National Railway (CNR) began introducing diesel engines in the early 1950s, the future of Stratford's motive shops was doomed. In 1959, the conversion from steam to diesel was completed, and the CNR closed its shops in the City (Johnston, 1967).

Stratford was certainly not a one-industry city at this time. It was home to many agricultural based enterprises, known for its furniture factories, and had a solid civic infrastructure. In spite of losing a major employer that had provided the City with occupation, wealth, and symbolic identity, Stratford was ready to retool and market its economic strengths to attract new and more diversified business (Leitch, 1980). It strengthened its industrial base by attracting companies in the automotive, aerospace, and machinery and equipment manufacturing sectors. Indeed, of Stratford's total work force of 16,645 in 2001, 4,900 were employed in manufacturing, followed by 1,785 in retail (which would include many engaged in tourism), and 1,640 in the health care field (Ministry of Economic Development and Trade, 2007).

A major incentive to Stratford's continued growth was the launch in 1953 of the *Stratford Festival*, involving a remarkable coming together of visionaries, artists, and local business people to create a Shakespearian performance season on the banks of the Avon River. The festival has become a major cultural event in Canada, and it attracts thousands of visits from other countries. Stratford embraced the Festival and adapted to its economic stimulus. The *Stratford Festival*'s impact on much of the analysis area is truly immense, affecting tourism and many related occupations (Lloyd, 1983). Stratford, as the home of this cultural and economic success, and Shakespeare, as its inspiration, have made their way into the psyche and symbols of the region. Perhaps an excellent example of this is the souvenir program designed for *The International Plowing Match and Farm Machinery Show* held in Stratford, 20-24 September 1988. The program cover displayed in the background a fairground of gaily-striped tents attracting people in tractors and horse-drawn wagons, in the middle ground the curve of a river with graceful swans, and in the foreground an energetic William Shakespeare plowing a field (Robinson, 2002). The colourful graphic neatly combines past and present, country and town, and the cohabiting worlds of physical work and literary imagination.

5.1.3.3.2 New Hamburg

If Stratford has learned to capitalize on its literary provenance, New Hamburg has achieved a sense of identity closely related to its geographic, industrial, and ethnic origins. Situated on the Nith River, whose water power was early harnessed for milling flour and driving industrial machinery, New Hamburg is home to several manufacturing companies that value their location in 'Canada's Technology Triangle', and on the transportation corridor of which Highway 7&8 is an important part. Two casting companies, Klassen Bronze and Riverside Brass, specialize in non-ferrous metal stampings and castings (Klassen began its operations in 1952 in an old mill on the Nith River.) Ontario Drive and Gear manufactures amphibious vehicles as well as gears and transmissions. Its presence is an example of the expansion of the automotive parts sector of Ontario into new geographic areas. Indeed, Wilmot Township has recently opened a 57 ha industrial park between Borden and New Hamburg, designed to attract automotive manufacturers who would support the new Toyota Plant in Woodstock. The entire Township is wired for fibre optics (Corporation of the Township of Wilmot, 2007).

Among New Hamburg's founding families were many Amish and Mennonites, who remain a strong presence in the analysis area. Twice a year New Hamburg is home to major fund-raising events hosted by

the Ontario Mennonite Relief Sale in support of global relief efforts. Of the 12 churches in New Hamburg, four are Mennonite.

A further example of the local inheritance valued by New Hamburg's citizens is its unique architectural past. In 1992, the Township of Wilmot Council created the New Hamburg Heritage Conservation District in the downtown shopping area along the Nith River. Over 65% of the buildings were deemed to have significant historical and architectural value. Their preservation and protection enable New Hamburg and its visitors to use and enjoy the built heritage along the Nith River, as generations did before them (Corporation of the Township of Wilmot, 2008.

5.1.3.3.3 Tavistock

Settlement in Tavistock was a result of the coming of the Buffalo and Lake Huron Railway in 1856, which was joined by the Port Dover and Lake Huron Railway in 1875 (Johnston, 1967). Once divided between the Townships of East Zorra in Oxford and South Easthope Township in Perth, Tavistock's final home was assured when it was incorporated as a village in 1909, and the Provincial Legislature awarded it to Oxford County (Johnston, 1967). As a rail distribution point for the two Townships, Tavistock developed small industries relating to its agricultural hinterland: woollen and flax mills; and factories for making pumps, furniture, and, eventually, cheese. The *Tavistock Cheese and Butter Company* began operations in 1896 and successfully exemplified the dominance that dairying enjoyed in Oxford and Perth Counties for many decades. Its early owners, Ballantyne and Bell, held a dairy school locally, and Bell eventually taught cheese making in the Guelph agricultural college. The company went public in the early 1920s, taken over by a group of farmers who sold shares, and paid out profits regularly to their patrons. It amalgamated in 1965 with the *German Union Cheese Manufacturing Company*, during a period when closings and amalgamations were common (Rotary Club, 1967). The *Tavistock Cheese and Butter Company* was ultimately acquired by Saputo Inc., a national cheese and dairy products company based in Saint-Léonard, Québec. In 2002 Saputo claimed 35% of the market of Canadian natural cheese production (Saputo Inc, 2002). It is currently the largest employer in Tavistock.

5.1.3.3.4 Administrative History

Historically and geographically, the analysis area includes: parts of Wilmot Township in Waterloo County; parts of the Townships of North Easthope, South Easthope, Ellice, and Downie in Perth County; the entire City of Stratford; and parts of the Townships of Blenheim, Blandford, and East Zorra in Oxford County. Over the course of the region's history, these original administrative units have been re-combined in various mergers and restructuring. The Regional Municipality of Waterloo was created in 1973 when 15 former local governments reorganized into seven municipal areas: part of the present Township of Wilmot is in the Highway 7&8 analysis area. The County of Oxford underwent a self-imposed municipal restructuring in 1975, which saw 11 townships redrawn into five including the new Townships of Blandford-Blenheim and East Zorra-Tavistock, parts of which are in the analysis area. Fourteen municipalities in the County of Perth underwent amalgamation in 1998, resulting in four today. Parts of the new townships of Perth East (North Easthope, South Easthope, and Ellice) and Perth South (Downie) are in the analysis area, as is the City of Stratford. The City of Stratford remains a separate entity from the county. At present, the Highway 7&8 Transportation Corridor analysis area contains parts of the Regional Municipality of Waterloo, Perth County, Oxford County, and all of the City of Stratford.

5.1.4 Character of Built Heritage

The civic ambition that characterized the area's more urban centres can be seen in its architecture. This is especially evident in Stratford, where strikingly impressive, sophisticated examples of 19th and 20th

Century institutional, commercial, and domestic buildings can be found. The Perth County Courthouse is strategically situated at the west end of Ontario Street, so that it provides a focus point as one progresses west along Highway 7&8. The Courthouse was designed by well-known London architect George Durand in 1885. The building is bold in its employment of dramatic asymmetrical features and its use of colour. The local buff-coloured brick is contrasted with plum-coloured Credit Valley stone, reddish terra cotta panels, and wood painted originally, as now, in a vermilion red to which purple has been added (Tausky and DiStefano, 1986). The Stratford City Hall, built in 1898-1899 to a design by Toronto architect George W. King, still gives an appropriately festive air to the city through its picturesque skyline, composed of the variously shaped tower, cupulas, dormers, gables, and pinnacles. The Festival Theatre itself, designed by architect Robert Fairfield in 1956 -1957 to recall the tent that had protected the earlier Stratford performances, is a well recognized landmark of theatre history (Bart-Riedstra and Riedstra, 1999). Stratford's core area also features a rich variety of mid to late 19th Century commercial structures. Along the west side of Downie Street just south of Ontario Street, for example, are buildings reflecting the pronounced round-headed arches of the Romanesque Revival and the delicately incised stone lintels of Queen Anne Revival commercial architecture. An eclectic dichromatic treatment of window heads is found at 75-83 Ontario Street, where rounded headed windows are highlighted by pointed arches formed by brick voussoirs. The City's domestic architecture provides a sampler of popular Victorian and Edwardian styles, as is indicated by: the fine Gothic Revival house at 122 Mornington Street, with its three steeply roofed dormer gables featuring decorative bargeboards; the Italianate house at 109 Mornington Street, with its decorative paired brackets, broad eaves, and the unusual round-headed transom in the storm porch; and the Queen Anne Revival house at 2 Brittania Street with the delicately curved bay in its front gable wing and round tower with a conical roof and intricate metal finial.

There are very sophisticated examples of urban architectural styles in other towns within the analysis area as well. The Italianate Kilbride Castle at Baden, with its interior 'trompe l'oeil' wall paintings, is a National Historic Site. The rich detailing of Puddicombe House at 145 Peel Street in New Hamburg makes it an excellent example of the Italianate style, as is the building at 268 Huron Road in Sebringville, with its bays delicately outlined in the raised brickwork.

Much of the urban architecture found in the smaller towns, however, has a distinctively, and charmingly, vernacular or ethnic quality. The commercial buildings at 237 Huron Road in Sebringville, for example, link an eclectic design with an Italianate cornice and Gothic ogee-arched drip moulds with a curious structure featuring a shed roof and an oddly placed window with a pointed arch. With the Glass Swan in Tavistock, Otto Niemeier created another eclectic design when, in 1892, he combined Italianate brackets and broad eaves with the currently fashionable Romanesque windows. The old flour mill gives a rural focal point to Peel Street in New Hamburg, despite the elaborate Romanesque Revival and Italianate store fronts, and remnants of local handiwork, such as the unusual knob/latch on the front door of the former Hamburg Hotel (see Knowles, 2002) serve as reminders of the Town's German origins.

Some more urban designs can also be found, such as the high style of late Victorian architecture, in the area's more rural settings. The Italianate house at 4275 Huron Street, soon to be the new home of Stratford's museum, has many notable features, including its brick storm porch. There are a number of late Queen Anne Revival houses in red brick, such as that at 4461 Line 32 in Perth South, which feature decorative gables with variations on Palladian windows, and elaborate columned porches.

The buildings most responsible for giving the analysis area its distinctive architectural character, however, are the many earlier, more vernacular, houses in late Georgian or Gothic Revival styles. Most of these adopt a relatively simple, popular design strongly influenced by buildings of the Georgian period. They are symmetrical, of one or one and one-half stories in height, with a façade that is three or five bays wide and features a centre door; more prosperous land owners occasionally built two-storey versions of

the five-bay design. The earliest examples generally had an unbroken roofline, but by the late 1850s and 1860s, under the influence of the Gothic Revival tradition, it had become customary to place a gable over the centre bay of the façade, usually with a pointed or round-headed window. The brick house at 39993 Perth Road East (on the corner of Highway 7&8) features an unusual double pointed arch in the gable, as well as more typical ornamental bargeboard. Occasionally the design is varied with a projecting frontispiece, as with the Bell Farmstead on Highway 59, north of Shakespeare.

