ENVIRONMENTAL ASSESSMENT AND PRELIMINARY DESIGN REPORT ONE-STAGE SUBMISSION

HIGHWAY 6

FREELTON NORTHERLY 16.9 KM TO GUELPH

W.P. 65-76-05

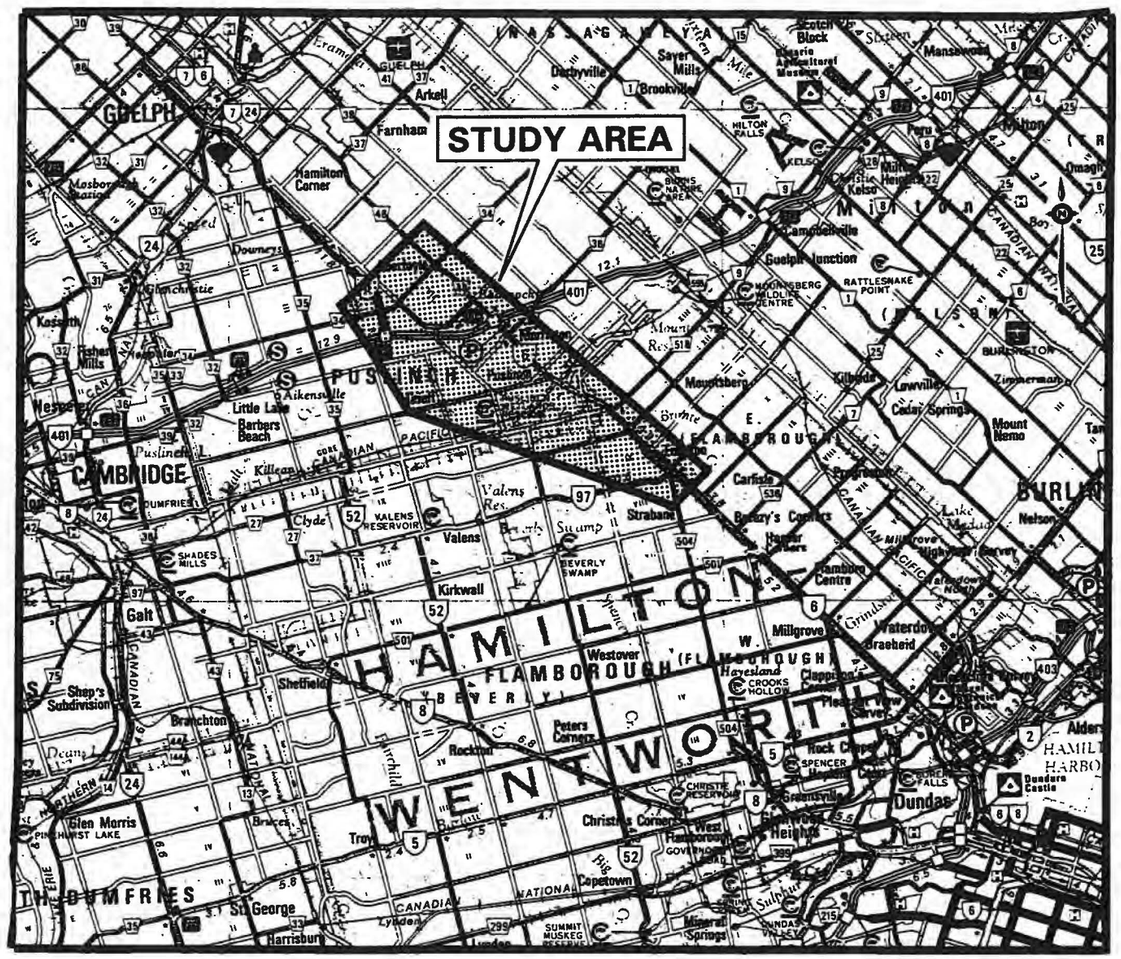
SEPTEMBER 1995

VOLUME 1

Ministry of Transportation
Ontario

HIGHWAY ENGINEERING SECTION
PEEL, HALTON AND HAMILTON
CENTRAL REGION

Ministry of Transportation
Ontario



ENVIRONMENTAL ASSESSMENT OF HIGHWAY 6

FREELTON NORTHERLY 16.9 KM TO GUELPH

COUNTY OF WELLINGTON
REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH
TOWNSHIP OF PUSLINCH TOWN OF FLAMBOROUGH

W.P. 65-76-05
DISTRICT 6 (TORONTO)

PREPARED BY:
FENCO MACLAREN INC.

SEPTEMBER 1995

REVIEWED BY:

C. SOUTHEY
SENIOR ENVIRONMENTAL PLANNER

H. WOJCINSKI, P. Eng. / T. SZEKELY, P. Eng.
SENIOR PROJECT MANAGER

APPROVED BY:

B. PELTIER, P. Eng.
MANAGER, ENGINEERING

W. PECK, P. Eng.
MANAGER, CONSTRUCTION

TABLE OF CONTENTS

VOLUME 1

CHAPTER 1 SUMMARY

1.1 Purpose of the Undertaking 1-1
1.2 Study Area 1-2
1.3 Advantages and Disadvantages of Alternatives to the Undertaking 1-2
1.3.1 Do Nothing Alternative 1-2
1.3.2 Modal Alternatives 1-2
1.4 Advantages and Disadvantages of Alternative Methods of Carrying Out the Undertaking 1-3
1.4.1 Upgrading of Existing Municipal Road Network 1-3
1.4.2 Corridor Alternatives 1-3
1.4.3 Route Alternatives 1-4
1.4.4 Alignment Alternatives 1-4
1.4.5 Update and Supplementary Investigations 1-5
1.5 Description of the Undertaking 1-6
1.6 Potential Environmental Effects and Mitigating Measure 1-8
1.7 Advantages and Disadvantages of the Undertaking 1-8
1.8 Public Participation 1-19
1.9 External Contacts 1-19
1.10 Sub-Studies Carried Out in Relation to this Project 1-19

CHAPTER 2 INTRODUCTION

2.1 The Environmental Assessment Report 2-1
2.1.1 Process for Amending/Updating This Environmental Assessment 2-1
2.2 Purpose of the Undertaking 2-2
2.2.1 General 2-2
2.2.2 Identified Transportation Problems 2-2
2.2.3 Purpose of the Undertaking 2-4
2.2.4 Project Objectives 2-4
2.3 Background 2-4
2.3.1 Previous Studies 2-4
2.3.2 Related Studies and Projects 2-5

CHAPTER 3 STUDY ORGANIZATION & THE ONE-STAGE ENVIRONMENTAL ASSESSMENT PROCESS

3.1 Introduction 3-1
3.1.1 Update and Supplementary Investigations 3-1
3.2 Pre-Submission Consultation 3-2
3.2.1 Purpose 3-2
3.2.2 Project Team 3-3
3.2.3 Internal Team 3-3
3.2.4 Government Ministries and Agencies Involvement 3-4
3.2.5 Municipal Involvement 3-4
3.2.6 Public Involvement 3-6
3.2.7 Railway Companies 3-14
3.2.8 Utility Companies 3-14
3.3 Development of Study Design 3-14
3.3.1 Project Appraisal and Pre-Study 3-14
3.3.2 Definition of the Study Area 3-15
3.3.3 Development and Review of Study Design 3-15
3.3.4 Study Staging and Timeframe 3-16
3.4 Determination of Environmentally Significant Issues 3-17
3.4.1 Definition 3-17
3.4.2 Identification 3-17

CHAPTER 4 EXISTING AND PROJECTED CONDITIONS

4.1 Natural Environment 4-1
4.1.1 Geology and Geomorphology 4-1
4.1.2 Soils 4-4
4.1.3 Hydrogeology 4-4
4.1.4 Hydrology 4-6
4.1.5 Fisheries 4-8
4.1.6 Forestry Resources 4-12
4.1.7 Environmentally Sensitive Areas/Wildlife 4-13
4.1.8 Climate 4-15
4.2 Social Environment 4-17
4.2.1 Communities 4-17
4.2.2 Noise 4-19
4.2.2.1 Initial Recommendation Phase 4-19
4.2.2.2 Update and Supplementary Investigations Phase 4-20
4.2.3 Visual Aesthetics 4-21

4.3 Economic Environment 4-22
4.3.1 Regional and Local Growth Strategies 4-22
4.3.2 Industrial, Commercial and Agricultural Activity 4-25
4.4 Cultural Environment 4-30
4.4.1 Heritage Resources 4-30
4.4.2 Archaeological Resources 4-32
4.5 Transportation Facilities and Utilities 4-33
4.5.1 Road Network 4-33
4.5.2 Public Transportation 4-34
4.5.3 Utilities 4-35
4.6 Summary of Identified Environmentally Significant Issues 4-35

CHAPTER 5 DEVELOPMENT & EVALUATION OF PROJECT ALTERNATIVES

5.1 Introduction 5-1
5.2 Evaluation Criteria 5-1
5.2.1 Identification of Analysis and Evaluation Factors 5-1
5.2.2 Analysis and Evaluation Procedure 5-3
5.3 Reasonable Alternatives to the Undertaking 5-3
5.3.1 Modal Alternatives 5-3
5.3.1.1 Do Nothing 5-3
5.3.1.2 Commuter Rail and Bus Service 5-4
5.4 Alternative Methods of Carrying Out the Undertaking 5-5
5.4.1 Upgrading of Existing Municipal Road Network 5-5
5.4.2 Corridor Concepts 5-7
5.4.2.1 Development of Corridor Concepts 5-7
5.4.2.2 Screening of Corridor Concepts 5-8
5.4.3 Route Location Alternatives 5-8
5.4.3.1 Preliminary Development of Route Location Alternatives 5-8
5.4.3.2 Refinement of Route Location Alternatives 5-11
5.4.3.3 Description of Alternatives Selected for Detailed Analysis and Evaluation 5-14
5.4.3.4 Rationale for the Selected Route Location Alternative 5-16
5.4.4 Alignment Alternatives (Initial Recommendations) 5-20
5.4.4.1 Preliminary Assessment of Alignment Alternatives 5-20
5.4.4.2 Refinement of Alignment Alternatives 5-23
5.4.4.3 Rationale for the Selected Alignment 5-24
5.4.5 Update and Supplementary Investigations - Alignment and Interchange Alternatives 5-28
5.4.5.1 County Road 34 Interchange Alternatives 5-28
5.4.5.2 Crieff Road to Highway 401 Alignment Alternatives 5-39
5.5 Special Studies 5-40
5.5.1 Interchange Configurations at Hanlon Expressway/ County Road 34 (Initial Recommendation) 5-41
5.5.2 Hanlon Expressway/County Road 34 Drainage Strategy (Initial Recommendation) 5-51
5.5.3 Intersection Arrangement at Highway 6 and Campbellville Road/Gore Road 5-51
5.5.4 Crieff Road/Highway 6 New Intersection Treatment 5-53
5.5.5 Interchange Configurations at Calfass Road/ Connection Road/Highway 6 New 5-54
5.5.6 Highway 6 Parallel to Highway 401 5-55
5.5.7 Directional Ramp from Hanlon Expressway to Highway 401E 5-56
5.5.8 Hydraulic Impact Study for Highway 6/401 N-E and W-N Ramps 5-56
5.5.9 From Highway 6 South to Highway 401 East Ramp 5-57

CHAPTER 6 PROJECT DESCRIPTION, POTENTIAL CONDITION CHANGES, MITIGATION MEASURES & COMMITMENTS TO FURTHER WORK

6.1 General Description of the Project 6-1
6.1.1 Location 6-1
6.1.2 Maintenance Implications 6-4
6.1.3 Project Implementation 6-5
6.1.4 Structural Planning 6-5
6.1.4.1 Construction Sequence 6-5
6.1.4.2 Contract Breakdown 6-6
6.1.4.3 Construction Timing & Earth Moving Strategy 6-10
6.1.4.4 Structural Planning 6-10
6.2 Identified Potential Environmental Condition Changes, Effects and Commitments to Mitigation 6-11
6.2.1 Detailed Description of the Project Area 6-11
6.2.2 Potential Environmental Conditions Changes, Effects and

Mitigation Measures 6-11
6.2.2.1 Natural Environment 6-11
6.2.2.2 Social Environment 6-24
6.2.2.3 Economic Environment 6-30
6.2.2.4 Cultural Environment 6-33
6.3 Commitment to Further Work 6-34
6.3.1 Further Investigation, Liaison and Documentation 6-34
6.3.2 Design and Construction Reports 6-36
6.3.3 Monitoring 6-36
6.3.3.1 Contract Compliance 6-36
6.3.3.2 Environmental Measure Effectiveness 6-37
6.3.3.3 Condition of Approval Compliance 6-37
6.3.3.4 Post-Construction Monitoring of Stormwater Quality Control Measures 6-37
6.3.3.5 Responsibility for Monitoring 6-38
6.4 Summary of Concerns, Identified Impacts, Associated Mitigation Measures, and Commitments to Further Work 6-38

LIST OF TABLES

Table 1.1 - Summary Assessment of Alternatives To and Within the Undertaking
Table 1.2 - Summary Assessment of Alternatives Considered During Update and Supplementary Investigations Phase
Table 1.3 - Summary of Concerns, Identified Impacts and Commitments to Mitigation and Further Work
Table 1.4 - Summary of Study Participant Contacts

Table 3.1 - Summary of Public Information Centre Results

Table 4.1 - Study Area - Landform Characteristics
Table 4.2 - Study Area Soils
Table 4.3 - Study Area Hydrogeologic Units
Table 4.4 - Fish Collection Records for Study Area Watercourses
Table 4.5 - Environmentally Sensitive Area Attributes
Table 4.6 - Summary of Identified Environmentally Significant Issues

Table 5.1 - Evaluation Criteria
Table 5.2 - Advantages & Disadvantages Associated with Corridor Concepts
Table 5.3 - Summary of Meetings to Present Results of Preliminary Report Alternatives Assessment
Table 5.4 - Summary Analysis of Alternatives 1 & 2
Table 5.5 - Preliminary Analysis (Screening) of Hanlon Expressway Interchange Concepts
Table 5.6 - Hanlon Expressway/County Road 34 Interchange Alternatives Detailed Comparative Assessment
Table 5.7 - Summary Ranking - Hanlon Expressway/County Road 34 Interchange Alternatives
Table 5.8 - Alignment Alternatives Between Crieff Road and Calfass Road Hwy 401 Areas - Detaled Comparative Assessment
Table 5.9 - Summary Ranking - Crieff Road to Calfass Alignment Alternatives
Table 5.10 - Assessment of Campbellville Road - Gore Road Realignment Options

Table 6.1 - Proposed Construction Staging
Table 6.2 - Summary of Property Requirements
Table 6.3 - Summary of Potential Noise Impacts
Table 6.4 - Summary of Concerns, Identified Impacts and Commitments to Mitigation and Further Work

LIST OF FIGURES

Figure 1.1 - Study Area Location Showing Recommended Highway 6 Route
Figure 1.2 - Corridor, Route and Alignment Alternatives
Figure 1.3 - Alternatives Subjected to Detailed Analysis and Evaluation During Update and Supplementary Investigations Phase

Figure 3.1 - Study Organization
Figure 3.2 - Study Area
Figure 3.3 - Study Area Coverage for Update and Supplementary Investigations (1992-1994)
Figure 3.4 - Environmental Assessment Process

Figure 4.1a - Geological Resources, Soils and Hydrogeology
Figure 4.1b - Geological Resources, Soils and Hydrogeology
Figure 4.2a - Existing/Designated Land Use and Environmentally Sensitive Areas
Figure 4.2a - Existing/Designated Land Use and Environmentally Sensitive Areas
Figure 4.3a - School Bus Routes, Major Utilities, Heritage Resources
Figure 4.3b - School Bus Routes, Major Utilities, Heritage Resources
Figure 4.4 - Existing and Forecast Traffic Volumes (AADT)

Figure 5.1 - Alternative Corridor Concepts
Figure 5.2a - Series A Route Location Alternatives
Figure 5.2b - Series A Route Location Alternatives
Figure 5.3a - Series B Route Location Alternatives
Figure 5.3b - Series B Route Location Alternatives
Figure 5.4a - Series C Route Location Alternatives
Figure 5.4b - Series C Route Location Alternatives
Figure 5.5a - Series D & E Route Location Alternatives
Figure 5.5b - Series D & E Route Location Alternatives
Figure 5.6 - Route Location Evaluation Links
Figure 5.7 - Preliminary Alignment Alternatives
Figure 5.8 - Additional Alignmetn Alternaitves
Figure 5.9 - Alignment Alternatives Subjected to Detailed Investigation
Figure 5.10a - Hanlon Expressway Interchange Concepts at Wellington Road 34 and Puslinch Road 4/15
Figure 5.10b - Hanlon Expressway Interchange Concepts at Wellington Road 34 and Puslinch Road 4/15
Figure 5.11 - Initial and Modified Interchange Schemes at County Road 34 Intersections
Figure 5.12 - Alternative 5-Modified
Figure 5.13 - Alignment Alternatives Crieff Road to Highway 401
Figure 5.14 - Hanlon Expressway/County Road 34 Interchange Alternatives
Figure 5.15 - Campbellville Road/Gore Road Realignment Alternatives
Figure 5.16 - Crieff Road/Highway 6 New Intersection Alternatives
Figure 5.17 - Calfass Road/Connection Road/Highway 6 New Interchange Options
Figure 5.18 - Alternative Cross-Sections for Highway 401/Highway 6 Corridor
Figure 5.19 - Hydraulic Impacts of N-E and W-N Ramps
Figure 5.20 - Alternatives for Relocation of Farkas Driveway

Figure 6.1 - Study Area Location Showing Recommended Highway 6 Route
Figure 6.2a - Contract Breakdown
Figure 6.2b - Contract Breakdown
Figure 6.3 - Earthmoving Strategy
Figure 6.4a - Structures
Figure 6.4b - Structures
Figure 6.5a - Drainage Areas and Culvert Locations
Figure 6.5b - Drainage Areas and Culvert Locations
Figure 6.6 - Noise Receiver Locations Analyzed

LIST OF APPENDICES

VOLUME 2

Appendix A - Joint Study Advisory Committee Terms of Reference

Appendix B - Selected Correspondence

Appendix C - Selected Minutes of Meeting

Appendix D - List of Technical Working Papers

Appendix E - Summary Analysis

VOLUME 3

Appendix F - Natural Environmental Information Supplement

Appendix G - Design Criteria

Appendix H - Heritage Features Analysis and Visual Assessment 1989 Report

Appendix I - Noise Analysis

Appendix J - Agricultural Impact Analysis (Supplementary)

Appendix K - Special Considerations

Appendix L - Traffic Analysis

Appendix M - Conceptual Stormwater Management Plan

Appendix N - Calculated Alignment

Appendix O - Design Plates

PREAMBLE

PREAMBLE

This Environmental Assessment has concluded that the most efficient and environmentally acceptable way of introducing transportation system improvements in the Highway 6 corridor between Freelton and Guelph involves widening existing Highway 6 between Freelton and the Region of Hamilton-Wentworth/County of Wellington Boundary (Maddaugh Road) and constructing a new mid-concession route west of existing Highway 6 from Maddaugh Road northerly to Highway 401 and westerly, immediately parallel to Highway 401, to connect to the Hanlon Expressway.

As the project proponent, the Ministry of Transportation (MTO) is seeking Environmental Assessment approval for the designation, property acquisition, construction and operation of the new route segment and associated improvements as an Individual undertaking, including modifications to the existing Highway 401 interchanges at Highway 6 (north of Morriston) and the Hanlon Expressway, and a new Hanlon Expressway/Wellington County Road 34 interchange.

The proposed improvements in the Highway 6 corridor between Freelton and Maddaugh Road include :

- Widening Highway 6 from 2 to 4 lanes (with a 1 m painted median) or 5 lanes, (continuous left-turn lane) depending on turning lane requirements, from 1.0 km north of Highway 97, Freelton northerly 4.0 km to Maddaugh Road;

- Within this 4 km section, realignment of Campbellville Road and Gore Road to improve intersection geometrics at Highway 6; and other, minor intersection improvements, including turning lanes and tapers.

Due to the urgency of improvements to the existing Highway 6 route and the general absence of identified significant environmental issues on the section within the Region of Hamilton-Wentworth, MTO has secured approval from the Ministry of the Environment and Energy (MOEE) to finalize the planning and design for the widening section of the project as a separate, Group "B" undertaking under the Provincial Highways Program Class Environmental Assessment.

The conclusions reached in this Environmental Assessment represent the culmination of an extensive and detailed assessment of the problems and opportunities in the study area which, in the context of the Environmental Assessment Act, was initiated in 1985. In this respect, it is important for reviewers of this document to recognize that it incorporates a range of decision making and documentation practices, all of which were deemed appropriate during the 10-year period over which the Environmental Assessment has been conducted. In particular, it is worth noting that the study involved an atypical decision making process for undertakings of this nature (joint municipal-provincial steering and technical committees), which introduced abnormal iterations and some non-technical influences.

A Draft Environmental Assessment Report was prepared and submitted to government ministries and agencies in 1989 for review and comment in order to resolve outstanding issues prior to formal submission to MOEE.

Concerns registered by the Ontario Ministry of Natural Resources during the pre-submission review were considered significant enough to initiate supplementary investigations into the justification for the recommended locations of a portion of the new Highway 6 route and the new Hanlon Expressway/County Road 34 interchange. The supplementary investigations, conducted between 1992 and 1994, reaffirmed the recommendation with respect to the new route segment but concluded that relocation of the proposed interchange is feasible and, indeed, desirable given recent provincial policy initiatives regarding the protection of wetland and fisheries resources and construction timing/design modifications in the adjacent Highway 401 corridor.

In this document, the elements of the proposed undertaking included in the pre-submission review are referred to as the Initial Recommendations. The work conducted to address comments and concerns emerging during the pre-submission review is referred to as the Update and Supplementary Investigations phase.

The Ministry of Transportation remains committed to a program of proactive, ongoing consultation with affected and interested study participants with a view to preservation and enhancement of environmental amenities and optimal utilization of economic resources in the project area. Following approval of this Environmental Assessment, this program will be pursued through the next design phase during which agreements with government ministries, agencies and property owners will be required.

In particular, elements of commitment during design and construction include :

- Groundwater monitoring in the pre- and post-construction periods, particularly as it relates to potential impacts to wetlands and stream baseflow;

- Development and implementation of a fisheries habitat compensation package in co-operation with the federal Department of Fisheries and Oceans and the Ontario Ministry of Natural Resources;

- Minimizing impacts to adjacent aggregate extraction operations, particularly related to optimal use of their resource base and their efforts to monitor and enhance natural environmental amenities;

- Co-operation with the Grand River, Halton Region and Hamilton Region Conservation Authorities, in the preservation and management of the Mill Creek, Aberfoyle Creek, West Bronte Creek and Fletcher Creek watersheds, respectively.

TABLE OF CONTENTS

Page

1.0 SUMMARY

1.1 Purpose of the Undertaking 1-1

1.2 Study Area 1-2

1.3 Advantages and Disadvantages of Alternatives to the Undertaking 1-2
1.3.1 Do Nothing Alternative 1-2
1.3.2 Modal Alternatives 1-2

1.4 Advantages and Disadvantages of Alternative Methods of Carrying Out the Undertaking 1-3
1.4.1 Upgrading of Existing Municipal Road Network 1-3
1.4.2 Corridor Alternatives 1-3
1.4.3 Route Alternatives 1-4
1.4.4 Alignment Alternatives 1-4
1.4.5 Update and Supplementary Investigations 1-5

1.5 Description of the Undertaking 1-6

1.6 Potential Environmental Effects and Mitigating Measure 1-8

1.7 Advantages and Disadvantages of the Undertaking 1-8

1.8 Public Participation 1-19

1.9 External Contacts 1-19

1.10 Sub-Studies Carried Out in Relation to this Project 1-19

1.0 SUMMARY

1.0 SUMMARY

1.1 PURPOSE OF THE UNDERTAKING

The proponent for this undertaking is the Ministry of Transportation of Ontario (MTO) which has the mandate for implementing, upgrading, operating and maintaining the provincial system of highway infrastructure. MTO will also assume responsibility for the environmental impacts of this undertaking.

Within the study area, a number of transportation problems associated with the existing highway network have been identified which constitute a specific need for the undertaking, including :

Level of Service

- Capacity deficiencies and resultant low levels of traffic service on existing Highway 6 south of Highway 401 and on Wellington County Road 46 (Brock Road), north of Highway 401 into the City of Guelph. The high proportion of turning movements in the absence of turning lanes on these two-lane roadways is a particular problem.

- Associated under-utilization of Highway 6 (Hanlon Expressway) on the west side of the City of Guelph.

- Capacity and demand incongruities on major roadways are frustrating municipal development initiatives.

Traffic Composition

- Identified conflicts between high speed regional traffic and slower moving local traffic and pedestrians suggest that a separation of predominantly through/commercial and local/passenger traffic is desirable.

Accident Experience

- The aforementioned traffic composition characteristics and capacity deficiency problems are largely accountable for the nature and severity of accidents on existing Highway 6.

Maintenance Requirements

- Traffic composition and driver behaviour (i.e. use of roadway shoulders to pass turning vehicles) result in higher than normal maintenance requirements and costs.

Based on the identified transportation related problems, the purpose of the undertaking is to:

introduce transportation system improvements in the Highway 6 corridor between Freelton and the City of Guelph which contribute to a reduction in the growth of road congestion, accident potential and associated costs, as well as support municipal Official Plan objectives.

The primary Project Objectives related to the foregoing statement of purpose are :

1. Improve the current Highway 6 connection along Highway 401, thereby providing a higher degree of Highway 6 continuity and a superior route in terms of level of service and travel time.

2. Optimize utilization of the Hanlon Expressway by making it more attractive to traffic now using County Road 46.

3. Induce removal of through traffic from existing Highway 6 through the village of Morriston, thus reducing the overall impact of noise, accidents, congestion and enhancing opportunities for community growth.

4. Induce removal of through traffic along County Road 46 to create similar benefits to the Village of Aberfoyle and the south end of the City of Guelph.

5. Provide the most efficient, cost-effective solution while limiting adverse environmental impacts to the greatest degree possible.

1.2 STUDY AREA

The limits of the study area, as shown in Figure 1.1, were initially derived from the terms of reference determined by a joint provincial-municipal advisory committee based on previous area traffic service studies (refer to Appendix A).

During the project appraisal phase of the study, consideration was given to the maximum anticipated extent of alignment shifts and associated potential direct impacts thereof. The study area was subsequently expanded to encompass Highway 6 and vicinity from Freelton northerly to the south limits of the City of Guelph, including County Road 46 (Brock Road) and the Hanlon Expressway.

It was also determined that the study should include the following limited coverage :

- Traffic Impact Study - Hanlon Expressway within the limits of the City of Guelph (Refer to Appendix L)

- General re-assessment of the Watson Road (Eastern) Corridor in terms of transportation planning, engineering and environmental components.

The Eastern Corridor is illustrated in Section 5.4.2 of this report which describes the investigation of alternative corridor concepts.

1.3 ADVANTAGES AND DISADVANTAGES OF ALTERNATIVES TO THE UNDERTAKING

1.3.1 Do Nothing Alternative

The Do Nothing alternative represents anticipated impacts and effects if none of the alternatives being considered is carried out. In this case it included normal ongoing maintenance of the existing road network, regular local and inter-city bus service upgrading and limited local road network improvements.