Despite the relative simplicity of this format, the design is capable of producing a wide variety of effects, which are richly illustrated throughout the analysis area. Different materials produce very different impressions, and these are intensified within the analysis area by regional practices regarding aspects of design and workmanship. In the area west of Stratford, for example, contrasting buff (or white) brick is used to create relatively ornate patterns against red brick. The Germanic practice of embedding stones in heavy applications of mortar produces a very different visual effect from the Scottish practice of shaping stones more precisely and separating them with more even lines of mortar. In the southeastern corner of the analysis area, just northwest of Plattsville, is a cluster of buildings in which cobblestones appear to have been laid within cement moulds to produce a highly distinctive stone wall. It is possible that these walls were intended to be covered with stucco, as one finds at 816772 Oxford Road 22 and 946376 Oxford Road 14; in the latter case, the stucco has been grooved to mimic ashlar. In the northeastern sections of the analysis area, traditional Mennonite houses can often be identified by the plastered external wall under the front veranda. It must be noted that there are relatively few buildings in the analysis area that feature visible, original wood siding. Most, it appears, have been covered in vinyl or aluminium siding or in modern board and batten, though the problem with such recladding, of course, is that, because the original facing material is hidden, one cannot be certain of its nature. The recladding also usually hides architectural details such as window lintels, cornice decorations, or pilaster strips, so that much about the style of the house is lost as well.

In addition to its rich assortment of early houses, the analysis area retains many early churches and schools. The most elaborately designed church in the analysis area is St. Peter's Catholic Church in the Perth East hamlet of Kinkora. With the intersecting lines and curves of its 'High Victorian Gothic' dichromatic brick patterning, its elaborate rose window, and its arcade of pointed arches, the building luxuriates in an exuberant display of controlled, if complex, design elements. At the other end of the architectural spectrum is the simpler, more classical Chesterfield United Church, west of Plattsville, its excellent proportions subtly highlighted by pilaster strips forming narrow pointed arches between the front bays and by a series of brick dripmoulds above the side windows. The plaque on St. Matthew's Lutheran Church in East Zorra-Tavistock Township serves as a reminder of its German heritage.

A number of historic school buildings remain within the analysis area, some still in use as part of a now larger school complex (e.g., SS#3 [1925] at 4672 Road 108 in Perth East), and others converted to homes. Most of the latter have been very carefully altered so as to keep the essential architectural qualities of the school building. SS#2 of northeast Hope (1864), for example, retains the bell in its belfry and the two separate entrances for boys and girls. At the former school in Gadshill, built in 1911, the delicate bellcote has been replaced by a substantial tower and the entire structure echoes the solidity of the Richardsonian Romanesque style that has influenced it.

The large number of pioneer cemeteries in the area reflects both the richness of its past and the respect with which the past is regarded. Some of the cemeteries are associated with still extant churches. Most are clearly marked by stones but at least two, the Old Baden Mennonite Burying Ground and the Old Evangelical United Brethern Cemetery, are completed unmarked. Further, some of the extant cemeteries within the analysis area are not listed on local heritage inventories.

There are only a few significant heritage bridges, partly because the landscape in many areas demands few crossings over watercourses. Some former heritage bridges, like the Haysville Truss Bridge and Hartman Bridges in Wilmot, have been demolished and replaced with modern structures.

5.1.5 Existing Inventories of Built Heritage within the Analysis Area

Paul Dilse (1981) wrote *Description of Man-Made Heritage within the Environment* as part of a Group A, Type I EA submitted to the Ministry of Transportation and Communication and the Ministry of Culture and Recreation in connection with a study of Highway 7&8 undertaken at that time. Dilse's report contains a general description of historical context, a cultural landscape assessment, an assessment of the built study area was focused on Highway 7&8 between (but excluding) Stratford, New Hamburg and Baden, but including Shakespeare.

In the cultural landscape assessment, Dilse recorded ten significant heritage landmarks, including the Baden Hills, the church steeples of Holy Family Roman Catholic Church and Trinity Lutheran Church in New Hamburg, Trinity Church in Sebastopol (north of Tavistock and then outside of his study area but within the current area of concern) and St. Anthony of Padua Roman Catholic Church, as well as concrete silos and continuous bush lines (Dilse, 1981). Several scenic views were identified along Highway 7&8 from Waterloo Regional Road 6 to Stratford's east limits. The most scenic views or landscapes he describes in his report include:

1. The view of New Hamburg and the Baden Hills from Highway 7&8 between Bleams Road and the Waterloo-Perth County boundary;
2. The Shildroth Farmstead and Neighbouring Otto Farmstead;
3. The landscape along Highway 7&8 from Lingelbach Cemetery (Sideroad 10) to the Andrew Riddell Junior Farmstead, west of Sideroad 15 and just east of Shakespeare;
4. All of Shakespeare except the twentieth century development in the west end;
5. The Little Lakes;
6. The Avon River highlands including the northern limits of Shakespeare;
7. The Wilmot Creek hill landscape with views of the Baden Hills, east of the Avon River highlands;
8. The height of land above Punkeydoodles corners; and
9. The landscape along South Easthope Concession Road 203, from about Sideroad 10 to Highway 59.

Dilse's built heritage assessment, based on a detailed visual assessment and reliable historical research, identified 63 sites with heritage significance within a study area that extended approximately 1½ concessions along both sides of the highway between Stratford and New Hamburg, and then narrowed to a generous road allowance south and east of New Hamburg. Thirteen sites were identified in Wilmot Township, 22 in North Easthope Township and 28 in South Easthope.

Most of these sites were reviewed, and Dilse's inventory was revised in cases where buildings have been demolished or significantly altered. This revised inventory can be found in **Exhibit 5.9**. Several sites are clustered in Shakespeare. It should be noted that two of the identified sites occur on other inventories. The Riverside Cemetery (Dilse's Reference 7) is also included in the cemeteries register for the Region of Waterloo, and the Fryfogel Inn (Dilse's Reference 26) is also listed on the Ministry of Culture's built heritage inventory.

Exhibit 5.9
Built Heritage Sites Inventoried by Dilse (1981)

Property	Dilse Reference No.	Township	Site Type
Lynn Meyers Barn	1	Wilmot	barn
William Scott Farmstead	2	Wilmot	group of buildings
Farmhouse	3	Wilmot	house
Farmstead	4	Wilmot	house
Wilmot S.S. No. 11 Schoolhouse	5	Wilmot	school
*Farmhouse	6	Wilmot	house
Riverside Cemetery	7	Wilmot	cemetery
*Nith Crest Farms Barn	8	Wilmot	barn
Frank-Rau Brewery	9	Wilmot	brewery
Christian Roth House	10	Wilmot	house
Cressman House	11	Wilmot	house and barn
Farmstead	12	Wilmot	group of buildings
John Jackson Farmstead	13	Wilmot	house
Shildroth Family Farmstead	14	North Easthope	house
Otto Family Farmstead	15	South Easthope	group of buildings
Pineview Stables	16	North Easthope	group of buildings
Barn	17	North Easthope	group of buildings
Charles Koch Farmstead	18	South Easthope	group of buildings
First Koch Farm Barn	19	North Easthope	barn
Issler Family Farm Barn	20	South Easthope	barn
Lingelbach Cemetery	21	South Easthope	cemetery
Lingelbach Evangelical Church	22	North Easthope	church
George Kleinknecht Farmstead	23	South Easthope	group of buildings
Outbuilding	24	North Easthope	outbuilding
Sebastian Fryfogel Farmstead	25	South Easthope	group of buildings
Fryfogel Tavern	26	South Easthope	tavern
Dr. Flynn's House	27	South Easthope	house
Andrew Riddell Farmstead	28	South Easthope	group of buildings
John McTavish Farmstead	29	North Easthope	group of buildings
Andrew Riddell Junior Farmstead	30	South Easthope	group of buildings
Small House	31	South Easthope	possible log house
*Gothic Revival House	32	South Easthope	house
Georgian House	33	North Easthope	house
Shakespeare Presbyterian Church	34	North Easthope	church
Commercial Block	35	North Easthope	group of buildings
Union Hotel	36	South Easthope	hotel
Cottage	37	South Easthope	house
*House	38	South Easthope	house
A Row of Gothic Revival Houses	39	South Easthope	group of buildings
Hall	40	South Easthope	public hall
The Capeling House	41	South Easthope	house
William Bell Farmstead	42	North Easthope	group of buildings
Richard Bell Farmstead	43	North Easthope	group of buildings
Barn	44	South Easthope	barn

Exhibit 5.9
Built Heritage Sites Inventoried by Dilse (1981)

Property	Dilse Reference No.	Township	Site Type
Alexander Anderson Farmstead	45	South Easthope	group of buildings
Barn	46	South Easthope	barn
James Rankin Farmstead	47	North Easthope	group of buildings
James Rankin Cemetery	with 47	North Easthope	cemetery
McCallum Farmstead	48	South Easthope	group of buildings
Barn and Shed	49	South Easthope	barn
James Reaney's Birthplace	50	South Easthope	house
Richardson Family Farmstead	51	South Easthope	barn
South Easthope Cemetery	52	South Easthope	cemetery
Barn	53	South Easthope	barn
John Brenneman Farmstead	54	South Easthope	group of buildings
Farmstead	55	North Easthope	group of buildings
William Rennie Farmstead	56	North Easthope	group of buildings
Farmstead	57	North Easthope	group of buildings
John Bell Farmstead	58	North Easthope	group of buildings
Reverend William Bell Farmstead	59	North Easthope	group of buildings
Farmstead	60	North Easthope	group of buildings
Stewart Family Farmstead	61	North Easthope	house
John Forbes	62	North Easthope	house
Farmstead	63	North Easthope	group of buildings

* Indicates heavily altered or demolished structures.

The sites listed in the Dilse inventory include single structures (houses, schools, industrial buildings, barns, churches, and outbuildings) and structure clusters (e.g., farmsteads and streetscapes). There are several examples of Pennsylvania German barns, Gothic Revival, Italianate, and Georgian structures. Four cemeteries are also mentioned (Riverside, Lingelbach, James Rankin, and South Easthope), although one is associated with the James Rankin farmstead (Dilse Reference 47) and not treated separately.

5.1.5.1 Perth County – Township of Perth South

There is no Heritage Committee in Perth South, and the only official inventory of heritage structures is that of designated buildings in the *Ontario Heritage Properties Database* maintained by the Ministry of Culture (King, 2007). It lists six properties in Perth South, one of which has been demolished. The listing of the only remaining site that falls within our analysis area appears to involve an error. The listed building on Highway 8 (310 Huron Street) identified as that of the Downie OPP Detachment now houses the Perth OPP Detachment, but it is a relatively new structure located in Perth East, and is not in fact designated under the *Ontario Heritage Act*. The listing may be confusing the Highway 8 building with the earlier location of the Downie OPP at 165 Station Road, but the members of the Clerk's Office in Perth South can find no evidence that this building has ever been designated or in any other way formally recognized as a building of heritage significance (King, 2008).

5.1.5.2 Perth County – Township of Perth East

The Township of Perth East does not have a Heritage Committee acting in an official advisory capacity to the Township Council (O'Rourke, 2007). The Perth County Historical Association gives some, albeit slight, consideration to other heritage issues in the Township, but their main focus is in the management and restoration of Fryfogel Inn (east of Shakespeare on the south side of Highway 7&8). The Association has raised substantial sums of money to allow for the restoration of windows and sills, interior murals, and a draining system to keep water from the basement, among other projects. It also sponsors a two-week school program, hires employees to keep the Inn open over the summer, and sponsors numerous special workshops (Hinz, 2007).

Like Perth South, however, the Township has as its only official inventory of heritage structures the listing of designated properties in the *Ontario Heritage Properties Database*, four of which are within the analysis area (**Exhibit 5.10**). These include the Brocksen School, now a museum and marked with a heritage plaque, Knox North Easthope Presbyterian Church, the Fryfogel Inn, and St. Patrick's Roman Catholic Church in Kinkora.

Exhibit 5.10
Township of Perth East Heritage Properties

Address	Property Name	Construction Date
Concession 2, Part Lots 33 & 34, North Easthope Township	Brocksden School	1826
Concession 5, Part Lot 26, N. Easthope Township	Knox North Easthope Presbyterian Church	1892
Highway 8, east of Shakespeare, South Easthope Township	Fryfogel Inn	1845
Kinkora	St. Patricks Roman Catholic Church	

5.1.5.3 Perth County – City of Stratford

As advised by its Heritage Committee, the City of Stratford has designated nearly 78 properties under Part IV of the *Ontario Heritage Act* (Ministry of Culture, 2004), as listed in **Exhibit 5.11**. The list includes residential dwellings, municipal buildings, schools, churches, bridges, and commercial sites. Stratford has also established a Heritage Conservation District (HCD), under Part V of the *Ontario Heritage Act* that encompasses much of the historic downtown city core. Approved in 1997, (City of Stratford Heritage Conservation District Standards, 1997), the HCD is linked with a Community Improvement Plan, which has as its goals;

> "…to preserve the heritage aspects of Stratford's Heritage Conservation District by encouraging the restoration, rehabilitation, and adaptive reuse of buildings [within the area] …to improve the economic and social climates of the area and increase the supply of residential units within the Heritage Conservation District to ensure a sizable downtown population" (City of Stratford Heritage Conservation District Community Improvement Plan, 2003).

Exhibit 5.11 City of Stratford Heritage Properties	
Name	**Address**
Stratford Jail	30 (Street) Andrew Street
Mansard Roofed House - Annie MacPherson Home for Boys	51 Avon Street
Kalbfleisch Family Edwardian House	63 Avon Street
Property at	72 Avon Street
William Trethewey Ontario Cottage	91 Birmingham Street
Dr. George Deacon Cement Block Craftsman Style House	101 Brunswick Street
McDonald/Creasy Greek Revival Style House	77 Brunswick Street
Property at	14 Caldeonia Street
Property at	68 Caledonia Street
Lt. Col. McComb House	210 Cambria Street
Thomas Trow House	220 Cambria Street
James MacDonald House	227 Cambria Street
David May Frame House	20 Centre Street
Italianate style house	135 Church Street
John Davidson House	208 Church Street
Pequegnat Family Ontario Cottage	109 Cobourg Street
A frame Regency cottage	117 Cobourg Street
Our Family House	50 Cobourg Street
Queen Anne Revival designed by R. Banks Barber	100 Daly Avenue
Henry Baker Queen Anne Revival	88 Daly Avenue
Joseph Rankin/William Mowat Gothic Revival	55 Daly Avenue
Judge Reed Burritt House	52 Devon Street
Property at	170 Douglas Street
Edwardian Commercial Buildings	111-117 Downie Street
Gordon Block & Idington Block	10 Downie Street, Festival Square
Mooney Biscuit & Candy Company Building	245 Downie Street
Late Victorian Commercial Block	53 Downie Street
Property at	96-100 Downie Street
Edmund Dufton/James Killoran Italianate houses	12-14-16 Elizabeth Street
John Farquharson/Alfred Ahrens Italianate	55 Elizabeth Street
Brick Townhouses built by Daly Family	107 Erie Street
Queen Anne Revival style house	90 Front Street
Property at	21 George Street E
Lawrence O'Loane Ontario Cottage	79 Hibernia
John Clark/Samuel Fuller Gothic Revival House	131 Huron Street
Huron Street Bridge	Highway 8 (Bridge at Huron Street)
John Idington Regency Cottage	57 James Street
Lunn/Moderwell Red Brick House	170 John Street
Bandshell	41 Lakeside Drive (now Veterans Drive)
Building at	119 Mornington Street
John McCarthy/James Dow enlarged Ontario cottage	220 Mornington Street
St. James Anglican Church	41 Mornington Street
Thomas Birch Ontario cottage	46 Mornington Street

Exhibit 5.11 City of Stratford Heritage Properties	
Name	**Address**
Peter Jarvis Italianate style house	14 Nile Street
Jeremiah Duggan Italianate style house	151 Nile Street
1857 Frame House	140 Norman Street
Former Manse	15 Norman Street
William Nichol/Rev. McLachlin House	89 Norman Street
Property at	98 Norman Street
Knox Presbyterian Church	142 Ontario Street
Queen's Hotel	161 Ontario Street
Larkworthy House	248 Ontario Street
Italianate building	310 Ontario Street
William Filey Italianate style house	322 Ontario Street
Commercial Block	70 Ontario Street
property at	76 Queen Street
Pumphouse (Stratford Art Gallery)	54 Romeo Street South
Stratford VIA Station (CN Railway Station)	101 Shakespeare Street
Neo-Classical Building	6-8 Shakespeare Street
Italianate style house	16-20 Shrewsbury Street
Tudor Revival Style Building	289 St. David Street
Queen Anne Box style building	357 St. David Street
Queen Anne Revival Style House	132 St. Vincent Street
Perth County Registry Office (former)	(24) St. Andrew Street
Stratford Carnegie Library	19 St. Andrew Street
Late Victorian Rowhouse	105-107-109 St. David Street
Brick Ontario Cottage	343 St. David Street
John Holmes Gothic Revival Style House	351-353 St. David Street
McBurney/Watkins Gothic Revival	104 Water Street
Edwardian House	111 Water Street
Stratford Normal School - Stratford-Perth Museum	270 Water Street
Falstaff Public School	35 Waterloo Street North
John Sydney Smith Gothic Centre Gable House	72 Waterloo Street North
Stratford City Hall	1 Wellington Street
property at	209 Wellington Street
McLennan House	203 William Street
Perth County Court House	(1 Huron St. corner of St. Andrews Street)
Stratford Downtown Core Heritage District	multiple

The district forms a roughly triangular area bounded by Lake Victoria and both St. Patrick and Waterloo Streets.

In addition, the City has a five-year project for recognizing and evaluating historic buildings that have not been designated. The end product will be a web-based register in which every building in the older sections of Stratford will be identified and rated. At this point, however, this comprehensive inventory is

neither complete nor accessible to the public, though notes related to the project can be consulted at the Perth County Archives (Belton, 2007; Webber, 2007).

5.1.5.4 Oxford County – Township of Blandford-Blenheim

The Township of Blandford-Blenheim has no official Heritage Committee and its only designated property is not within the analysis area. However, Oxford County has required each township to compile a *Heritage Resources Inventory* and these are included in the County OP. The inventory contains four sections that are of value to this report:

1. A list of Places of Worship within the Township;
2. A list of Cemeteries;
3. A brief list of Cultural/Architectural Resources; and
4. A list of Plaques and Monuments.

Included in the Blandford-Blenheim inventory are two churches and one cemetery within the analysis area (**Exhibit 5.12**). The sites listed in this inventory fall within the community of Plattsville, in the southeast corner of the analysis area.

Exhibit 5.12
Township of Blandford-Blenheim Heritage Properties

Name of Feature	Address	Description
Plattsville Missionary Church	15 Albert Street East, Plattsville	The congregation was established in 1877 as a Methodist Church. A large addition was erected in 1996.
Plattsville United Church	20 Samuel Street, Plattsville	It was a Methodist congregation until 1925 when it became United. Built in 1876. Addition built in 1993 which includes a new foyer and elevator.
Plattsville Cemetery	Seaton Street, Plattsville	Created in 1855. It was once a Lutheran Cemetery but now services the entire community. Owned by the Municipality and is considered to be an active cemetery according to By-law 971-93

5.1.5.5 Oxford County – East Zorra-Tavistock

Like most other townships in the analysis area, East Zorra-Tavistock lacks a Heritage Committee and a comprehensive listing of significant heritage structures (Carswell, 2007). The Township of East Zorra-Tavistock has listed in the Oxford County *Heritage Resources Inventory* a large number of structures in Tavistock, see **Exhibit 5.13** (Carswell, 2007). The sites that have been identified are primarily churches and cemeteries. Only one building within the analysis area is listed under the heading 'Cultural/architectural resources', which is the Glass Swan on Highway 59 in Tavistock. Three plaques are also listed: one honoring the founder of Tavistock; one posted in Punkeydoodle's Corners; and one marking the location of Caleb Caister's Tavern. The Tavistock Grand Trunk and Buffalo and Lake Huron Railway stations are also listed in the Ministry database but do not appear on the township register.

Exhibit 5.13
Township of East Zorra-Tavistock Heritage Properties

Name of Feature	Address	Description
Grace United Church	42 William Street, Tavistock	The original congregation was established in the 1840s. The current church was built in 1904. The congregations from Zion and South Easthope churches, Knox United Church, and Harmony United Church united in 1969.
St. Matthews Lutheran Church	965565 Maplewood Sideroad	Services began in 1852, and the current church was built in 1866. It is the oldest Lutheran Church in East Zorra.
St. Paul's Evangelical Lutheran Church	17 Wellington Street, Tavistock	Dedicated in December 1882.
Tavistock Bible Chapel	32 Oxford Street, Tavistock	Built in 1880.
Tavistock Mennonite Church	129 Wettlaufer Street, Tavistock	Built in 1942.
Amish Mennonite Cemetery	985992 Perth-Oxford Road	This cemetery was opened before the East Zorra Mennonite Cemetery, (around the 1840s). The stones have been moved to one end of the cemetery.
East Zorra Municipal(Brickyard) Cemetery	656981 15th Line	The adjoining farm owners donated this cemetery in 1857. The only burials being made there now are from the People Care Centre in Tavistock when there are no relatives to claim the deceased.
Old Evangelical United Brethren Cemetery	696854 17th Line	This cemetery was opened in 1858. In the 1940s, slabs and markers were laid flat and enclosed with a fence.
St. Paul's Evangelical Lutheran Cemetery	Roth Street, Tavistock	A half-acre was made available for cemetery use at the Grand Trunk Railway tracts in 1882.
The Glass Swan	52 Woodstock Street South, Tavistock	There is a plaque commemorating the historic house from Tavistock's earliest days.
Canada's Birthday (plaque)	986044 Perth-Oxford Road	Located at Punkeydoodle's Corners. A six-sided concrete pillar with the inscription "Canada's Birthday 1982". It commemorates the Right Honourable Joe Clark's visit to the community on this day.
David Stock Caister's Tavern	597112 Oxford Road 59, Tavistock	Caister's Tavern was operating from approximately 1845-1854. Until 1848 Caister's home was the only public accommodation in north-central Oxford County. The site has a plaque.
Founder of Tavistock	22 Woodstock Street South, Tavistock	A stone cairn was erected in 1930 in memory of Captain Henry Eckstein, founder of Tavistock, A.D. 1848. Rededicated in 1948.