This option was not recommended primarily because it would increase capacity deficiencies in the corridor and perpetuate undesirable operating conditions and driver behaviour. This would result in increased accident potential and associated costs in terms of loss of human life, property damage and maintenance requirements. In the long term, these costs would offset any capital cost savings attributable to not implementing the undertaking. Further, although this alternative would initially exhibit fewer direct impacts to the natural environment than the alternative methods of carrying out the undertaking, net effects associated with increased roadway congestion and accident potential could include net degradation of water and air quality.

1.3.2 Modal Alternatives

Based on the generally long range, inter-regional nature of travel demand in the study area and the interface of existing and proposed transportation modes and facilities serving the study area, the following options were deemed to constitute reasonable alternatives to the undertaking and were subjected to a comparative analysis with the baseline ("Do Nothing") condition for the horizon year (2004) relative to the identified project objective :

- Commuter rail service
- Commuter bus service

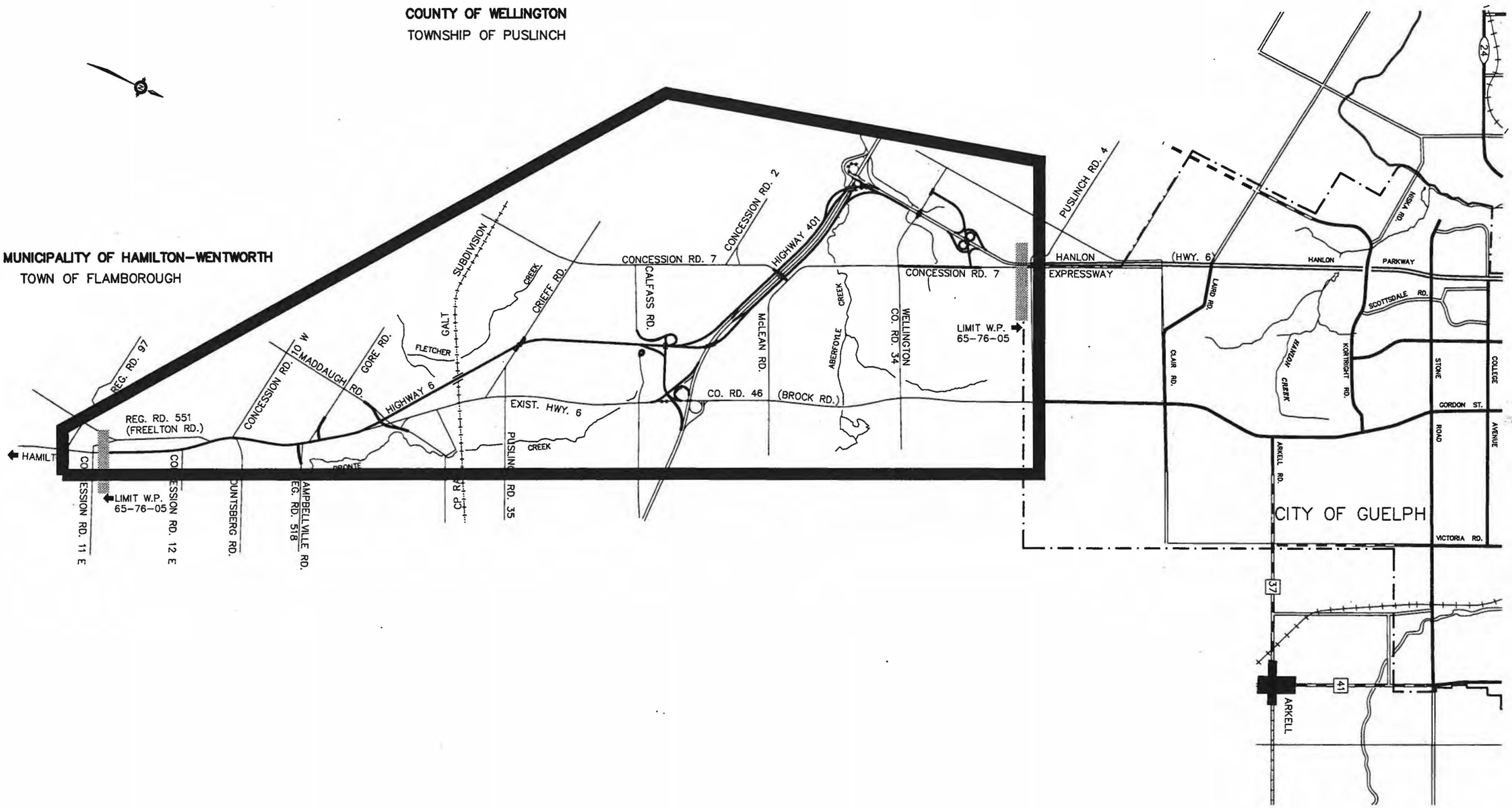
The initial screening process concluded that other modal alternatives (High Occupancy Vehicle lanes, carpooling, cycling, walking) could not, individually or in combination, satisfy the project objectives and were eliminated from further consideration.

The GO Transit rail and bus commutershed excludes the study area with the exception of limited bus service linking Guelph and the Toronto Transit Commission York Mills Station via Brampton along Highway 7. Further, GO Transit has no plans to extend service into the study area. Similarly, VIA Rail does not explicitly provide commuter service in the study area and has discouraged this type of ridership through scheduling practices.

Therefore, the modal alternatives under consideration were rejected as viable options for fulfilling the project objectives (Refer also to Section 5.3.1 for additional details).

COUNTY OF WELLINGTON
TOWNSHIP OF PUSLINCH

REGIONAL MUNICIPALITY OF HAMILTON–WENTWORTH
TOWN OF FLAMBOROUGH



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

STUDY AREA

Figure 1.1

STUDY AREA LOCATION SHOWING RECOMMENDED HIGHWAY 6 ROUTE

1.4 ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE METHODS OF CARRYING OUT THE UNDERTAKING

1.4.1 Upgrading of Existing Municipal Road Network

Improvements to three major municipal arterial road corridors were considered in order to meet project objectives:

- Brock Road
- Watson Road
- Victoria Road

The improvement of **Brock Road** to a 4-lane facility is feasible but would be relatively impractical within the City of Guelph north of College Avenue in terms of physical and property constraints and associated undesirable net effects to frontage, landscaping and natural vegetation, as well as network continuity and traffic distribution.

Within the **Watson Road Corridor**, potential adverse impacts to the environment would outweigh the minimal transportation advantages with respect to re-distributing traffic from Brock Road. In particular, the net environmental effects of this option due to the potential loss of high quality non-renewable resources (sand and gravel, agricultural lands, significant geological formations, wetlands) make it undesirable.

The use of the **Victoria Road Corridor** would facilitate north-south and east-west connections in Guelph and would be relatively inexpensive. However, these benefits would be outweighed by traffic-related disadvantages such as induced crosstown truck traffic, pressure for non-designated land uses, conflicts with local access requirements and proximity effects. These are potential impacts that would be difficult to mitigate without negating the initial advantages achieved with this option.

In light of these findings and the conclusions of previous studies, upgrading of the existing municipal road network was also rejected for its failure to satisfy the project objectives, and alternatives which focused on improvements to the provincial highway network were examined in more detail.

The following is a brief outline of the manner in which the assessment progressed from the conceptual planning phase to the specific elements addressed during the Preliminary Design phase. Chapter 5 and Appendix E provide a detailed description of the assessment of the various means for undertaking the project.

1.4.2 Corridor Alternatives

Five basic highway corridor concepts were developed to initiate the investigation of alternatives within the undertaking (refer to Figure 1.2).

1. East Concept (A Series) - optimizing use of the existing Highway 6 corridor south of Highway 401 and linking with the Hanlon Expressway north of Highway 401.

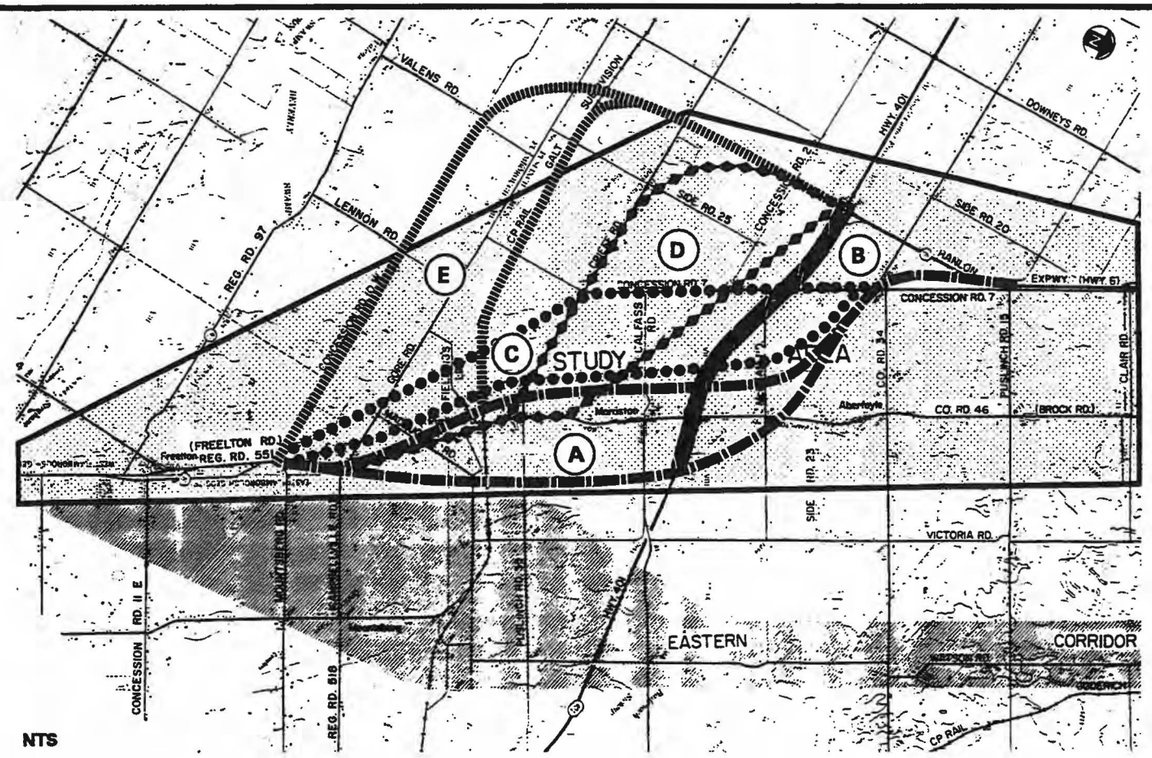
2. Highway 401 Concept (B Series) - utilizing the East concept south of Highway 401 and continuing westerly in the Highway 401 corridor to the existing Hanlon Expressway interchange.

3. Central Concept (C Series) - following a major Ontario Hydro corridor and a local concession road or new alignment west of existing Highway 6, connecting with the Hanlon Expressway north of Highway 401.

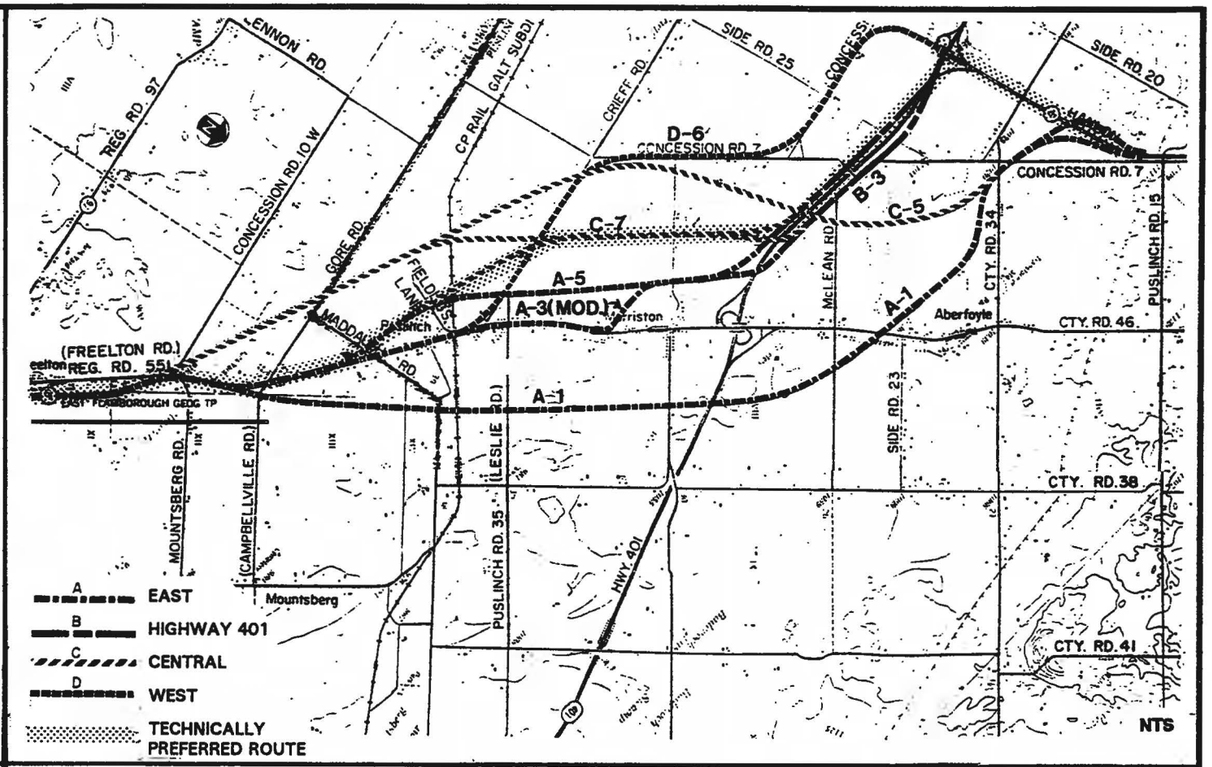
4. West Concept (D Series) - using existing Highway 6 and local road network to connect with the Hanlon Expressway at the existing Highway 401 interchange.