Exhibit 5.13 Township of East Zorra-Tavistock Heritage Properties		
Name of Feature	**Address**	**Description**
Grace United Cemetery	42 William Street, Tavistock	Associated with Grace United Church in Tavistock.
St. Matthews Lutheran	965565 Maplewood Sideroad	Cemetery Associated with St Matthew's Lutheran Church which was built in 1866. Burial records date to the1850s.

5.1.5.6 Region of Waterloo – Township of Wilmot

The Township of Wilmot has an official Heritage Committee, which is beginning to compile an inventory of heritage resources but does not yet have an official listing. Several buildings in the Township of Wilmot are designated under the *Ontario Heritage Act*, especially in the Town of New Hamburg where the Township has also established a Heritage Conservation District (Fung, 2007; Martin, 2007). The latter incorporates much of the downtown core, stretching southward roughly from Burns Street, east of the river and including portions of Union, Mill, Burns, Huron, Peel, Wilmot, and Seyler Streets. There are a few areas of interest, although these are not inventoried (Fung, 2007). They are subsequently not mapped in this report. These locales include the Wilmot Line (the original boundary road between the City of Waterloo and Township of Wilmot), the New Hamburg Arena (WWII aircraft hanger that was moved and converted into an arena), the New Hamburg Grandstands (designated by Council in December 2006, burned down due to vandalism in January 2007), the Hartman Bridge (downtown New Hamburg, now refurbished), and various (unnamed) pioneer cemeteries.

The Regional Municipality of Waterloo has GIS mapping of various kinds of resources, including significant built structures, designated structures, cemeteries, pre-1881 churches, and heritage bridges (Lamondin, 2007). Eighty-three sites are listed in the Region's GIS inventory. There are 26 cemeteries, 46 structures, and 11 bridges. The structures include churches, residences, farmsteads, and barns, as well as commercial and industrial sites. A significant number of buildings fall within New Hamburg's core, particularly in its Heritage Conservation District. **Exhibit 5.14** provides the Region's inventory of sites.

There are some discrepancies in the Region's inventory for Wilmot Township. Although Dilse (1981) identified 13 sites within Wilmot Township, only one of these (the Riverside Cemetery) is listed on any of the Region's inventories. While five of the Region's listings are also found in the Ministry of Culture database, Castle Kilbride in Baden, a National Historic Site also listed by the Ministry, is not included in the Region's inventory. Moreover, several inventoried buildings and bridges have been demolished or severely altered.

Exhibit 5.14 Wilmot Township Heritage Properties	
Name	**Address**
Bridges	
Holland Mills Road Bridge	Holland Mills Road, south of Highway 7&8
Haysville Truss Bridge	Demolished
Hartman Bridge	New Hamburg
Lot 22, Concessions I and II Bridge	Haysville
Bridge #30	
Bridge #31	
New Hamburg Viaduct	New Hamburg

Exhibit 5.14 Wilmot Township Heritage Properties	
Name	**Address**
Regional Road 6 Culvert (00652)	
Regional Road 6 Culvert (00653)	
Regional Road 6 Culvert (00654)	
Regional Road 6 Culvert (00655)	
Churches	
Zion United Church	215 Peel Street, New Hamburg
Zion Evangelical Lutheran Church	Concession South of Erbs Road, Part of Lots 3 & 4
St. James Anglican Church	Block A Concession 2, Part of Lot 27
Cemeteries	
Riverside Cemetery	Bleams Road near Highway 7&8 in New Hamburg
Berlett's Corners Cemetery	Berlett's Road
St. Agatha Roman Catholic Cemetery	Concession South of Erbs Road, Part of Lot 7
Fairmount Lutheran Cemetery	Concession South of Snyders Road, Part of Lot 15
Steinmann Amish Mennonite Cemetery	Concession South of Snyders Road, Part of Lot 18
Wilmot Centre Cemetery	Concession South of Bleams Road, Part of Lot 13
Old Baden Mennonite Burying Ground	Concession North of Snyders Road, Part of Lot 13
Bethel United Church Cemetery	Block A Concession 3, Part of Lot 30
Baptist Mission (abandoned)	Block B Concession 1, Part of Lot 19
Nith Valley Mennonite Cemetery/Biehn Mennonite	Block A Concession 3, Part of Lot 24
Holy Family Roman Catholic	Bergey Court
Stauffer Cemetery (abandoned)	Township Road 8
Shantz Mennonite Church Cemetery	Concession South of Erbs Road, Part of Lot 12
Saint Agatha Amish Mennonite Cemetery	Concession South of Erbs Road, Part of Lots 8 & 9
St. James' Anglican Church Cemetery	Block A Concession 2, Part of Lot 27
Wilmot Mennonite Cemetery/Geiger	Concession South of Bleams Road, Part of Lot 17
Zion Evangelical Lutheran St. Agatha	Concession South of Erbs Road, Part of Lots 3 & 4
Zion Evangelical Lutheran Philipsburg	Concession South of Erbs Road, Part of Lots 19 & 20
Christners Cemetery	Concession North of Snyders Road, Part of Lot 23
Emmanuel Evangelical Lutheran Cemetery	Concession South of Snyders Road, Part of Lot 7
Wilhelm Cemetery	3558 Sandhills Road
Wilmot Amish Mennonite Society Cemetery	Block B Concession 2, Lot 15
New Hamburg Reformed Mennonite/Hostetler's	North Snyders Road Lot 20
Hofstetter Cemetery	Concession South of Snyders Road, Part of Lot 9
Pinehill Cemetery	Block A Concession 1 Part of Lot 14
Baird Family Monument	Block A Concession 4 Lot 27
Designated Buildings	
Wagler Property	Part of Lot 17, Concession North of Snyder's Road; 1138 Snyders Road
Martini/Hauck/Curtis House	Part Lot 7, Concession North of Snyder's Road; 1634 Snyders Road
Henry Killer/Nelson Koch Farmstead	Part of Lots 18 & 19, Concession 1, Block B
Property at Zoeller/Wagner House	Part of Lot 15, Concession South of Bleams Road; 279 Bleams Road East
Zion United Church	215 Peel Street New Hamburg

Exhibit 5.14 Wilmot Township Heritage Properties	
Name	**Address**
Zion Evangelical Lutheran Church	Concession South of Erbs Road Part of Lot 3 & 4
St. James Anglican Church	Block A Concession 2 Part of Lot 27
Blue Moon Hotel	Part Lot 6, Concession South of Snyders Road, Petersburg
Hostetler/Ritz House	Concession South of Snyders Road, Part of Lot 21, Township Road 5
Christner/Rudy Homestead	Part of Lot 22 & 23 South of Snyders Road
Former Bank of Hamilton	Part of Lot 27 West of Peel St. Smith's Survey; 98 Peel Street
William Scott Home-Block, Mammoth House or Ernst Block	Part Lot 23, Concession. North of Bleams Road
Waterlot Restaurant/Kirkpatrick	17 Huron Street, New Hamburg
Baden Hotel, aka EJ's Restaurant and Tavern	Plan 627 Part of Lot 96 Concession South of Snyders Road, Part of Lot 15
Shantz Country Cupboard, Tschirhart/Rola Building	Regional Road 12, Part of Lot 7, Concession South of Erbs Road
Survey Scott Pt. 2	190 Mill Street, New Hamburg (demolished),
Plan Smiths Lot 21, Part of Lot 22 etc.	178 Peel Street, New Hamburg
Survey Shade Part of Lot 20	190 Peel Street, New Hamburg
Smith Plan Lot 19	206 Peel Street, New Hamburg
Plan Smith Part of Lot 18	216 Peel Street, New Hamburg
Smith's Plan Lot 17 Part of Lot 18	230 Peel Street, New Hamburg
Survey Shade Part of Lot 16	231 Wilmot Street, New Hamburg
Survey Shade Part of Lot 17	223 Wilmot Street, New Hamburg
Survey Shade Part of Lots 17 & 18	213 Wilmot Street, New Hamburg
Survey Shade Part of Lot 22, Part of Lot 23, Part of Lots 24 & 25	148 Peel Street, New Hamburg (demolished)
Survey Smiths Part of Lot 1 NS East and West Street	34 Peel Street New Hamburg (demolished; now a police station)
Survey Shade Part of Lot 1 PT Wilmot Street	30 Huron Street New Hamburg (demolished; now a post office)
Plan Smith Mill Race PT	50 Huron Street, New Hamburg (demolished; now a CIBC bank)
Plan Smith Lot 4 NS Huron St	96 Huron Street, New Hamburg (demolished; now multiple buildings)
Survey Scott Lot 4	91-93 Burns Street, New Hamburg
Plan Smith Lot 2 Lot 3	73 Burns Street, New Hamburg (demolished; new building)
Smiths Plan Lot 1	178 Mill Street, New Hamburg
Smiths Plan Part of Lot 2	85 Huron Street, New Hamburg (demolished; now a Subway Restaurant)
Survey Scott Lot 2 etc.	Huron Street, New Hamburg
Plan Smith Part of Block B etc.	29 Huron Street, New Hamburg (demolished; now RBC financial)
Survey Scott Part of Lot 23 Plan etc	122 Wilmot Street, New Hamburg (park; no building)
Survey Shade Lot 11, Lot 12 etc.	236 Wilmot Street, New Hamburg
Plan Smith Pt Lot 18 E/S Wilmot Street	209 Wilmot Street, New Hamburg

Exhibit 5.14 Wilmot Township Heritage Properties	
Name	**Address**
Survey Shade Part of Lots 19 & 20	183 Wilmot Street, New Hamburg
Plan Smith Part of Lot 19	193 Wilmot Street, New Hamburg
Plan Smith Lot 6 NS of East and West etc.	114 Huron Street, New Hamburg (demolished; now TD Canada Trust)
Survey Scott Part of Block 2	121 Huron Street, New Hamburg
Plan Smith Part of Lot 1	251-253 Huron Street, New Hamburg
Survey Scott Part of Lot 23 Plan etc	105-111 Huron Street), New Hamburg (demolished; parking lot
Schneider Heritage Home	Bleams Road East, New Hamburg (demolished; new house)
Agreement-Kroetsch Residence	1513 Erbs Road, St. Agatha

5.1.6 Mapping of Heritage Resources

The individual resources for each inventory provided in the preceding sections have been mapped on a 1:50,000 scale topographic sheet for the analysis area (**Exhibit 5.15**). The majority of listed sites could be identified; however, some could not be located.

It should be noted that this listing is not a comprehensive summary of heritage resources within the analysis area. Heritage resources in some areas, such as all Perth and Oxford Counties, are dramatically underrepresented. A preliminary field reconnaissance of structures within Perth South, Perth East, Blandford-Blenheim, and East Zorra-Tavistock identified numerous significant heritage structures, none of which are mapped because no recognized registers have been produced for those areas. The heritage mapping provided also identifies historic communities and historic roads where a high density of historic structures has been found, or can be anticipated to be found.

Along with the many individual structures of heritage interest in the analysis area are numerous cultural landscape units and vistas that merit recognition and preservation. Some of these were noted by Dilse (1981). Among the many cultural landscapes of particular interest are several areas along roads of special historic importance, such as the Huron Road (west of Stratford and east of Punkeydoodle's Corners), Road 107 (from Shakespeare north through Amulree and Hampstead), and Snyder's Road (east of New Hamburg). There are also areas of ethnic interest, such as those showing Mennonite influence in the northeastern section of the analysis area, and cultural enclaves of particularly historical and/or architectural significance, such as the Roman Catholic Church, manse, and cemetery in Kinkora. Among the important views are those that implicitly explain the relationship between a village and its setting, such as the view of Avonton clustered near the river, Avon Road 130 as seen from the hills above the town, and vistas allowing a view of significant cultural sights, such as the hill near Line 40 in Perth East where a triangulation tower was built in 1913 by the Geodetic Survey of Canada. As with individual structures, however, significant cultural landscape units and vistas have not yet been systematically catalogued by the jurisdictions within the analysis area. A detailed inventory of important cultural landscape units and vistas will be compiled within the defined potential corridors during the Preliminary Planning for Provincial Highways/Transitways.

It should also be noted that several cemeteries appear on the 1:50,000 topographic maps of the area or were reported by local residents at the initial Public Information Centre but are not included on existing inventories. The Project Team has mapped their locations in Figure 90; however, their locations have not been verified in the field, nor has a listing been compiled at this time.

Exhibit 5.15 – Built Heritage Resources

5.1.7 Preliminary Recommendations

The heritage resources in the analysis area have been unevenly catalogued and mapped by the various jurisdictions, resulting in an incomplete picture of resources as documented on the cumulative map and list of heritage structures identified on **Exhibit 5.15**. The map shows a relatively dense collection of heritage structures along Highway 7&8 between Stratford and New Hamburg, in Wilmot Township, and in various towns and villages, but implicitly suggests a lack of significant built heritage in the areas that have not been inventoried. While the concentrated areas of heritage resources need to be respected, the many significant buildings along Highway 7&8, for example, reflect its early age and the important role the road played in the area's development. It is also essential to note, however, that the uncanvassed parts of the analysis area also contain important resources (observe the number of early settlements indicated in historic maps shown in Section 5.1.2). A detailed survey of the preferred corridor(s) should be carried out during Preliminary Planning for Provincial Highways/Transitways to complete the inventory of heritage resources therein and to make sure that the full range of built heritage structures, plaques, bridges and cemeteries, cultural heritage landscape units, and vistas are given consideration in the planning and selection of alternative routes**.**

5.2 Cultural Heritage - Archaeology

A Stage 1 Archaeological assessment overview and background study has been conducted to gather information about known and potential cultural heritage resources within the analysis area. The locations of registered archaeological sites can be found in **Exhibit 5.16** and are described in detail in the following sections.

5.2.1 Registered Archaeological Sites

5.2.1.1 Registered Sites in Oxford

There are 12 registered sites within the portion of the analysis area that falls within Oxford County (**Exhibit 5.17**). Four of the sites fall within the former Blandford Township and eight are within Blenheim Township. All of these sites were originally reported by William Wintemberg and have been registered by subsequent researchers. It is not known how many of these sites exist, nor if the locations were ever verified in the field. All but two of the sites are attributed to the Archaic period (circa 10,000 – 3,000 years before the present [BP]), although three of these also have Iroquoian components. One other is assigned an Early Woodland affiliation and the last site, AhHe-5 –Dixon, is recorded as a historic period native burial. Few details of the sites are provided in the Ministry database records. However, the historic aboriginal burial is described as containing "birchbark, needlecase, rusty knife, piece of amethyst, brass kettle". It is not known how Wintemberg came to hear of the burial, whether he observed it himself, or whether it still exists.

Exhibit 5.16 – Registered Archaeological Sites within the Analysis Area

Exhibit 5.17
Registered Archaeological Sites Within the Analysis Area, Oxford County

Borden	Name	Township	Time Period	Function	Researcher
AhHe-5	Dixon	Blandford	Historic	burial	Wintemberg
AhHe-3	Henderson	Blandford	Archaic	camp	Wintemberg
AhHe-4	Scott	Blandford	Archaic	camp	Wintemberg
AiHe-6	Facey	Blandford	Archaic	camp	Wintemberg
AhHd-34	Hall	Blenheim	Archaic	unknown	Wintemberg
AhHd-39	Hewitt	Blenheim	Archaic	unknown	Wintemberg
AhHd-40	Estate	Blenheim	Early Woodland	unknown	Wintemberg
AhHd-41	Fair	Blenheim	Archaic	camp	Wintemberg
AhHd-42	Hagedorn	Blenheim	Archaic	camp	Wintemberg
AhHd-6	Wintemberg 2	Blenheim	Archaic/Iroquoian	unknown	Wintemberg
AhHd-5	Wintemberg 1	Blenheim	Archaic/Iroquoian	camp	Wintemberg
AhHd-7	Lass	Blenheim	Archaic/Iroquoian	camp	Wintemberg

Although it is inappropriate to provide specific details about site locations, it can be said that the sites within Blandford Township typically fall near the county line and eastern township boundary. The Blenheim Township sites are clustered in similar areas and around the community of Plattsville.

5.2.1.2 Registered Sites in Perth

There are 11 registered sites in Perth County (**Exhibit 5.18**). Three fall within North Easthope Township and eight within South Easthope. The majority of sites are historic era or EuroCanadian residential or industrial sites and the temporal affiliation of the other two is not known. All but two of the sites were registered by Paul Lennox during his survey of lands to be impacted by Highway 7&8 construction. Given the lack of archaeological assessments carried out in Perth County, the only sites registered within the analysis area are those recorded by Lennox for the highway project. There are no registered sites in the portions of the analysis area that fall within Perth County, due to a lack of survey and site registration.

Exhibit 5.18
Registered Archaeological Sites within the Analysis Area, Perth County

Borden	Name	Township	Time Period	Function	Researcher
AiHf-2	Heinkel	North Easthope	unknown	unknown	Lennox
AiHf-3	Stratford - Little Lakes	North Easthope	unknown	unknown	unknown
AiHe-27	Bushler	North Easthope	EuroCanadian	house	Lennox
AiHf-1	Easthope Kiln	South Easthope	EuroCanadian	kiln	Lennox
AiHf-4	Stratford - Little Lakes	South Easthope	EuroCanadian	house	Lennox
AiHe-21	Fryfogel Inn	South Easthope	EuroCanadian	house	Chapman
AiHe-22	Riddell 1	South Easthope	EuroCanadian	homestead	Lennox
AiHe-23	Riddell 2	South Easthope	EuroCanadian	homestead	Lennox
AiHe-24	Fryfogel	South Easthope	EuroCanadian	cheese factory	Lennox
AiHe-25	Amacher	South Easthope	EuroCanadian	homestead	Lennox
AiHe-26	Guilk	South Easthope	EuroCanadian	unknown	Lennox

The presence of so many historic era archaeological sites along Highway 7&8 is not surprising, since the highway was once the Huron Road, an early 19th century major east-west thoroughfare. Many of the sites along this road reflect early, mid and late 19th century farmsteads. Other buildings of the same period are still standing and some of these have been designated under the *Ontario Heritage Act* or are listed on municipal heritage building inventories. Of particular note in this listing is the Fryfogel Inn, discussed earlier in this report and investigated in some detail by Don Chapman (1976).

5.2.1.3 Registered Sites in Waterloo County (Wilmot Township)

The majority (48) of the 71 archaeological sites within the analysis area fall within Waterloo County, specifically Wilmot Township (**Exhibit 5.19**). The reason for this does not necessarily reflect its archaeological richness or potential but instead the fact that considerably more archaeological investigations have been carried out here. Eight sites are of an unknown cultural and temporal affiliation (one lithic scatter and one camp) but because of their nature they do not likely relate to historic-era occupations. Four others have been assigned as "precontact aboriginal of an undetermined age" (two find spots, one unknown, and one camp site). Sixteen sites are attributed to the Archaic period (circa 10,000 to 3,000 years before the present) and include camp sites (n = 7), find spots (n = 5) and sites of an as yet undetermined function (n = 4). Two sites date to the earlier part of that period (circa 10,000 to 8,000 BP) and one to the later part of the same (circa 4,500 – 3,000 BP). Two sites are described as Woodland camps and eight others have been given a Late Woodland/Iroquoian affiliation. The latter include so described precontact and Neutral sites, including one communal burial or ossuary (situated along Highway 7&8 and previously protected from roadwork), four village sites, and three camps. Another site has both an Archaic and Woodland component and the last nine sites are historic era EuroCanadian domestic (n = 7) and industrial (n = 2) sites. The historic sites are typically concentrated in the historic communities of Baden and New Hamburg, although they appear elsewhere as well.

In general, the registered sites within Wilmot Township are typically clustered along Highway 7&8 and within historic centres. Nonetheless, there are several scattered throughout the southern portion of the township and along other major roadways like Erb's Road, Berlett's Road, Snyder's Road, and Wilmot Centre Road. Many of the sites along the eastern periphery of the analysis area and within the small emergent commuter centres west of Waterloo and Kitchener have been recorded during recent cultural resource assessments conducted prior to subdivision construction.

Exhibit 5.19
Registered Archaeological Sites Within the Analysis Area, Waterloo County, Wilmot Township

Borden	Name	Time Period	Function	Researcher
AiHd-82	Sluyter	Late Woodland	village	Lennox
AiHe-31	Good Enough	precontact aboriginal	find spot	RM Waterloo
AiHe-34	Morningside	Archaic	camp	Janusas
AiHd-81	Hofstetter	Iroquoian	ossuary	Lennox
AiHe-36	Nuhrgang	precontact aboriginal	unknown	Mayer
AiHe-33	Shantz	EuroCanadian	midden	RM Waterloo
AiHe-4	Cressman 1	Archaic	unknown	unknown
AiHe-35	Helmuth	precontact aboriginal	find spot	RM Waterloo
AiHd-83	Hunsburger Creek	Archaic	camp	Lennox
AiHd-90	Ranger	Late Woodland/Iroquoian	camp/midden	Lennox
AiHe-38	Castle Kilbride	EuroCanadian	farmstead	Knight
AiHe-47	n/a	EuroCanadian	farmstead	Wilson
AiHe-6	Brodrecht	Archaic	unknown	H I Smith
AiHe-7	New Hamburg 1	Iroquoian/Neutral	village	unknown
AiHd-91	Baden Brewery	EuroCanadian	brewery/creamery	RM Waterloo
AiHe-9	Wagner 1	Archaic	find spot	H I Smith
AiHd-99	n/a	Late Archaic	find spot	ASI
AiHe-1	Bender	Archaic	camp	H I Smith
AiHe-10	n/a	unknown	unknown	H I Smith
AiHe-45	n/a	unknown	lithic scatter	Wilson
AiHe-46	n/a	EuroCanadian	midden	Wilson
AiHe-8	Rudy	Archaic	camp	H I Smith
AiHe-44	n/a	Early Archaic	find spot	Wilson
AiHe-5	Cressmand 2	Archaic	find spot	unknown
AiHd-12	Zimmer	Archaic	unknown	Wintemberg
AiHd-13	Brown	Early Woodland	unknown	Wintemberg
AiHd-16	Shantz	unknown	unknown	H I Smith
AiHd-17	Spongy Lake	Woodland	camp	Hurley
AiHd-18	Baden Hill	Late Woodland/Iroquoian	village	Wintemberg
AiHd-2	Baden	unknown	unknown	H I Smith
AiHd-112	Petersburg 2	unknown	camp	Mayer
AiHd-5	Patterson	Archaic	unknown	WLU
AiHd-6	Stemmler	Archaic/Woodland	camp	H I Smith
AiHd-69	Schout	unknown	unknown	Mayer
Borden	Name	Time Period	Function	Researcher
AiHd-20	Wolf	Late Woodland/M. Iroquoian	village	Wintemberg
AiHd-110	Michel	Early Archaic	find spot	Knight
AiHd-111	Petersburg 1	precontact aboriginal	camp	Mayer
AhHe-2	Cressman	Late Woodland/Neutral	camp	H I Smith
AiHe-11	n/a	unknown	unknown	H I Smith
AiHe-12	n/a	unknown	unknown	H I Smith
AiHe-14	Bergey 1 and 2	Archaic	camp	unknown
AiHe-15	New Hamburg 1	Archaic	camp	H I Smith
AiHe-20	Boehler Pottery	EuroCanadian	pottery	Woolfrey
AiHe-28	Bearinger	EuroCanadian	midden	Janusas