5. Extreme West Concept (E Series) - following the Hydro corridor or Highway 6 to east-west corridors, running westerly and then north on a new tangential southerly extension of the Hanlon Expressway.

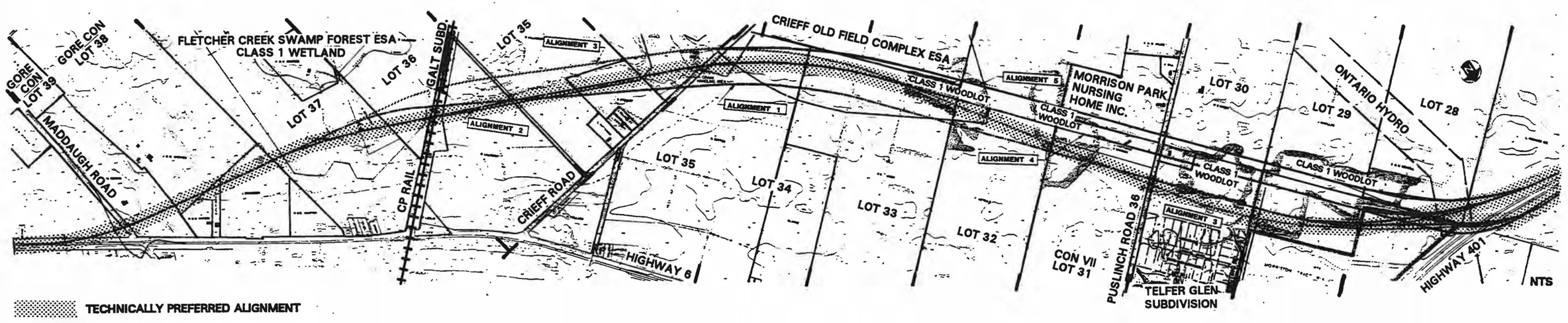
The development of route alternatives and the determination of possible corridor combinations were considered necessary to establish the basis for any absolute rejection of corridor concepts. As indicated in Table 1.1, none of the corridors were eliminated on the basis of a coarse assessment of their capability to meet the project objectives.



CORRIDOR ALTERNATIVES



ROUTE LOCATION ALTERNATIVES SUBJECTED TO DETAILED ALALYSIS AND EVALUATION



REFINED ALIGNMENT ALTERNATIVES SUBJECTED TO DETAILED ANALYSIS AND EVALUATION

HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 1.2

CORRIDOR, ROUTE AND ALIGNMENT ALTERNATIVES

1.4.3 Route Alternatives

A total of 26 route location alternatives were developed and evaluated against evaluation criteria within seven transportation planning, engineering and environmental factor groups (refer to Appendix E for summary analysis). The full range of route alternatives under consideration are shown in Figure 5.2.

Through an iterative series of consultations with study participants, the route location alternatives were screened and six alternatives were selected for detailed investigation. At this point, all Series E (Extreme West Concept) alternatives had been rejected because potential net environmental effects far outweighed possible traffic service advantages and the Highway 401 Concept was integrated with the East and Central Concepts. The short list of route alternatives included three from the East Concept, two from the Central Concept and one from the West Concept, as shown in Figure 1.2.

On the basis of a detailed 7-stage link elimination procedure, Alternative C-7, was selected as the route location option which most effectively satisfies the project objectives (refer to summary assessment in Table 1.1). The Minister of Transportation announced the selected route in October, 1986.

1.4.4 Alignment Alternatives

During the Preliminary Design phase, within the bounds of the selected route, five alternative alignments were developed to the point where highway right-of-way requirements could be defined and discussions with individual property owners initiated, recognizing identified engineering controls and environmental sensitivities.

As in the Route Location phase of the study, an iterative consultation process resulted in the selection of a mutually acceptable alignment based on an assessment of net environmental effects (refer to Table 1.1). This option (Alignment 2 as illustrated in Figure 1.2) was subsequently subjected to minor modifications as a result of discussions with the Township of Puslinch. In addition, commitments by MTO to the mitigation of potential adverse environmental effects and issues requiring addition investigation were refined during the Preliminary Design phase.

TABLE 1.1

SUMMARY ASSESSMENT OF ALTERNATIVES TO AND WITHIN THE UNDERTAKING

Alternative	Report Section	FACTOR GROUP: Service To Public	Natural	Social	Economic	Cultural	Engineer	Cost	Summary Remarks
MODAL									
Do Nothing	5.3.1.1	●	⬤	●	●	⬤	⬤	⬤	Significant short and long term consequences (road congestion, accidents)
Commuter Rail/Bus	5.3.1.2	●	⬤	⬤	⬤	⬤	⬤	●	Ineffective in meeting ultimate travel demand. No TATOA mandate.
Improve Municipal Roads	5.4.1	⬤	●	●	●	⬤	●	●	Major environmental and cost implications outweigh service benefits.
CORRIDOR[1]	5.4.2 Appendix E								
A - East		⬤	●	⬤	●	⬤	⬤	⬤	Significant environmental impacts if existing corridor is not used.
B - Highway 401		●	⬤	⬤	⬤	⬤	⬤	⬤	Few benefits if implemented in isolation.
C - Central		⬤	⬤	⬤	●	⬤	⬤	⬤	Moderate traffic service improvements. Significant impacts to aggregate extraction and property in general.
D - Western		⬤	⬤	⬤	●	⬤	⬤	⬤	Limited traffic service improvments. Major property impacts; lowest construction costs.
E - West Extreme		●	●	●	⬤	⬤	⬤	●	Poorest level of service. Extensive, significant impacts to natural environment. Highest cost.
ROUTE (short list)	5.4.3.4 Appendix E								
A - 1.		⬤	●	⬤	⬤	⬤	⬤	●	Good traffic service offset by impacts to hamlets and natural features.
A - 3		●	⬤	●	⬤	●	⬤	⬤	Undesirable safety characteristics.
A - 5		⬤	⬤	⬤	⬤	⬤	⬤	⬤	Intrusive/restrictive effects on Morriston.
C - 5		⬤	●	⬤	●	⬤	⬤	⬤	Unacceptable net effects to provincially significant natural features at south end.
C - 7		⬤	⬤	⬤	⬤	⬤	⬤	⬤	Greatest potential benefits and least overall impacts (high mitigation potential).
D - 6		●	⬤	●	●	⬤	⬤	⬤	Significant and extensive net environmental impacts. Lowest cost.
ALIGNMENT	5.4.4.3 Appendix E								
1		⬤	⬤	⬤	⬤	⬤	●	⬤	Marginally less desirable than Alternative 2 due to agricultural impacts.
2		⬤	⬤	⬤	⬤	⬤	●	⬤	Best balance of natural, agricultural and social impacts.
3		⬤	●	⬤	●	⬤	●	⬤	Least desirable agricultural impacts at Crieff Road. Impacts to Fletcher Creek ESA.
4		⬤	●	●	●	⬤	●	●	Least desirable impacts to Class 1 woodlots. Displacement of Calfass Road residences.
5		⬤	●	●	●	⬤	●	⬤	Least desirable proximity effects on Calfass Road residences. Impacts to Fletcher Creek ESA.

Capability to Satisfy Project Objectives: ● → ⬤ (Most effective)

▒ Preferred Alternative

1 None of the Corridor alternatives was rejected on the basis of the preliminary assessment

1.4.5 Update and Supplementary Investigations

The pre-submission review of the Draft EAR was substantially completed by early 1990 and it was determined that most of the comments received could be readily addressed (Pre-submission comments are included in Appendix B of this report). However, the Ontario Ministry of Natural Resources expressed continuing concern with respect to the following principal components :

- the proposed location of the new Hanlon Expressway/Wellington County Road 34 interchange;
- description and justification of impacts related to woodlands/forestry, fisheries and wetland resources, particularly as related to the preferred alignment of the new route segment between Crieff Road and Highway 401 (forestry) and the County Road 34 interchange (fisheries and wetlands).

These concerns were considered significant enough to initiate supplementary investigations into the justification for the recommended locations of the portion of the new Highway 6 route between Crieff Road and Highway 401 and the new Hanlon Expressway/County Road 34 interchange.

The supplementary investigations, conducted between 1992 and 1994, reaffirmed the recommendation with respect to the new route segment but concluded that relocation of the proposed interchange is feasible and, indeed, desirable given recent provincial policy initiatives regarding the protection of wetland and fisheries resources, as well as construction timing/design modifications in the adjacent Highway 401 corridor.

The additional options considered and the summary rationale for the selected alternative are shown in Table 1.2 and Figure 1.3 respectively.

TABLE 1.2

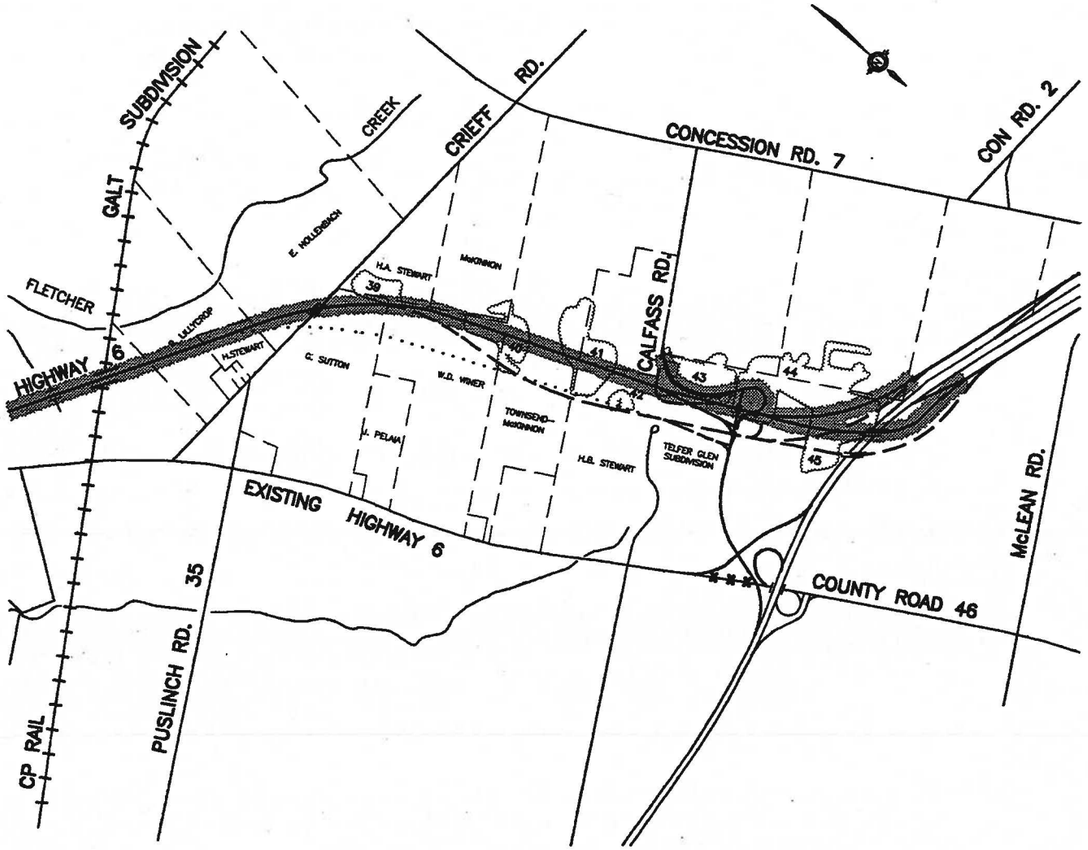
SUMMARY ASSESSMENT OF ALTERNATIVES CONSIDERED

DURING UPDATE AND SUPPLEMENTARY INVESTIGATIONS PHASE

Alternative	Report Section	FACTOR GROUP							Summary Remarks
		Transport. Service	Natural	Social	Economic	Cultural	Engineer	Cost	
ALIGNMENT Crieff Road To Highway 401	5.5.1								
1		●	●	●	●	NA	●	●	Most effective in minimizing agricultural, noise, property impacts. Most impacts to Class 1 woodlots.
2		●	●	●	●	NA	●	●	Good compromise scheme for agricultural, woodlot impacts but creates undesirable noise impacts at Morriston (Telfer Glen).
3		●	●	●	●	NA	●	●	Adverse agricultural, noise, property impacts are determinant. Most effective in minimizing impacts to Class 1 woodlots
INTERCHANGE Hanlon Expressway/ County Road 34	5.5.2								
5 (Modified)		●	●	●	●	NA	●	●	Much superior for determinant factor group (Natural), particularly in minimizing effects on provincially significant wetland.
7		●	●	●	●	NA	●	●	More convenient in terms of long term and construction period traffic service. Only moderate mitigation potential for wetland, fisheries impacts.

NOTE : Cultural Environment elements (built heritage, archaeological resources, cultural landscape) were not assessed since they had been examined in detail during previous alignment and interchange investigations; no effects on sensitive features were identified related to the alignment alternatives.

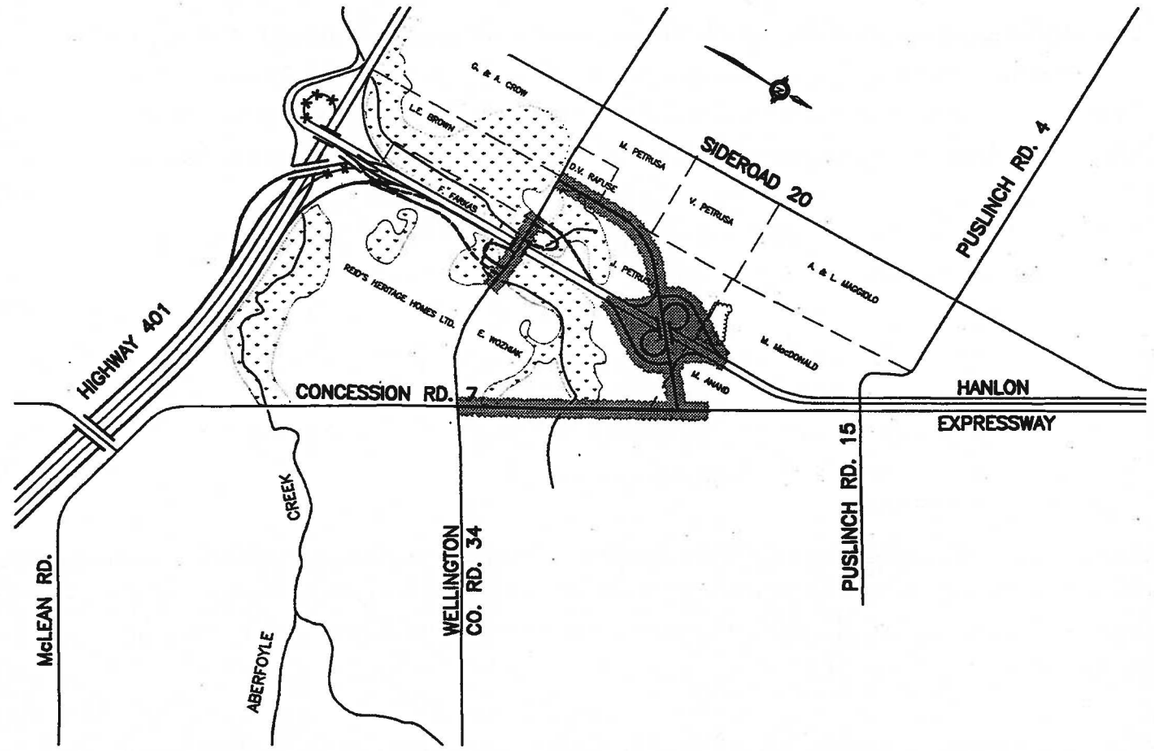
Capability to Satisfy Project Objectives: ● ——→ ● Most effective ▒ Preferred Alternative



NOTE: ALTERNATIVE 1 IS THE ALIGNMENT IDENTIFIED AS THE TECHNICALLY PREFERRED OPTION IN 1988

ALIGNMENT ALTERNATIVES
CRIEFF ROAD TO HIGHWAY 401

——— ALTERNATIVE 1
— — ALTERNATIVE 2
· · · · · ALTERNATIVE 3
▒▒▒ PREFERRED



NOTE: SIX (6) CONCEPTUAL INTERCHANGE ALTERNATIVES WERE DEVELOPED AND SCREENED. THIS INCLUDED FIVE FOR THE COUNTY ROAD 34 INTERCHANGE AND A SIXTH, SEPERATE CONCEPT FOR AN INTERCHANGE AT PUSLINCH ROAD 4/15. A HYBIRD OF TWO CONCEPTS (ALTERNATIVES 4 AND 5) WAS CARRIED FORWARD FROM THE SCREENING PROCESS AND REFERRED TO AS ALTERNATIVE 5 (MODIFIED).

ALTERNATIVE 7 IS THE INTERCHANGE SCHEME IDENTIFIED AS THE PREFERRED OPTION IN 1988, MODIFIED TO INCORPORATE NEW CONSTRUCTION TIMING AND DESIGN CHANGES IN THE HIGHWAY 401 CORRIDOR.

INTERCHANGE ALTERNATIVES
ALONG HANLON EXPRESSWAY

——— ALTERNATIVE 5 (MODIFIED)
- - - - ALTERNATIVE 7
▒▒▒ PREFERRED

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

WOODLOTS
WETLANDS
39 VEGETATION UNIT NUMBER

NOT TO SCALE

Figure 1.3
ALTERNATIVES SUBJECTED TO DETAILED ANALYSIS AND EVALUATION DURING UPDATE AND SUPPLEMENTARY INVESTIGATIONS PHASE

1.5 DESCRIPTION OF THE UNDERTAKING

The selected alignment for the proposed Highway 6 improvements is illustrated in Figure 1.1. Greater detail is exhibited on the preliminary design plan and profile plates in Appendix L. Generally, the project limits are defined by the existing 4-lane Highway 6 section at Freelton to the south and the north-oriented speed change lanes of the proposed Hanlon Expressway/ Wellington County Road 34 Connecting Road interchange to the north.

The major design features of the undertaking are described within four basic sections as follows (refer to appropriate Design Plates in Appendix O).

Section A	-	South project limit to Maddaugh Road (now a separate, Group B undertaking)
Section B	-	Maddaugh Road to Highway 401
Section C	-	Highway 401 widening to Hanlon Expressway
Section D	-	Hanlon Expressway to north project limit

Section A - South Project Limit to Maddaugh Road (Plates 1 - 16)

- Improvements on this section entail widening existing Highway 6 from 2 to 4 or 5 lanes, depending on turning lane requirements, while maintaining special limited access status. The design affects 7 side roads and 39 private entrances.

- The section between the south project limit and Flamborough Concession Road 12 is designated with a standard 4-lane plus 1.0 m flush median cross-section due to adjacent land use (primarily wetland). At the Concession Road 12 intersection, provision is made for right-turn (S-E move) and left-turn (N-E move) lanes.

- From Concession Road 12 to Regional Road 551 (Freelton Road) the design incorporates a 5-lane cross-section (continuous left-turn lane).

- At Freelton Road the raised island channelizing N-W moves is shifted to the west and the island for W-S moves is removed.

- The section from Freelton Road to Flamborough Concession Road 10/Mountsberg Road commences with asymmetrical widening on the curve north of Freelton Road into a 5-lane section which will serve three existing entrances. In addition to the centre lane left-turn provision, right-turn tapers are provided at Concession Road 10 West and Mountsberg Road.

- Between Mountsberg Road and Campbellville Road, the design is based on a 5-lane cross-section. Nine existing entrances would be served.

- Campbellville Road and Gore Road are realigned to the south and north respectively to provide improved intersection angles with Highway 6 and increased spacing (230 m) on Highway 6 between the two T-intersections. A continuous turning lane is provided between the intersections. In addition, a dedicated right-turn lane is provided at Campbellville Road and a right-turn taper is provided at Gore Road. The ultimate condition at this location includes provision for the westerly extension of Campbellville Road across Highway 6, connecting to Gore Road approximately 620 m west of Highway 6, and closure of the interim Gore Road/Highway 6 intersection. Existing property accesses would be retained.

- The proposal for the section between Gore Road and the divergence point of the new route calls for a full 5-lane section, despite the low number of side entrances, for reasons related to continuity and safety.

- The connection with existing Highway 6 where the new alignment diverges to the west will comprise a reverse curve on existing Highway 6 from the north to a T-intersection with Maddaugh Road which will be realigned on both sides of Highway 6 to create an 80° 4-leg intersection with the new route.

- A short section of existing Highway 6 will also T with realigned Maddaugh Road from the south and will be retained as a cul-de-sac (with turning basin for maintenance) to retain five existing private entrances which will lose direct access to Highway 6. This 250 m cul-de-sac would likely be assumed by the Town of Flamborough.

- The Maddaugh Road intersection will be signalized, with a flashing amber in advance of the intersection on the north leg to warn of the signals.

- The left-turn lane on the north leg of the Maddaugh Road intersection will extend north to a point opposite the Mathies farm entrance (Lot 38, Gore Concession) to provide for safe access to the property for left-turning vehicles.

- The standard 5-lane section for widening of existing Highway 6 will include 4 x 3.75 m lanes with 4.00 m flush median and 3.0 m shoulders with 0.50 m partially paved. A curb-and-gutter section with mountable curb will be used where there is limited right-of-way or for localized drainage purposes.

Section B - Maddaugh Road to Highway 401 (Plates 18 - 27)

- This section comprises a 4-lane roadway on a new alignment with full control of access status.

- At Fielding Lane, a 4.0 m wide by 4.25 m high box culvert structure is proposed to provide single lane access to existing Highway 6 for properties west of the new route.

- The crossing of the CP Rail Galt Subdivision is 520 m west of the existing Highway 6 grade separation. The overpass is a continuous deck 3-span reinforced concrete structure with grades of 2.5% to 3.0%.

- Crieff Road will retain its existing horizontal alignment with a raised profile to pass over new Highway 6. No access to the new route is to be provided or protected for.

- Calfass Road will be closed (cul-de-sac) on the east side of the new route and realigned from the west to link with the new Connection Road north of Morriston. Existing property access will be retained. The E-S ramp at the Connection Road will be designed as a simple circular loop and include a stop condition for W-S traffic, giving priority to E-S moves.

- The new Connection Road links new and existing Highway 6 north of Morriston and provides a link between the new route (south) and Highway 401 (east) as well as Brock Road and moves to and from Morriston. The Connection Road/Old Highway 6/Highway 401 interchange ramp terminals will be signalized.

- The existing Brock Road interchange will be upgraded with the introduction of a new direct S-E ramp constructed and reconstruction of the N-E and W-N/S ramps to improve geometrics.

- The drainage strategy for this section essentially retains existing overland runoff patterns with three stormwater management infiltration basins located in existing depressions.

- The 4-lane cross-section for new Highway 6 will feature a 6.0 median with a concrete barrier between a point north of the CP Rail line to immediately south of 401. This cross-section provides a 2.7 m paved left shoulder.

Section C - Highway 401 Widening (Plates 28 - 33)

- Highway 6 will parallel Highway 401 in the form of the collectors in a mini express-collector system. The current construction program has the widening of Highway 401 from 4 lanes to 6 lanes scheduled for completion in 1996. For the purpose of the Highway 6 design, it was assumed that the 6-lane Highway 401 would be in place prior to construction of Highway 6. The Highway 6 parallel lanes will have 2 through lanes in each direction plus one speed change lane to accommodate the transfers to and from Highway 6. The separator between the Highway 401 lanes and Highway 6 lanes protects for the expansion of Highway 401 to 8 lanes in the future.

- This will involve some property acquisition during detail design on either side of Highway 401.

- The interchange at the Hanlon Expressway will be reconstructed to remove the N-E loop ramp and replace it with a directional ramp. This will also require the reconstruction of the W-N ramp to grade separate it from the N-E ramp. The E-N ramp will also be reconstructed to improve the ramp geometrics.

Section D - Hanlon Expressway to North Project Limit (Plates 34 - 35)

- The Hanlon Expressway is designed as a 4-lane controlled access facility with sufficient median to widen to 6 lanes if required in the future. A speed change lane is carried northbound for 1400 m to provide a comfortable weave between the merge point of the E-N and W-N ramps and the Connecting Road interchange to the north.

- County Road 34 will be grade separated from the Hanlon Expressway. The grade separation will be on the existing County Road 34 alignment.

- A Connecting Road will be constructed to connect County Road 34 to the proposed interchange 875 m to the north. The Connecting Road will be 2 lanes with sufficient right-of-way to be widened to 4 lanes in the future. The interchange itself will be a standard Parclo A-4 with 2-lane exit ramps.

- Concession Road 7 will be reconstructed to form the east link between the Connecting Road and County Road 34.

1.6 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATING MEASURES

Detailed information concerning potential effects and related mitigating measures for the recommended design are included in Chapter 6 of this Environmental Assessment Report. Table 1.3 summarizes information related to identified environmentally significant areas and issues.

Section 6.3 of this report describes commitments to future work made as a result of this environmental assessment. The reader should also note that MTO will subsequently prepare Design and Construction reports for the various Detail Design contracts associated with implementing the Highway 6 project. These reports will document decisions made and measures taken to address environmental issues identified in this report, and those emerging during Detail Design.

1.7 ADVANTAGES AND DISADVANTAGES OF THE UNDERTAKING

Once implemented, the undertaking is expected to produce the following benefits in terms of satisfying the project objectives :

a) North-south through traffic and traffic from the south to Guelph :

Reduce the current jog along Highway 401 and offer the best route, as compared with Brock Road, in terms of level of service and travel time;

b) East-north traffic and traffic from the east to Guelph :

In light of anticipated operating restrictions on Brock Road and proposed operational improvements in the Highway 401 Corridor and on the Hanlon Expressway, improve the current Highway 401 - Hanlon route making it more attractive to traffic now using Brock Road;

c) To the Hamlet of Puslinch and the Village of Morriston :

Substantial removal of through traffic from existing Highway 6, thus reducing the overall impact of noise, accidents and congestion and enhancing opportunities for development in designated growth areas;

d) To the south end of the City of Guelph and the Village of Aberfoyle :

Reduce through traffic and associated proximity effects along Brock Road and Gordon Street and enhance opportunities for community and economic growth;

e) To the City of Guelph :

Provide additional rationale for improvements to the Hanlon Expressway corridor within the city limits.