Exhibit 5.19 Registered Archaeological Sites Within the Analysis Area, Waterloo County, Wilmot Township				
Borden	**Name**	**Time Period**	**Function**	**Researcher**
AiHe-29	Nader	EuroCanadian	house	Janusas
AiHe-3	Linseman	Archaic	camp	H I Smith
AiHe-30	Nevill	EuroCanadian	midden	RM Waterloo
AiHd-74	Baechler	Late/Middle Woodland	camp	Lennox

In general, these sites span a period occupation from roughly 10,000 years ago to the mid-to-late 19th century. The Region continues to contain potential for the discovery of archaeological sites from the earliest periods of native occupation in the province circa 12,000 BP (i.e., Paleoindian times) to the historic era.

It should be noted that not all of the sites listed in the Provincial database are still extant. For example, several sites or find spots were either mitigated during cultural resource assessments or not deemed worthy of mitigation in the first place. Others have likely been either fully or partially destroyed by highway and building construction.

5.2.2 Historic Cultural Features

Historic cultural features, particularly relating to areas of early historic settlement, also influence archaeological potential. Lands near places of early military or pioneer settlement, adjacent to early transportation routes, or historically used natural resources, typically have archaeological potential. A description of historic cultural features in each township/county is provided in Section 5.1.2. This section summarizes the general location of historic cultural features in the analysis area. Township historic maps are provided in **Exhibits 5.1 - 5.8**.

5.2.2.1 Ellice Township, Perth County

Ellice Township is located in the northwest portion of the analysis area. In general, the historic structures are situated adjacent to the concession roads. As a result, those lands within roughly 100 m of these roads demonstrate archaeological potential.

5.2.2.2 Downie Township, Perth County

Downie Township is located in the southwest portion of the analysis area. The historic atlas map for Downie Township shows that most lots were settled by 1879 and virtually all of the concession roads were open (see **Exhibit 5.6**). The Grand Trunk Railway opened a line through the township in 1857, resulting in the growth of the City of Stratford and the emergence of stations like St. Paul's in the central portion of the township. The majority of historic buildings are situated adjacent to the concession roads. In addition to the lands associated with the early historic centres, those in proximity to the thoroughfares have archaeological potential.

5.2.2.3 South Easthope Townships, Perth County

The 1879 map of South Easthope Township (located in the central portion of the analysis area) illustrates structures on most lots. In addition to the general vicinity and cores of Shakespeare and Tavistock, and the lands adjacent to the Huron Road, the lands immediately beside the concession roads of the Township also show archaeological potential as they all appear to have been open by the last quarter of the 19th century (**Exhibit 5.7**).

5.2.2.4 North Easthope Township, Perth County

As with the townships previously described, the lots within North Easthope Township (located in the central portion of the analysis area) were almost all settled by 1879 and the concession roads were apparently open (**Exhibit 5.8**). High potential for historic sites exists around the early settled communities described, as well adjacent to the concession roads.

5.2.2.5 East Zorra Township, Oxford County

East Zorra Township (located in the south-central portion of the analysis area) was surveyed in 1820, but by 1822 only 145 acres were cleared in the township. The first lot sold was on the ninth concession (RCT, 1968), along the western township boundary. There are few communities within the portion of the township that falls within the analysis area. Tavistock is the main one and its history has already been described. Caleb Caistor is said to have established a tavern on the east side of Highway 59, south of Tavistock. This highway was also a major route at the time. By 1876 most of the lots within the township were settled (**Exhibit 5.9**).

5.2.2.6 Township of Blenheim, Oxford County

Only a very small portion of the analysis area falls within Blenheim Township (the southeastern portion of the analysis area). Nonetheless, the area of concern contains two small historic centres, namely Plattsville and Chesterfield (**Exhibit 5.10**).

5.2.2.7 Township of Blandford, Oxford County

Only a small portion of Blandford falls within the analysis area (in the southeast portion). Although there are no early settlements within the Blandford Township portion of the analysis area, the areas along the concession roads do have some archaeological potential for the recovery of historic era sites.

5.2.2.8 Township of Wilmot, Waterloo County

The Township of Wilmot is located in the northeastern portion of the analysis area. That there are numerous designated and undesignated historic structures along Highway 7&8, and within the historic crossroads communities described in all of the relevant townships. By Ministry of Culture criteria, proximity to these, also suggests historic potential for adjacent lands. Many of the standing structures identified in local registers of heritage buildings relate to the time of the initial founding of communities and townships.

5.2.3 Project Area and Application of Specific Information

Two miscellaneous criteria are also considered when evaluating archaeological potential. These include local knowledge and recent disturbance. Local knowledge of the presence of archaeological sites, usually determined through the identification and/or collection of artifacts from an area, automatically confirms potential and triggers the need for Stage 2 field survey. There is some local knowledge of archaeological sites within Wilmot, Blandford and Blenheim Townships at least, yet this information is not specific enough to determine the location of sites. The disturbance of natural soil horizons through development-related activities, primarily road construction, subdivision development, and infrastructure projects can negate potential for the recovery of archaeological resources. Throughout the analysis area there are several locales where prior, extensive disturbance can be confirmed, including along roadways and in the more urban zones. Other, less noticeable, disturbance likely also exists in several areas, but this would have to be confirmed by an on-site inspection.

5.3 Summary of Significant/Sensitivity of Cultural Environment

5.3.1 Built Heritage

Heritage resources in the analysis area have been very unevenly catalogued and mapped by the various jurisdictions. Concentrated areas of heritage resources need to be respected. The many significant buildings along Highway 7&8, for example, reflect its early age and importance. But it is also essential to note that the uncanvassed parts of the analysis area also contain important resources (e.g., the number of early settlements indicated in historic maps shown earlier) and a survey of uncanvassed areas will be enacted at a later point in this study process when the potential for transportation alternatives to be located in these areas are known. The fact that many municipal listings have not considered various types of resources, including plaques, bridges and cemeteries, further supports the need for additional survey.

5.3.2 Archaeological Heritage

The details provided in the preceding sections demonstrate that a good portion of land within the analysis area has archaeological potential for either precontact aboriginal sites, historic sites or both. Any corridor that would cross east-west or north-south through the analysis area will likely cross watercourses and other features signalling a high probability for finding archaeological sites. The lands adjacent to Highway 7&8 have very high archaeological potential, particularly with respect to EuroCanadian sites. However, it should be considered that virtually all of the right-of-way has been subject to some degree of disturbance or archaeological study in the past.

Given the very high potential of most of the analysis area, it does not seem that a corridor could be planned that will avoid all potential site areas. Nonetheless, a few observations can be offered that may assist with the planning process. First, any work within and adjacent to the existing highway right-of-way is likely to result in the discovery of historic era archaeological sites. If such sites are found, they are likely to relate to early structures along the Huron Road and will undoubtedly require mitigation. Second, the central and southern portion of Wilmot Township is exceptionally rich in both native and EuroCanadian archaeological sites of great importance. Any work in this area will also undoubtedly require extensive assessment. Although less is known of the archaeological record north and south of Stratford, much of this area appears to have slightly less historic settlement and fewer watercourses, suggesting a higher percentage of property with low archaeological potential. While this view may be biased from a lack of suitable information, it conforms with the known information about archaeological site distributions in the general region.

6.0 SUMMARY OF SIGNIFICANT ENVIRONMENTAL FEATURES AND ISSUES

A summary of existing environmental conditions and constraints has been provided at the end of each of the previous sections on the natural, socio-economic, and cultural environments. The information collected on environmental conditions confirms that the evaluation criteria, to be used in identifying and evaluating planning alternatives are relevant to the analysis area. The criteria will be used to collect information on, generate, compare and select a preferred planning alternative, detailed planning alternative and ultimately a preliminary design alternative that satisfies the goals of this transportation study.

A summary of the key environmental features is provided in **Exhibit 6.1**. The reader should keep in mind that these findings are based on secondary source investigations and enhanced through discussions with staff at municipalities, agencies, and other facilities. The significant features of the environment in the analysis area will be confirmed through the consultation and fieldwork as the study progresses.

Exhibit 6.1
Summary of Significant Environmental Features in Analysis Area

Factor	Sub-Factor	Significant Features in Highway 7&8 Analysis Area	Shown on Exhibit	Described in Section
Natural Environment				
Fisheries and Aquatic Ecosystems	Fish Habitat	• Nith River, Horner Creek, Upper Grand, Avon River, Trout Creek, Black Creek, and Whirl Creek.	Exhibit 3.1	Section 3.1
	Fish Community	• Coldwater, coolwater, and warmwater fish communities. • Aquatic Species at Risk in watersheds include black redhorse, silver shiner, wavy-rayed lampmussel, rayed bean mussel, and redside dace.	Exhibit 3.1	Section 3.1
Terrestrial Ecosystems	Wildlife/Wildlife Habitat	• Species at Risk mapping includes protected mussel species in the Nith River tributaries crossing Highway 7&8.	Exhibit 3.2	Sections 3.1.4 and 3.2.4
	Wetlands	• PSWs: Central Whitemans/Horner Creek Complex, Ellice Swamp, Gads Hill South, Haysville Wetland Complex, Little Lakes Swamp Complex, New Hamburg Oxbow Wetland Complex, Phillipsburg Swamp, and Spongy Lake. • Several LSWs also located in analysis area.	Exhibit 3.2	Section 3.2.2
	Forest Cover (e.g., woodlands [forest stands, woodlots and interior forest habitat] and significant valley lands [valley and stream corridors])	• Minimal forest cover in analysis area (<5%). • Nith Valley supports Carolinian biota and lowland deciduous forests, including one plant Species at Risk (Showy Goldenrod).	Exhibit 3.2	Section 3.2.3
	Vegetation Communities and Flora	• Nith Valley supports Carolinian biota and lowland deciduous forests, including one plant Species at Risk (Showy Goldenrod).	Exhibit 3.2	Section 3.2.4
	Designated/Special Areas (e.g., 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)	• Little Lakes Bog and Swamp Forest – ANSI – LS • Phillipsburg Forest ANSI –LS • Phillipsburg Swamp ANSI – LS • Spongy Lake Bog ANSI – LS • St. Agatha Beech-Maple Forest ANSI - LS • Baden Hills Kames ANSI – ES • Harmony Cut ANSI – ES • Seebach Hill Spillway ANSSI – ES • Wartburg Road Cut ANSI – ES	Exhibit 3.2	Sections 3.2.5 and 3.2.6

Exhibit 6.1
Summary of Significant Environmental Features in Analysis Area

Factor	Sub-Factor	Significant Features in Highway 7&8 Analysis Area	Shown on Exhibit	Described in Section
		• Easthope Moraine ANSI – ES • Ellice-Huckleberry Marsh ANSI – LS • Gads Hill Moraine ANSI – LS • International Biological Program Sites – Ellice Huckleberry Marsh, Gads Hill Agreement Forest and Spongy Lake Bog, and Sand Hills.		
Groundwater	Areas of Groundwater Recharge and Discharge	• Regionally significant recharge occurs through surficial sands and gravel deposits in northwest section of analysis area, as well as Easthope and Gads-Hill Moraine. • Discharge areas created by topographical depressions (i.e., wetlands, streams and isolated ponds) receive limited groundwater discharge on a seasonal basis.	Exhibit 3.5	Section 3.3.4.2
	Groundwater Source Areas and Wellhead Protection Areas	• Capture zones and groundwater source areas have been mapped.	Exhibit 3.5	Section 3.3.4.3
	Large Volume Wells	• 42 municipal wells and three communal supply wells in the analysis area. They are mainly located east of Baden, west of Stratford, and one in Tavistock.	Exhibit 3.5	Section 3.3.4.4
	Private Wells	• Private wells (2,718 well records) scattered throughout the analysis area and clustered along existing roadways .	Exhibit 3.5	Section 3.3.4.4
	Groundwater-Dependent Commercial Enterprises	• To be confirmed through field investigations.		-
	Groundwater-Sensitive Ecosystems (e.g., groundwater fed wetlands and coldwater streams)	• Groundwater divide occurs near Easthope Moraine along a line running north of Shakespeare towards Gads Hill, separating Nith River watershed in east and Avon River watershed in south. Moraine areas are most sensitive	Exhibits 3.4 to 3.7	Section 3.3.4.3
Surface Water	Watershed/Subwatershed Drainage Features/Patterns	• Grand River Watershed – Nith River, Horner Creek, and Upper Grand. • Thames River Watershed – Avon River, Trout Creek, Black Creek, and Whirl Creek.	Exhibit 3.1	Section 3.4
	Surface Water Quality and Quantity	• Existing watercourses and watersheds are significant throughout analysis area, as named above.	Exhibit 3.1	Section 3.4
Air Quality	Local and Regional Air Quality (Total contaminant and greenhouse gas emissions)	• 90^{th} percentile contaminant concentrations meet provincial ambient air quality criteria and national ambient air quality objectives.	Exhibit 3.8	Section 3.5

Exhibit 6.1
Summary of Significant Environmental Features in Analysis Area

Factor	Sub-Factor	Significant Features in Highway 7&8 Analysis Area	Shown on Exhibit	Described in Section
		However, measured levels of PM2.5 were found to occasionally exceed the respective air quality criteria, which is typical in Southwestern Ontario.		
	Sensitive receptors to air pollutants and greenhouse gas emissions	• Residential areas in New Hamburg and Stratford as well as residences close to transportation facilities.	Exhibit 4.2	Section 4.2.3
Socio-economic Environment				
Land Use Planning Policies, Goals, Objectives	First Nation Land Claims	• Huron Tract. • Claims as identified by Indian and Northern Affairs Canada: o Stoney Point Indian Reserve (court file #T-702-85); o Chippewas of Kettle and Stoney Point (court files #24085/96, #13182/92, #T-863-95, and #T-3077-94); and o Walpole Island First Nation (court file #00-CV-189329).	Exhibit 4.1	Section 4.1.1
	Provincial/Federal land use planning policies/goals/objectives	• PPS • GHG Plan	Exhibit 4.2	Section 4.1.2
	Municipal (regional and local) land use planning policies/ goals/objectives (OPs)	• OPs in County of Perth, City of Stratford, Regional Municipality of Waterloo, Township of Wilmot, and County of Oxford are relevant to analysis area.	Exhibit 4.2	Section 4.1.3
	Development Objectives of Private Property Owners	• Throughout analysis area especially in designated growth area in Region of Waterloo.	Exhibit 4.2	Section 4.1.3
Land Use/Community	First Nation Reserves	• None in analysis area.	-	Section 4.2.1
	First Nations Sacred Grounds	• Locations to be confirmed through consultation with First Nations.	-	Section 4.2.2
	Urban and Rural Residential	• Urban residential (existing and future) in Stratford, New Hamburg, and Shakespeare. • Rural residential scattered throughout analysis area.	Exhibit 4.2	Section 4.2.3
	Commercial/Industrial	• Commercial/industrial land uses in Stratford and New Hamburg. • Scattered commercial uses along existing Highway 7&8. • Shakespeare has cluster of commercial businesses on existing Highway 7&8.	Exhibit 4.2	Section 4.2.4
	Tourist Areas and Attractions (e.g., museums, theatres, etc.)	• Stratford Festival is a very significant tourist destination, attracting over 600,000 visitors per year from across Ontario and United States. • Theatres, parks, restaurants, hotels, etc. are primarily located in	Exhibit 4.3	Section 4.2.5

Exhibit 6.1
Summary of Significant Environmental Features in Analysis Area

Factor	Sub-Factor	Significant Features in Highway 7&8 Analysis Area	Shown on Exhibit	Described in Section
		Stratford to accommodate the festival. Fryfogel Inn is historic/tourist destination in Shakespeare.		
	Community Facilities/Institutions (e.g., hospitals, schools, places of worship, and unique community features)	• Community facilities, libraries, schools, churches, arenas etc. are primarily located in built-up areas of Stratford and New Hamburg, with some facilities in Shakespeare.	Exhibit 4.3	Section 4.2.6
	Municipal Infrastructure and Public Service Facilities (e.g., sewage and water services, police/emergency services, and local utilities)	• Municipal infrastructure in Stratford and New Hamburg. • Shakespeare has municipal well and water supply system.	-	Section 4.2.7
Noise Sensitive Areas (NSAs)	Highway Noise	• Noise levels near a highway fluctuate depending on topography, seasonal traffic volumes, percentage of truck traffic, and frequency of users entering and exiting roads or entrance ways.	-	Section 4.3
	Construction Noise	• Residential areas and sensitive institutional uses adjacent to proposed construction areas are sensitive to construction noise.	-	Section 4.3
Land Use/Resources	First Nation Treaty Rights or Use of Land and Resources for Traditional Purposes (e.g., hunting, fishing, harvesting of country foods, and harvesting of medicinal plants)	• Huron Tract. • Claims as identified by Indian and Northern Affairs Canada: o Stoney Point Indian Reserve (court file #T-702-85); o Chippewas of Kettle and Stoney Point (court files #24085/96, #13182/92, #T-863-95 and #T-3077-94); and o Walpole Island First Nation (court file #00-CV-189329).	Exhibit 4.1	Section 4.4.1
	Agriculture	• Agriculture is a significant land use in analysis area . • Most lands are Class 1 and 2 soils, and considered as Prime Agricultural Soils. • No specialty crop areas identified in local OPs.	Exhibit 4.5	Section 4.4.2
	Recreation (e.g., conservation areas, municipal parks, public spaces, golf courses, trails, greenways, and open space linkages)	• Thistledown Equestrian Centre (in Shakespeare). • Stratford Country Club. • Stratford Municipal Golf Course. • Little Lake Golf Centre (in Stratford). • Foxwood Golf Club (in Petersburg). • Tavistock Golf Course.	Exhibits 4.2 and 4.3	Section 4.4.3

Exhibit 6.1
Summary of Significant Environmental Features in Analysis Area

Factor	Sub-Factor	Significant Features in Highway 7&8 Analysis Area	Shown on Exhibit	Described in Section
		• Plattsville Community Park. • Shakespeare Optimist Park and Community Centre.		
	Aggregates, Mineral-Resources	• A number of licensed pits/quarries north of Highway 7&8 near Shakespeare and one north of Stratford. • Other aggregate resources areas on fringes of analysis area.	Exhibit 4.2	Section 4.4.4
Major Utility Transmission Corridors	Railroads, hydro, gas, oil etc.	• Goderich-Exeter Railway corridor which runs parallel to Highway 7&8 from Stratford, easterly towards Kitchener.	-	Section 4.5
Contaminated Property and Waste Management	Landfills, Hazardous Waste Sites, 'Brownfield' Areas, other known contaminated sites, and high-risk contamination areas	• Two active waste disposal sites in analysis area (one northwest of Tavistock and in southeast Stratford). • Four closed waste disposal sites in analysis area (one north of Shakespeare and three in Stratford). • Other areas of potential contamination include auto wrecking/scrap yards, Anderson Waste Disposal Site, and light industrial areas.	Exhibit 4.6	Section 4.6
Landscape Composition	Scenic Composition (total aesthetic value of landscape components)	• Flat to gently rolling terrain. • Landscape is dominated by farming activities.	Exhibit 3.4	Section 4.7
	Sensitive Viewer Groups	• Residential areas as described above, concentrated in Stratford, New Hamburg, and Shakespeare.	Exhibit 4.2	Section 4.7
	Scenic value of views/vistas from the transportation facility	• Views from existing Highway 7&8 are dominated by agricultural land uses (i.e., active farms). • Flat topography and long straight sections of existing highway result in relatively unremarkable views from highway.	-	Section 4.7
	Specimen Trees	• Specimen trees to be identified as protection priorities.	Exhibit 3.2	-
Cultural Environment				
Cultural Heritage – Built Heritage and Cultural Landscapes	Built heritage resources identified through designation or heritage conservation easement under *Ontario Heritage Act*	• Fryfogel Inn (in Shakespeare) designated under *Ontario Heritage Act* Castle Kilbride in Baden on Ministry of Culture's listing. • Several other built heritage resources identified by local heritage committees and municipalities are scattered throughout analysis area, primarily concentrated in built-up villages or communities, including Stratford, Shakespeare, and New Hamburg. • Township of Wilmot and City of Stratford have HCDs.	Exhibits 5.1 to 5.8	Section 5.1