TABLE 1.3

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Geotechnical/Soils	4.1.2 5.4.3 5.4.4 5.4.5 6.2.2.1 (i) Appendix B	Exposure of erodible soils in deep cut section and on high fill slopes.	MTO	Use of benching/berms on 2:1 slopes. Use of 3:1 slopes. Expeditious revegetation of newly graded slopes.	Optimal slope stability. Reduced soil erosion potential.	Conduct systematic geotechnical /foundations investigations. Use appropriate erosion control measures in contract documents.	MTO Remote Sensing MTO Geotechnical
		Acquisition/encounter of soils with high potential for property waste/contamination.	MOEE	Early implementation of soils management strategy, as required, to control/monitor excavation, dust, waste handling/stockpiling/transport. Conform to MOEE Soil Cleanup Criteria or similar guidelines.	Maintain maximum flexibility for potential solutions/ mitigation. Reduced potential for dispersion of/ exposure to hazardous materials.	More detailed land use/site characteristics assessment. Soil quality classification to identify excavated material as hazardous waste, as required.	Property Owners MOEE Municipal Abatement
Forestry Resources	4.1.6 5.4.2 5.4.3 5.5 6.2.2.1 (ii) Appendix F	Encroachment on or severance of four Class 1 woodlots. Total removal of 11.3 ha.	Property Owners MNR	Restrict extent of construction corridor. Use of marketable timber (no waste of resources).	Loss of nature specimens unavoidable. Areal extent of lost vegetation replaced to a large degree.	Develop post-construction landscaping and refurbishing plan to replace removals.	Property Owners Ministry of Natural Resources (Cambridge District) MTO Environmental Section
		Encroachment on two plantation areas (private WIA area and MNR Morriston Tract).	MNR	Mark and protect specimen trees outside construction zone; repair damaged trees.	Trees outside grading area but inside right-of-way may be retained.	Further investigation of retention of existing trees within right-of-way.	
		Indirect impacts to remainder portions of affected woodland areas due to fragmentation into smaller units.	MNR	Selective/close-cut clearing and cutting of trees so they fall away from sensitive areas. Restrict disposal outside right-of-way.	Impacts to trees outside construction envelope are minimized.	Incorporation of Special Provisions and Operational Constraints in Detail Design and contract documents.	
		Loss of some habitat of West Virginia White Butterfly.	MNR	Restrict extent of construction envelope as much as possible.		Construction site monitoring/ enforcement. Post-construction planting to protect newly created edge as much as possible.	
Hydrogeology and Hydrology	4.1.3 4.1.4 5.4.2 5.5 6.2.2.1 (iii) 6.3.1 Appendix F	Alteration of groundwater flows in Fletcher Creek, Galt/Mill Creek headwater areas.	GRCA, Halton RCA, MNR	Restrict extent of construction zone. In particular, retain existing alignment of Wellington Road 34 at Hanlon Expressway (recommended scheme avoids detour requirement; minimizes encroachment on adjacent wetland).	Groundwater flow rates and directions are expected to be unaffected.	Conduct additional pre- and post-construction geotechnical and on-site field hydrogeological investigations, including groundwater and private well monitoring.	GRCA, Halton RCA, Hamilton RCA Ministry of Natural Resources Ministry of Environment and Energy (Science and Technology Branch)

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Hydrogeology and Hydrology (cont'd)		Adverse of effects to quality/quantity of private wells/ponds.	MOEE Property Owners	Replace organic material with granular material which will not impede groundwater flows. Use of BMP's to promote infiltration and minimize groundwater contamination.	Present groundwater quality expected to be maintained.		CP Rail Property Owners
		Displacement of kettle pond areas on Galt Moraine near Morriston.	Halton RCA Recreational Users	Unavoidable.	Drainage strategy maximizes retention of existing natural surface drainage patterns. Alteration of surface water hydrology is not expected to be significant.	Co-operative liaison with Conservation Authorities, MNR, MOEE in development/ implementation of subwatershed management strategies.	Municipalities MTO Geotechnical Section MTO Structural Office
		Localized alteration of surface water hydrology/hydraulics of Fletcher Creek, Galt/Mill Creek, Bronte Creek and hydrologic function of headwater wetlands. Increased peak flows.	Property Owners GRCA Halton RCA Hamilton RCA MNR MOEE	Drainage strategy/construction staging to minimize reduction in stream flows.			MTO Environmental Section, Environmental Engineering Unit
		Watershed management strategies.	MOEE Conservation Authorities	Strategic placement of crossing culverts sized and located to maintain surface flows, flood plain contours.			
		Localized drainage problems at Freelton, Mountsberg Road, Morriston.	Property Owners MTO Halton RCA	Design drainage system to reduce direct discharge of runoff to receiving watercourse (flow dissipation, where possible). Reverse shoulders, urban (curb-and-gutter) section at Mountsberg Road.	Drainage system utilizes roadside ditches to eliminate direct runoff to sensitive discharge areas and alleviate local drainage problems. SWM measures counteract the effects of incurred peak flows and incorporate watershed management strategies.	Consultation with affected parties. Formulate detailed drainage strategy.	Property owners Conservation Authorities
		Placement of fill in Galt/Mill Creek ESA in conjunction with reconstruction of Concession Road 7.	GRCA MNR	Profile revised so there will be no change to existing profile through the subject area.	In a Regional Storm flood waters will flow over Concession Road 7. Increasing the potential flood backwater level is avoided.	Co-operative liaison with GRCA, MNR, MOEE in development/ implementation of subwatershed management strategies.	GRCA MNR MOEE MTO Environmental Section

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Hydrogeology and Hydrology (cont'd)		Placement of fill in Galt/Mill Creek ESA in conjunction with constructing a grade separation for County Road 34 over the Hanlon Expressway.	GRCA MNR	The culvert carrying Galt/Mill Creek has been sized to retain hydraulic characteristics north and south of Country Road 34 during a Regional Storm.	Upstream and downstream hydraulic effects minimized.	Co-operative liaison with GRCA, MNR, MOEE in development/ implementation of subwatershed management strategies.	MNR MOEE GRCA MTO Environmental Section
		Effects of constructing the new N-E and W-N ramps (at the Highway 401/Hanlon Expressway interchange) on the Regional and 1:100 year water levels on Aberfoyle Creek	GRCA MNR	Ensure that highway construction does not raise the Regional and 1:100 year flood levels.	A hydraulic impact study was carried out and concluded the proposed W-N and N-E ramps will not have an impact on the Aberfoyle Creek flood level.	Co-operative liaison with GRCA, MNR, MOEE in development/ implementation of subwatershed management strategies.	GRCA MNR MTO Environmental Section
Aquatic Biology and Surface Water Quality	4.1.4 4.1.5 5.4.2 5.4.3 5.5 6.2.2.1 (iv) 6.3.1 Appendix F	Increased sediment loadings during construction as a result of earthworks and instream work (soil exposure, compaction, erosion; siltation; turbidity).	Halton RCA, GRCA MNR	Timing constraints. Instream work on Galt/Mill Creek tributaries restricted to June 1 - September 1. Protection of watercourses through conventional sedimentation and erosion control measures and construction practices. Expedite re-establishment of ground cover.	Some short-term increase in sediment loadings. However, net effects to aquatic organisms and habitats expected to be low.	Incorporate Special Site-Specific Provisions and Operational Constraints in Detail Design and contract documents. Construction site monitoring/ enforcement.	Ministry of the Environment and Energy (Central, West Central Regions, Land Use Planning Branch). Ministry of Natural Resources (Cambridge District). GRCA. Halton RCA. Hamilton RCA MTO Environmental Section
		Effects on fisheries habitat.	MNR, DFO, GRCA, HRCA	Develop a fish compensation package acceptable to DFO, MNR, GRCA and HRCA. Construction only during approved "window" defined by MNR.	"No net loss - net gain" of fish habitat achieved. No spills of toxic substances anticipated therefore net impact expected to be minimal.	Consultation with affected parties. Obtain authorization from Federal Department of Fisheries and Oceans and MNR.	Department of Fisheries and Oceans (Burlington). MNR GRCA HRCA

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Aquatic Biology and Surface Water Quality (cont'd)		Elevated water temperatures from removal of riparian vegetation. Acute exposure to toxics from accidental spills on construction site (fuels, herbicides, lubricants, etc.)	MNR MNR	Retain riparian vegetation to greatest extent possible. Refuel and maintain construction equipment in designated locations removed from study area watercourses. Maintain supply of suitable absorbent material on-site as a contingency measure for immediate clean-up of any inadvertent waste or fuel spill. Drainage strategy/construction staging to minimize reduction in stream flow during construction.			MTO Environmental Section MNR MOEE
Environmentally Sensitive Areas/Wildlife	4.1.7 5.4.2 5.4.3 5.5 6.2.2.1 (v) 6.3.1 Appendix F	Long term accumulation of salts, metals, hydrocarbons and other toxics in flora and fauna from highway operation and maintenance. Encroachment on Fletcher Creek Swamp Forest (loss of wetland waterflow/terrestrial habitat). Impacts to segments of Galt Creek and Forest with placement of fill for County Road 34 grade separation. Severance of Crieff Old Field Complex (proximity to sensitive avian habitat)	MNR MNR Hamilton RCA GRCA	Introduce roadside barrier plantings to reduce impact on natural vegetation. Restrict extent of construction zone. Investigate the minimization of the application of current sand/salt mix while maintaining desirable road safety levels. Design to maximize use of natural drainage patterns; effective stormwater management; environmentally acceptable fill disposal/distribution. Retain vegetation cover to greatest extent possible. Restriction of construction activities during spawning and breeding periods. (construction window for cold water fisheries is from June 1 to September 1)	Reduced transport of contaminants. Encroachment limited to fringe area. Wetland hydrologic functions maintained. Loss of habitat unavoidable. Impacts during breeding season minimized.	Incorporate Special Provisions and Operational Constraints in Detail Design and contract documents. Consultation with affected parties.	MTO Maintenance Branch MTO Environmental Section MNR MOEE Ministry of Natural Resources (Cambridge District) GRCA, Halton RCA, Hamilton RCA Municipalities (Puslinch/Wellington)

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Communities/Property Impacts	4.2.1 4.3.1 5.4.2 5.4.3 6.2.2.2 (i) 6.3.1	Improved access to rural settlement areas and enhanced area wide accessibility creating development pressures. Long term pressure for expansion of western boundaries of Hamlet of Puslinch and Village of Morriston; pressure for rezoning at strategic locations.	Township of Puslinch	Development control by municipal/ provincial agencies.	Possible urbanization of corridor	MTO corridor control sensitive to highway proposal.	Property owners Municipalities MTO Property Section MTO Environmental Section
		Potential safety hazard to residents of Morriston Nursing Home.	Morriston Nursing Home	Standard highway right-of-way security fencing.	Restricted access reduces potential pedestrian/ vehicular conflicts.	Consultation/negotiation with affected owners.	Property owners
		Property frontage requirements create reduced front yard setbacks on existing Highway 6.	Property Owners	Use of urban cross-section in affected right-of-way areas.	Depth of property taking reduced/minimized.	Post-construction landscaping and refurbishing plan for affected frontage.	Property owners
		One residence displaced; severances; landlocked parcels.	Property Owners	Appropriate compensation including buyout, property exchange and purchase of landlocked parcel.	Provision of alternate areas for use/enjoyment, or funds to acquire other property.	Investigate access provisions to landlocked property owner (Lillycrop) parcels.	Property owner
		Major reconstruction of driveway required for property in southwest quadrant of the Hanlon Expressway County Road 34 due to raised profile of County Road 34.	Property Owner (Farkas)	Two alternative schemes for reconstructing the driveway have been presented to the property owner. Minimize driveway grade and tree removal as much as possible.	Removal of trees which act as a visual/noise screen from County Road 34. Increase in driveway grade to between 5.5% and 8%.	Consultation/negotiation with affected owner. Post-construction landscaping and refurbishing plan.	Property Owner (Farkas)
		Reduction in property value due to severance by County Road 34 Connection Road.	Property Owner (J. Petrusa)	Connection Road adjacent to property boundary where possible.	New interchange and improved access will increase development opportunities which should increase property values.	Consultation/negotiation with affected owner.	Property Owner (J. Petrusa)
		Change in wetland and water table level and resulting effects on vegetation.	Property Owner (Wozniak)				

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Noise	4.2.2 5.4.2 5.4.3 5.5 6.2.2.2 (ii) 6.3.1 Appendix I	16 homes in the vicinity of existing Highway 6 will experience a slight long term decrease in noise level.	NA	NA	Net benefit.	NA	NA
		14 homes adjacent to new route section will experience a perceptible (3-4 dBA) increase in noise level.	NA	None required	Use of Open Friction Course (OFC) pavement could reduce noise increase to an imperceptible level (< 3 dBA).	Investigate warrants for use of Open Friction Course (OFC) pavement (possible 1-2 dBA reduction).	MTO Geotechnical Section (pavement design)
		20 homes adjacent to new route section will experience a moderate (5-9 dBA) increase in noise levels[1].	Property Owners MOEE	Highway profile in cut adjacent to many sensitive areas reduces impacts by 3-4 dBA. Noise attenuation adjacent to Telfer Glen Subdivision may be warranted/ effective but could require 10 m high barrier depending on availability of excess material to fill low areas.	Potential increases of 3-7 dBA (with OFC). Potential increases reduced to 1-4 dBA if barrier installed at Telfer Glen.	Corridor control (new residential development). Investigate feasibility of noise barrier/berm further in Detail Design phase based on earthwork strategy and more accurate assessment of vertical alignment. Investigate warrants for use of Open Friction Course pavement (possible 1-2 dBA reduction).	Ministry of Environment and Energy (Land Use Planning Unit) Property Owners Ministry of Municipal Affairs Municipalities MTO Geotechnical Section (pavement design)
		2 homes adjacent to new route section will experience a significant (10+ dBA) increase in noise level.	Property Owners MOEE	Not economically viable due to isolated nature of individual residences.	Potential increases reduced to moderate levels (5-9 dBA) with OFC.	Investigate warrants for use of Open Friction Course pavement (possible 1-2 dBA reduction).	
		Short term annoyance due to construction related noise.	Property Owners MOEE	Enforce Model Municipal Noise Control Bylaw (NPC 115-85 dBA maximum at 15 m). Hours of operation limited to 0700-1900 except in emergencies (exception permit required) unless work area is greater than 400 m from residential areas. Adherence to standard contract provisions for construction equipment operation and maintenance.	Reasonable hours and conditions of operation minimize annoyance.	Incorporate in Detail Design and Operational Constraints in Detail Design and contract documents. Consultation with affected owners, agencies. Construction site monitoring/ enforcement.	Municipalities Property Owners

1 Includes registered but undeveloped single family dwelling lots in Telfer Glen Subdivision

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Visual Aesthetics	4.2.3 5.4.2 5.4.3 5.5 6.2.2.2 (iii) 6.3.1	Displacement of existing visual screening and introduction of potentially intrusive visual component. Particularly sensitive areas include: · rear yards in close proximity to the new route · TCG pit at Concession Road 7/401 · Dufferin Aggregates pit at Hanlon/401 interchange · Fielding Lane properties near the CP Rail overpass · properties on existing Highway 6 at Maddaugh Road (headlight glare) · Calfass Road residences adjacent to new Connection Road · properties at the County Road 34 grade separation · properties adjacent to County Road 34 Connection Road	Property Owners	Develop landscaping and refurbishing plan which is sensitive to existing residential and institutional uses, unique landforms and views/vistas. Retain and/or reinstate vegetative screening/cover to greatest extent possible.	Maintain required aggregate extraction operation screening. Reduced intrusiveness of views of the highway facility.	Post-construction landscaping and refurbishing plan. Consultation with affected parties.	MTO Environmental Section Property Owners MNR (re aggregate extraction pit buffers)
Agricultural Operations	4.3.2 5.4.2 5.4.3 5.5 6.2.2.2 (i) 6.3.1 Appendix J Appendix K	Loss of active agricultural land (14.2 ha). Loss of Class 1 and 2 land (3.2 ha). 7 farm severances. Highway runoff/spray to agricultural land adjacent to new route section.	OMAF Agricultural Operators/ Owners, Wellington Federation of Agriculture OMAF, Agricultural Operators	Alignment balances property requirements and severance effects to the greatest possible extent. Concerned parties have expressed satisfaction with tradeoffs. Maintain access to viable severances. Highway profile in cut and New Jersey median barrier to reduce spray. Highway drainage retained in right-of-way adjacent to agricultural operations (ROW includes new stormwater infiltration basins).	Unavoidable. Unavoidable. Continuance of agricultural activities in severances at operators' discretion. Effects on adjacent active/ cultivated areas minimized.	Incorporate in Detail Design. Refine drainage strategy during detail design.	Affected operators/owners Ministry of Agriculture and Food (Land Use Planning Branch and Area Land Specialist) Wellington Federation of Agriculture MTO Property Section Municipalities

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Agricultural Operations (cont'd)		Impacts to Hollenbach outdoor barn (reduced feedlot area, loss of primary sheltered calving area, reduced height of windbreak, relocated Crieff Road access).	Property Owner (F. Hollenbach) OMAF	Develop measures to replace/ minimize loss of Hollenbach amenities (relocated feedlot access, reconfiguration of outdoor barn area, introduce windbreak and cattle pass).	Loss of grain handling area unavoidable. Other measures appear feasible.	Continue negotiations with affected operator/owner. Monitor changes in existing activities and plans for future use of land.	
		Loss of access to field on south side of property west of Highway 6 New	Property Owner (Fielding)	Construct a 4 m wide access from Fielding Lane southward adjacent to Highway 6 to subject field.	Revised access.	Continue negotiations with affected operator/owner.	
Mineral Aggregate Extraction Operations	4.1.1 4.3.2 (i) 5.4.2 5.4.3 5.4.5 5.5 6.2.2.3 (ii) 6.3.1 Appendix B Appendix C	Encroachment on buffer areas/berms which may result in sterilization of mineral aggregate resources. Displacement of site screening; visual exposure. Impacts to proposed after use areas. Sterilization of resources. Impact to on-site environmental monitoring systems. Maintenance of access across Highway 401 via Concession Road 7 bridge.	Dufferin Aggregates TCG MNR	Encroachment is unavoidable. Attempt to avoid resource sterilization through strategic construction timing (i.e. highway improvements introduced after resource extraction). Replacement of vegetative screening where practical. Sensitive landscaping/ refurbishing. Groundwater monitoring can likely be reinstated in immediate vicinity. Design incorporates offset alignment for bridge reconstruction to allow existing bridge to remain in operation until the new bridge is constructed.	Existing berms and plantings will be displaced or reconfigured. Visual exposure minimized but not eliminated. Limited disruption of monitoring program. Traffic disruption limited to periods for tie-into existing roads.	Investigate means of addressing possible reduction of setback (buffer) requirements to address sterilization resource issue. Liaison with operator re construction timing strategy. Develop post-construction landscaping and refurbishing plan. Develop co-operative approach to retaining affected monitoring station with Dufferin Aggregates.	Dufferin Aggregates TCG MNR MTO Geotechnical Aggregate Resources
Other Business Operations	4.3.2 5.4.2 5.4.3 5.5 6.2.2.3 (iii) 6.3.1 Appendix B	Some loss of exposure due to traffic diversion to new route.	Business Operators on section of existing Highway 6 to be bypassed.	Maintain access to existing business for Highway 6. New traffic (i.e. connections between existing and new routes). Possibly new signage for businesses in interchange area.	Re-establishment of commercial presence through signage and provision of access to existing businesses.	Investigate possibility of signage for Morriston businesses at Connection Road/Highway 6 to enhance exposures. Continue discussions with property owner (B. Lillycrop) with respect to exposure (signage) for farm implement dealership.	Affected operators Municipalities MTO Traffic Section (Central Region)

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Heritage Features	4.4.1 5.4.2 5.4.3 5.5 6.2.2.4 (i) Appendix H	Indirect impacts to site #60 (northwest corner Highway 6/ Mountsberg Road) - removal of some vegetative screening and other landscaping. Displacement of rubble and stone fences where new alignment crosses field lines.	Property Owners Ministry of Culture Tourism and Recreation	Retain vegetation cover to greatest extent possible. Landscaping sensitive to screening requirements. Retain fence lines to greatest degree possible.	Integrity of heritage feature maintained. Disruption of cultural landscape minimized.	Post-construction landscaping and refurbishing plan.	MCTR Property Owners MTO Environmental Section
Archaeological Resources	4.4.2 5.4.2 5.4.3 6.2.2.4 (ii) 6.3.1 Appendix H	Proximity to registered archaeological site (Segota Site AiHa-24).	Ministry of Culture Tourism and Recreation	Ensure a real extent of site. Mark and protect during construction.	Integrity of registered site maintained.	Complete detailed assessment of properties not covered during Preliminary Design and mitigation of significant archaeological remains discovered. Determine strategy for protection of Segota site (possible acquisition) and incorporate in Detail Design. Construction site monitoring/ enforcement of protection measures. Consultation with affected agencies.	Ministry of Culture Tourism and Recreation (Southwest Region) MTO Central Region Archaeologist MTO Property Section Property Owners
Structural Planning	6.1.5	Highway 6 structure over CPR Connection Road to County Road 34 structure over the Hanlon Expressway Concession Road 7 over Highway 401	CP Rail	Design Concession Road 7 structure to keep north abutment as far south as possible to avoid relocation of McLean Road.	Reconstruct McLean Road locally to provide intersection with relocated Concession Road 7.	Further discussions required to determine number of tracks to be spanned and cost sharing arrangement. Determine if 2-lane or 4-lane structure will be constructed initially. Further refinement of structural design at next design phase.	CP Rail MTO Structural Section County of Wellington MTO Structural Section Township of Puslinch MTO Structural Section

TABLE 1.3 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Utilities	4.5.3	Clearance from 500kV line with Highway 6 northbound (S-W ramp) at Highway 401.	Ontario Hydro	Design profile to maximize clearance.	Clearance of 13m provided. Absolute minimum allowable clearance is 12.2m but desirable is 15m.	Further consultation with Ontario Hydro to secure agreement for clearance provided.	Ontario Hydro
		Relocation of 125 kV Tower adjacent to Concession Road 7.		Determine if relocation of towers or shift of Concession Road 7 to the east is the least disruptive/most cost effective.	Relocation of hydro towers or shift of Concession Road 7 alignment.	Further consultation with Ontario Hydro to determine optimal solution.	

f) Municipal development initiatives :

Enhance the development potential of designated growth areas within the City of Guelph and the Township of Puslinch by realizing the service function of the Highway 6 and Brock Road corridors.

Although the preferred design represents the most satisfactory means of meeting project objectives, it is a compromise solution which results in property impacts and proximity effects inherent in any new highway route. Effects on agribusiness operations and two provincially significant wetlands are of particular concern. The proposed undertaking incorporates means of minimizing these disadvantages through specific mitigation/compensation measures, as well as an equitable distribution of project impacts.

1.8 PUBLIC PARTICIPATION

Public involvement in this study comprised a comprehensive participation program encompassing the concerns of the general public, special interest groups and affected private property owners. Information was provided to, and input received from these groups through multi-media dissemination of material, public information centres and meetings, individual meetings and site visits and personal correspondence.

Formal contacts were made at strategic points during the route location and preliminary design phases of the work to assist in the identification of project controls, the assessment and evaluation of route alternatives, the refinement of the route alignment and the determination of appropriate mitigation measures and further investigations to be conducted. Interface with affected property owners was particularly intensive and valuable in the latter two stages.

Further details regarding contact points are included in Section 3.2.6. The conduct and results of the public participation program are summarized in Chapters 3 and 5 and detailed in the support technical papers listed in Appendix D.

1.9 EXTERNAL CONTACTS

An integral facet of the pre-submission consultant program was the establishment of an External Team and liaison with member provincial ministries and agencies. This mechanism served to define areas of provincial interest and secure agreement at critical decision-making junctures. In addition to conducting formal External Team presentations outlining study findings and recommendations, the Project Team engaged in working meetings to ascertain specific concerns, as well as negotiations regarding possible mitigation measures. Pre-submission comments from Official Government Reviewers are included in Appendix B.

Table 1.4 provides an indication of all study participant contacts made during the course of the study.

1.10 SUB-STUDIES CARRIED OUT IN RELATION TO THIS PROJECT

The following supplementary studies were conducted in conjunction with the Route Location phase of the study. They influenced but were not directly controlled by the Project Team.

1. Hanlon Expressway Traffic Impacts - Special study of Hanlon Expressway intersections within the City of Guelph to identify possible required improvements in level of service resulting from traffic volumes diverted to the expressway. The investigation was curtailed due to initiation of the Hanlon Expressway Assessment (by MTO Southwestern Region), which examined options for upgrading the facility to full control of access and has since proceeded to a full planning study and detail design in co-operation with the affected municipalities.

2. Watson Road (Eastern) Corridor Study - Reviewed and confirmed findings of the 1982 Corridor Study relative to the transportation planning, engineering and environmental implications of opening this corridor as the eastern gateway to the City of Guelph.

TABLE 1.4
SUMMARY OF STUDY PARTICIPANT CONTACTS

	Technical/ Steering Committee Meetings	Working Meetings	Presentations	Correspondence	Invited to Public Information Centres
MUNICIPAL COUNCIL & STAFF					
County of Wellington	•		•	•	•
City of Guelph	•	•	•	•	•
Township of Puslinch	•	•	•	•	•
Region of Hamilton-Wentworth	•		•	•	•
Town of Flamborough	•		•	•	•
FEDERAL AND PROVINCIAL MINISTRIES & AGENCIES					
Fisheries and Oceans				•	
Environment and Energy		•	•*	•	•
Natural Resources		•	•*	•	•
Agriculture and Food		•	•*	•	•
Culture, Tourism and Recreation			•*	•	•
Municipal Affairs			•*	•	•
Housing			•*	•	•
Economic Development and Trade			•	•	•
Health			•	•	•
Attorney General			•	•	•
Solicitor General/Correctional Services			•*	•	•
Colleges & Universities			•	•	•
Community & Social Services			•	•	•
Education			•	•	•
Management Board Secretariat			•*	•	•
Labour			•	•	•
CONSERVATION AUTHORITIES					
Grand River		•	•*	•	•
Halton Region		•	•*	•	•
Hamilton Region		•	•*	•	•

* Attended External Team presentation(s)

TABLE 1.4
SUMMARY OF STUDY PARTICIPANT CONTACTS *(cont'd)*

	Technical/ Steering Committee Meetings	Working Meetings	Presentations	Correspondence	Invited to Public Information Centres
INTEREST GROUPS					
Ont. Federation of Agriculture		•		•	•
Ont. Cattlemen's Association				•	•
Ont. Federation of Naturalists				•	•
Area Naturalist Clubs				•	•
Area Historical Societies				•	•
Architectural Conservatory of Ontario				•	•
Ontario Historical Society				•	•
Aggregate Producers Association of Ontario				•	•
Guelph Development Council				•	•
University of Guelph		•	•	•	•
PROPERTY OWNERS Directly and Indirectly affected residents, businesses, development interests		•	•	•	•
GENERAL PUBLIC			•	•	•
MEMBERS OF PARLIAMENT					
Provincial				•	•
Federal					•
TRANSIT/RAILWAY COMPANIES					
GO Transit				•	•
CP Rail				•	•
UTILITIES COMPANIES					
Ontario Hydro		•	•*	•	•
TransCanada Pipelines			•	•	•
Bell Canada				•	
Union Gas				•	

* Attended External Team presentation(s)

The following investigations were carried out by the Project Team in relation to the Preliminary Design phase of the study. The results of the first six are included in this report (Section 5.3.4) based on their implications with respect to environmentally sensitive issues. All are included in the Preliminary Design Report:

1. Interchange Configurations at Hanlon Expressway/County Road 34 (Initial findings) - determined the most acceptable interchange configuration in the ultimate condition based on preliminary identification of property requirements.

2. Hanlon Expressway/County Road 34 Drainage Strategy - determined drainage requirements in the interchange area to accommodate the Regional Storm flow and maintain existing drainage patterns to the greatest extent possible.

3. Intersection Arrangement at Highway 6 and Campbellville Road/Gore Road - identified an intersection configuration which improves geometric design standards and accommodates municipal land use proposals.

4. Crieff Road/Highway 6 New Intersection Treatment - determined the most appropriate configuration based on satisfying project traffic demands and minimizing costs and identified property impact concerns.

5. Interchange Configurations at Calfass Road/Connection Road/Highway 6 New - recommends an option which maintains local road connections at Morriston, minimizes property impacts, accommodates highway traffic directional demands and provides for future land use development (access).