Exhibit 6.1
Summary of Significant Environmental Features in Analysis Area

Factor	Sub-Factor	Significant Features in Highway 7&8 Analysis Area	Shown on Exhibit	Described in Section
	Heritage Bridges	• Limited documentation on heritage bridges. • City of Stratford Heritage Committee is assembling a list. • Hartman Bridge (downtown New Hamburg).	-	Section 5.1.2
	Areas of Historic 19th Century Settlement	• Wilmot Township has large and small historic centres that were important to founding Amish populations in Philipsburg, St. Agatha, Petersburg, Baden, and New Hamburg.	Exhibits 5.15 and 5.16	Sections 5.1 and 5.2
	Cultural Landscapes (collection of individual man-made features modifying pristine landscape)	• Scenic views with cultural landscapes include: o Views of New Hamburg and Baden Hills from Highway 7&8; o Shildroth and Otto Farmsteads; o View to Lingelbach Cemetery (Sideroad 10); o Shakespeare area; o Little Lakes area; o Avon River highlands and northern limits of Shakespeare; o Wilmot Creek hill landscape; and o Height of land at Punkeydoodle's corners.	-	Section 5.1.5
	First Nation Burial Sites	• To be confirmed through consultation with First Nations.	-	Section 5.2.1
	Cemeteries	• Scattered throughout analysis area. • Four documented in *Description of Man-Made Heritage in the Environment: Preliminary Report* (Dlise, 1981).	Exhibit 4.3	Section 5.1.5
Cultural Heritage – Archaeology	Pre-Historic and Historic First Nation Sites	• Analysis area is rich in archaeological potential throughout. • Southern and central portions of Wilmot Township are exceptionally rich in both native and EuroCanadian archaeological sites.	Exhibits 5.1 to 5.8	Section 5.2.1
	Historic Euro-Canadian Archaeological Sites	• Analysis area is rich in archaeological potential throughout. • Southern and central portions of Wilmot Township are exceptionally rich in both native and EuroCanadian archaeological sites.	Exhibits 5.16	Section 5.2.2

7.0 SUMMARY OF INPUT RECEIVED ON ENVIRONMENTAL CONDITIONS AND MTO RESPONSES AND CHANGES

This section provides a summary of comments and input received on the draft *Report F (Part 1): Environmental Conditions and Constraints* during the public review period in the Fall 2007, as well as an explanation of how this feedback was addressed in this version of the report by the MTO (Exhibit 7.1).

Exhibit 7.1
Summary of Report F (Part 1): Environmental Conditions and Constraints Comments Received and MTO Action Taken

Comment Source	Comments/Suggested Changes	Action Taken
Environmental Assessment Officer Environment Canada - Ontario	**Species at Risk and Migratory Birds**	
	EA should consider adverse effects on species of local, regional, provincial or federal concern, including wildlife species listed under the federal *Species at Risk Act* (SARA).	Comments will be implemented during the evaluation of transportation planning alternatives.
	Known occurrences of species currently designated by COSWEIC and COSSARO and listed in Schedule 1 of the *Species at Risk Act* should be considered.	The Provincial S-Ranks and SARA Schedule 1 will be utilized to allow for differentiation among corridor alternatives. Regionally rare species, where known or encountered through field surveys will be noted in the evaluation and factored into the overall quality rating of vegetation communities/habitats, typically reported under Vegetation and Wetlands.
	If there is potential for additional species at risk to occur at the project site (i.e. previous known occurrence, species range overlap and/or known habitat preference exists), information on the habitat preference of the species should be compared with information on the habitats at the project site to determine if the area could support that species. A qualified biologist should conduct a thorough biological inventory of all areas of natural habitat that may be affected by the project and have the potential to support species at risk. A strategy should then be developed to protect any identified species at risk, with a primary	The Species At Risk search tool was utilized during the determination of ranges for additional SARA species. Potential habitat for avian Species At Risk was identified during the breeding bird surveys by comparing site conditions with known habitat profiles and distributions for avian Species At Risk. Where potential habitat occurrences are identified, they will be considered along with recorded occurrences in the evaluation.

	focus on avoidance. Consulting the species at risk search tool is suggested. The *Ontario Breeding Bird Atlas* should be utilized to determine the distribution and abundance of breeding migratory birds in a particular study area. The *Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada* should be consulted when dealing with SAR in EA.	The *Ontario Breeding Bird Atlas* was used as a resource guide as suggested. However, actual field inventory data will be used as the primary data for the evaluation. The *EA Best Practice Guide* was consulted.
	Wetlands Important consideration should be given to the Federal Wetland Policy and potential impact to wetlands.	Wetlands will be given high consideration during both the generation and the evaluation of transportation planning alternatives.
	Air Quality Consider Air Emissions and Air Quality with respect to Construction Impacts and mitigation for: vehicular exhaust emissions, dust/particle emissions/formation, asphalt batching and road paving	Total emissions of the criteria pollutants PM10, PM2.5, NOx, CO, and VOCs and the greenhouse gases CH4, N2O, CO2 will be measured for the alternative transportation networks. Alternatives will be evaluated by comparing the relative changes in total tonnes of air emissions. Impacts to air quality during construction will be dealt with during detail design. Construction impacts will be minimized through the implementation of a construction code of practice, such as Environment Canada's *Best Practices for the Reduction of*

		Air Emissions From Construction and Demolition Activities. Emissions due to asphalt batching and road paving will be mitigated by implementation of a construction code of practice.
	Wildlife Travel Corridors and Mortality Rate Undertake Wildlife Travel Corridors and Mortality Rate investigation	Accident information has been collected and will be assessed.
Resource Planner Grand River Conservation Authority	**Floodplain Mapping** Utilize floodplain mapping	Suggestion will be utilized once transportation need is confirmed.
	Stormwater Management Request GRCA Stormwater information. Undertake detailed calculations and confirmation of culvert sizing etc.	Stormwater management quality and quantity calculations will be undertaken during preliminary design and shared. This information will be collected during Detail Design.
	Wetlands Suggest unevaluated wetlands be evaluated. Wetland loss be avoided and restore and enhance remaining wetlands/linkages where feasible.	Comments noted however, the evaluation of unevaluated wetlands is not part of this assignment. Unevaluated wetlands have been identified and are found as part of Exhibit 3.2 and Report 'F'. Comments noted.
	Natural Features Add Waterloo Region Philipsburg Swamp and	Philipsburg Swamp and Forest ESPA were

	Forest ESPA to report text and map	added to mapping and text in Report 'F'.
	Additional policies and guidelines for evaluation of significant natural features and functions The current *GRCA Wetland Policy*, *Significant Wildlife Habitat Technical Guide* (OMNR, 2000) and *Natural Heritage Reference Manual* (OMNR 1999) be referenced in Exhibit 3.13. Recommend background reviews and field inventories of provincially and regionally significant species and communities be conducted.	Suggested references added to Exhibit 3.13 and will be used during the evaluation of significant natural features and functions. Interpretation of significant natural features and functions information will come forward from detailed supplementary field investigations. The study will rely on information available from the planning authorities and conservation authorities that have the responsibility to identify significant features such as Significant Wildlife Habitat and Significant Woodlands. Background reviews have been conducted and field inventories will be performed.
District Planner Ministry of Natural Resources	**Fisheries** Utilize available fisheries information.	Comments noted. Recent fish records will be used as part of the collection of site specific data.
	Wildlife *The Wildlife Habitat Technical Guide* (OMNR 2000) provides additional guidance on the identification of significant wildlife habitat.	Comments noted. *The Wildlife Habitat Technical Guide* will be used.
	Deer Wintering Areas Suggest using the Land Information Ontario data warehouse.	LIO data warehouse was check for Deer Wintering Areas.
	Significant Wildlife Habitat Significant wildlife habitat can include many different types of features/values. The significant Wildlife Habitat Technical Guide (OMNR, 2000) should be utilized and municipalities should be contacted.	Comments noted. Under the PPS, the planning authorities have the responsibility to identify Significant Wildlife Habitat. An assessment of Significant Wildlife Habitat has been undertaken and features identified in Report

		'F'.
	Unevaluated Wetlands These wetlands should be acknowledged and identified in Exhibit 3.2.	Unevaluated wetlands have been identified in Exhibit 3.2 and Report 'F' and will be mapped once fieldwork is completed.
	Significant Woodlots The report should discuss significant woodlands and the approaches municipalities have taken to identify these areas within the analysis area.	An assessment of Significant Woodlands has been undertaken and features identified in Report 'F'. In the absence of this designation by municipalities, the evaluation of potential impacts to the vegetation criterion will include consideration of indicators such as upland vegetation units, provincially significant vegetation communities and the known presence of species at risk or of conservation concern.
	Rare Species Exhibit 3.3 and Appendix C – Species List are inconsistent and that field verification for the presence of rare species may be required.	Known presence of rare species in the study area has been refined, including the addition of information provided by MNR and clarification of the species list in Appendix C.
	ANSIs Ellice-Huckleberry Swamp Regionally Significant Life Science ANSI and Gad Hill Moraine Regionally Significant Earth Science ANSI should be added to Section 3.2.5	These two additional ANSI's have been incorporated into Report 'F'.
	Exhibit 3.13 Amend to indicate that significant woodlands and significant wildlife habitat have protection under the PPS.	Exhibit 3.13 has been amended accordingly.
	Regional/landscape-level relationships between natural features Add a statement to Section 3.6.2, Terrestrial	Generalized principles of landscape

	Resources that impact assessment and analyses completed during subsequent stages of the study will consider regional/landscape- level relationships between natural features.	connectivity will be captured in the future assessment. An analysis of landscape connectivity that provide corridors for wildlife passage between core areas and overview of where major wildlife movement is expected to occur within the study area will be carried out when transportation needs are confirmed. Impacts to environmental features created by future corridors will be addressed in Draft Report 'E'.
	Petroleum Wells This information is limited and should be expanded.	Comments noted and additional information incorporated.
	Exhibit 6.1 should be updated to reflect the above noted comments.	Comments are noted and the changes to Exhibit 6.1 made.
	Additional Layers from LOI should be obtained: ▪ Aggregate Site Authorized ▪ ARA Line Segment and ARA Polygon Segment ▪ Crown Land ▪ Nesting Sites ▪ Spawning Areas ▪ Wooded Area (reflects SOLRIS data)	Incorporated the recommended layers into Report 'F".
	Heronries Obtain these layer and suggest site assessment during future stages of EA	Information is being obtained and site assessments will be carried out in future stages of the EA.
CAO Perth East	Concerned regarding impacts to woodlots	Concern has been noted and areas of potential impact and mitigation will be confirmed.
CAO City of Stratford	Consideration for social, natural and cultural impacts.	Concern has been noted and areas of potential impact and mitigation to be confirmed.
Environmental Assessment Facilitator	Concern regarding negative cultural heritage	Concern has been noted and areas of potential

Ontario Realty Corporation	and environmental impacts.	impact and mitigation to be confirmed.
Regional Archaeologist Ministry of Culture	Concern regarding potential negative cultural heritage impacts – particularly archaeological.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
Rural Planner OMAFRA	Concern regarding negative impact to agricultural land in study area.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
Members of the Public	Concern regarding negative impacts to built cultural heritage resources.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
	Concern regarding negative impacts to existing private wellheads through contaminated surface runoff.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
	Concern regarding negative impacts to wetlands, woodlots and linkages.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
	Concern regarding negative impacts to air quality.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
	Concern regarding destruction of wildlife habitat	Concern has been noted and areas of potential impact and mitigation will be confirmed.
	Concern regarding noise pollution.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
	Concern regarding loss of agricultural lands.	Concern has been noted and areas of potential impact and mitigation will be confirmed.
	Concern regarding damage to Conservation Areas.	Concern has been noted and areas of potential impact and mitigation will be confirmed.