6. Alternative Centrelines and Profiles of Highway 6 New Across Crieff Road - involved modifications in the horizontal and vertical alignments of the technically preferred alternative to satisfy concerns expressed by adjacent property owners and the Township of Puslinch Council.

7. Alternative Median Treatment of Highway 6 New - examined median barrier treatments on Highway 6 between Maddaugh Road and Highway 401 in accordance with its full CAH status.

8. Alternative Cross-Sections for Widening Highway 6 - determined the most appropriate cross-section application for widening Highway 6 northerly from the existing 4-lane section to Maddaugh Road based on projected turning moves to side entrances.

9. Highway 6 Centreline Shift at Mountsberg Road - investigated the possibility of shifting the existing Highway 6 centreline at Mountsberg Road, where the right-of-way is constricted, to minimize property impacts. A localized 4 m westerly shift and use of an urban cross-section (curb-and-gutter) was deemed to be an appropriate treatment.

10. Highway 6 New/Highway 401 Ramp Configuration - resulted in a northeasterly shift of the technically preferred Highway 6 New ramp alignments at Highway 401 as a result of discussions with Ontario Hydro concerning impacts to existing and proposed tower locations in their 500 kV corridor.

11. Comprehensive Stormwater Management Study - formed the basis for a more detailed final stormwater management plan. Included the identification and screening of candidate Best Management Practices (BMP's); the assessment of site suitability for BMP's; formulation of a drainage strategy and the selection of a preferred concept for managing highway stormwater runoff; and a preliminary hydrologic analysis to determine additional right-of-way requirements.

12. Typical Cross-section for Highway 401/Highway 6 parallel Lanes - reviewed the cross-section of Highway 401/Highway 6 to ensure that implementation of the Highway 6 parallel lanes would not unnecessarily preclude the further widening of Highway 401 in the future. Upon review, it was concluded that protection for an 8-lane Highway 401 adjacent to Highway 6 would provide enough flexibility for future expansion while not incurring undue upfront property and structure costs.

13. Impact on Slovenski Park - review of Highway 401/6 widening adjacent to Slovenski Park. This was a particularly sensitive section along Highway 401 due to the requirement to remove some trees which act as a screen adjacent to Highway 401. In an effort to reduce the impact, the utilization of an urban cross-section along the north edge of pavement adjacent to the park was reviewed. However, it was concluded that there was not a significant difference in impact between the urban and rural cross-sections.

Therefore, the rural section was recommended due to the cost, maintenance and stormwater management implications of an urban section.

15. Hanlon Expressway N - Highway 401 E Directional Ramp - outlines the rationale for abandoning the N-E loop ramp in favour of incorporating a directional N-E ramp into the project.

16. Highway 6 S - Highway 401 E Ramp - review of the original Connection Road/Brock Road interchange proposal which had access from northbound Highway 6 to eastbound Highway 401 (S-E move) share the loop ramp with the N-E move. This was identified as a major move between the two provincial highways which should be improved by constructing a direct S-E ramp to eliminate having to turn left turn to enter the ramp.

17. Access to the Farkas Property - developed two alternatives for reconstructing the Farkas driveway. The Farkas driveway will have to be raised approximately 5 m and realigned westerly to match the new profile on County Road 34.

18. Maddaugh Road Re-alignment - review of re-alignment of Maddaugh Road in an effort to minimize property impacts, specifically in the southeast quadrant.

19. Highway 6/401 N-E and W-N Ramps Hydraulic Impact - determine if there is a barrier effect caused by placement of high fills for the N-E and W-N ramps on the regional storm and 1:100 year water levels on Aberfoyle Creek. It was concluded the proposed ramps at the Highway 401/Hanlon Expressway interchange will not impact the Aberfoyle Creek upstream flood levels.

TABLE OF CONTENTS

Page

2.0 INTRODUCTION

2.1 The Environmental Assessment Report 2-1
2.1.1 Process for Amending/Updating This Environmental Assessment . . 2-1

2.2 Purpose of the Undertaking 2-2
2.2.1 General 2-2
2.2.2 Identified Transportation Problems 2-2
2.2.3 Purpose of the Undertaking 2-4
2.2.4 Project Objectives 2-4

2.3 Background 2-4
2.3.1 Previous Studies 2-4
2.3.2 Related Studies and Projects 2-5

2.0 INTRODUCTION

2.0 INTRODUCTION

2.1 THE ENVIRONMENTAL ASSESSMENT REPORT - ONE-STAGE SUBMISSION

The Environmental Assessment Report - One-Stage Submission represents a one-time only environmental assessment carried out by the Ministry of Transportation for a Group "A" project as defined in the "Provincial Highways Program Class Environmental Assessment". It includes a description of the following elements :

- Purpose of the project;
- Environmental Assessment process followed, including consultation with affected parties;
- Current environmental conditions in the study area;
- Environmental effects associated with the project, and reasonable alternatives thereto; and
- Commitments to mitigating adverse environmental effects and further work to be undertaken relative to identified environmentally sensitive issues.

Group "A" projects require Full or Individual Environmental Assessments and are subject to formal review and approval by government ministries/agencies and the public, including a possible hearing before the Environmental Assessment Board.

2.1.1 Process for Amending/Updating This Environmental Assessment

The Ministry of Transportation (MTO), in submitting this Environmental Assessment to the Ministry of the Environment and Energy, has attempted to provide as much detail as possible about both the undertaking itself, and the anticipated net environmental impacts. After approval under the Environmental Assessment Act is granted for an undertaking, MTO's standard approach is to initiate further technical investigations during the Detail Design phase of the project which generally occurs two to three years prior to construction. In addition to the more detailed technical work, further consultation with all stakeholders is also undertaken at that time. Issues and concerns which are raised during the Detail Design are documented and addressed in Design and Construction Reports which are filed for information purposes prior to any construction.

Although MTO has attempted to be as thorough as possible, there is a possibility that the Detail Design may identify significant environmental impacts which may not have been anticipated in the Environmental Assessment Report. These impacts may fall into either of two categories. The first category includes changes to the proposed undertaking which are required because of new information resulting from the Detail Design engineering and environmental investigations. The second category includes short term impacts which result from construction staging of the undertaking. The staging of construction is dependent upon financial resources, provincial priorities, and realized growth in demand, and can only be determined during the Detail Design phase.

MTO is committed to addressing the environmental concerns resulting from this undertaking, whether identified in the Environmental Assessment Report or during the Detail Design phase prior to construction. MTO will screen all component projects of this undertaking during their Detail Design for new concerns. **NEW CONCERNS ARE DEFINED TO INCLUDE ONLY THOSE CONCERNS WHICH HAVE NOT ALREADY BEEN IDENTIFIED IN THIS ENVIRONMENTAL ASSESSMENT REPORT.** If MTO determines that a new concern is significant, then the Ministry will conduct the Detail Design for the affected component of the project under the Provincial Highways Class Environmental Assessment process. This formal process includes the preparation of an Environmental Study Report in place of a Design and Construction Report and provides the opportunity for formal agency and public review. Provisions within the Class Environmental Assessment allow for a "Bump-up" to an Individual Environmental Assessment should serious environmental concerns remain unresolved. The intent of preparing an Environmental Assessment well in advance of construction is to allow for planned development within the study area while still protecting a route for the highway.

THEREFORE, WHERE CLASS ENVIRONMENTAL ASSESSMENT PROVISIONS ARE EXERCISED, THEIR APPLICATION WILL BE LIMITED TO THE DESIGN AND CONSTRUCTION DETAILS RELATED TO THE IDENTIFIED CONCERN ONLY, AND WILL NOT PROVIDE THE OPPORTUNITY TO RE-EXAMINE THE ROUTE LOCATION OR THE BALANCE OF THE DESIGN.

Acceptance of this Environmental Assessment and approval of the project by the Minister of the Environment and Energy will permit the Ministry of Transportation to :

- Designate the recommended route alignment;
- Purchase the property necessary for implementation of the project;
- Construct the highway facility; and
- Operate and maintain the completed facility.

As indicated in the Preamble to this Environmental Assessment, the portion of this project between Freelton and the Region of Hamilton-Wentworth/County of Wellington boundary has been separated from the remainder of the undertaking for environmental assessment approval purposes due to the urgency of the improvements from a safety perspective and the absence of identified significant environmental issues. Planning and design for that 4 km section will be completed as a Group "B" undertaking, also in accordance with the Provincial Highways Program Class EA.

In accordance with this approved process, a Public Information Centre will be held and an Environmental Study Report (ESR) will be prepared. Group "B" projects are not subject to the same formal review and approval process as Group "A" projects but may be "bumped-up" to an Individual assessment if certain conditions (established in the EA Class Document for such a change in status) are met.

2.2 PURPOSE OF THE UNDERTAKING

2.2.1 General

Highway 6 is a major north-south arterial route which, between the City of Hamilton and the City of Guelph, carries predominantly commuter traffic. In addition, it provides a multi-purpose provincial link between the Niagara Peninsula and the Georgian Bay area. The Guelph area also generates and attracts a significant amount of traffic to and from Toronto to the east.

Due to increasing travel demand, Highway 6 has been reconstructed to a 4-lane roadway from Highway 403 northerly to Freelton. Construction of the section ending at Freelton was completed in 1981. Studies of current conditions indicate that additional capacity is also required from Freelton northerly to Highway 401. This need is becoming increasingly acute with recent economic expansion and new development in both Guelph and the City of Cambridge.

The Hanlon Expressway (Highway 6 north of Highway 401) is a 4-lane road located within both the Township of Puslinch and the City of Guelph. It was constructed in 1975 to relieve traffic pressure on County Road 46 (old Highway 6) and serve industrial development on the western periphery of Guelph. However, it does not attract the previously expected traffic volumes from either the east or south and the demand remains on County Road 46 (Brock Road/Gordon Street) through the City.

2.2.2 Identified Transportation Problems

Within the study area, the following problems have been identified as deficiencies which should be rectified or minimized, and constitute a specific need for the undertaking :

*a) Level of Service**

From an analysis of MTO 1979 Origin - Destination (O-D) survey data for Highway 6, County Road 46 and the Hanlon Expressway immediately north of Highway 401, the 1983 Corridor Study concluded that County Road 46 handles 61% of the traffic from Hamilton and Toronto while supplying only 30% of the total available capacity (volume/capacity ratio of 0.53). Conversely, the Hanlon Expressway attracts 39% of the traffic while providing 70% of the capacity (volume/capacity ratio of 0.17).

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from "A" to "F", with Level of Service "A" representing the best operating conditions (high level of service) and Level of Service "F" the worst (low level of service).

The level of service along Highway 6 south of Highway 401 is low in the peak periods, particularly through Morriston, due mainly to the large truck component and the lack of turning lanes.

---

* **The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.**

The 1983 Preliminary Design Report for Highway 6 between Freelton and Puslinch Road 35 indicated that this section of the highway now operates at Level of Service "E" (capacity is reached) for PM peak-hour volumes.

The level of service along County Road 46 is also low due to the high V/C ratio and high percentage of turning volumes. Conflicts with pedestrians through Aberfoyle and the southern parts of Guelph are also a major contributing factor to the low level of service.

The 1982 Corridor Study suggested that, at the south limit of Guelph, County Road 46 is operating at Level of Service "E" and is expected to reach forced flow conditions (Level of Service "F") by 1995.

In addition to incurring relatively high user costs, these capacity and demand incongruities on the major study area roadways are frustrating municipal development initiatives, particularly in the southwest quadrant of the City of Guelph and in designated growth nodes within the Township of Puslinch (Morriston and Aberfoyle).

b) Accident Experience

Accident data for the period 1982-1991 for Highway 6 between Freelton and Morriston reveal that this section of highway exhibited accident rates in the range of 0.6 to 1.2 accidents per million vehicle kilometres (except 1990 which had a rate of 1.8). This is lower than or in line with the provincial average for King's highways (which has ranged from 1.0 to 1.2 a/mvkm in the subject years). However, between Morriston and Highway 401, the accident rate for the most part has been in the range of 2.8 to 4.0 a/mvkm (with only 2 years having lower rates). This is significantly higher than the provincial average. The Highway 401/Highway 6 interchange falls within the Morriston section and is a contributing factor to the higher accident rate.

Notably, personal injuries occurred in almost 50% of all accidents. During 1982, three fatalities were recorded between Freelton and Morriston. These characteristics may be attributable to a combination of the type of accident (the majority were rear end collisions, apparently related to turning movements to many commercial and residential accesses), high/excessive rates of speed and the relatively high proportion of heavy commercial vehicles (average daily - 18%; estimated maximum daily - 25-30%).

c) Traffic Composition

As indicated above, a high percentage of large commercial vehicles travel the Highway 6 corridor within the study area. The proportion of such vehicles is also substantial on County Road 46 (15%). Slow moving vehicles (trucks gearing up/down) and school buses making stops, combined with limited opportunities for passing on the two-lane section, contribute to capacity problems.

High speed regional traffic, and commercial vehicles in particular, has been cited as being "intimidating" by those making local trips. Residents of the Hamlets of Aberfoyle and Morriston and the University of Guelph with buildings close to the Highway 6 right-of-way have expressed concern with the increasing volumes of (high speed) traffic, citing problems such as noise, vehicle/pedestrian conflicts, and adverse impacts to air quality, landscaping, development potential and property values in general.

These concerns suggest that some separation of through/commercial and local/passenger traffic is desirable.

d) Maintenance Requirements

The high traffic volumes and percentage of trucks using the Highway 6/County Road 46 corridor, combined with the high left-turning volumes, results in the utilization of shoulders for passing manoeuvres. This contributes to the abnormally high maintenance requirements and costs for the facility.

With the exception of a short urban section and associated sewer system in the Hamlet of Puslinch, Highway 6 is characterized by a rural cross-section and drainage of surface runoff is provided primarily by open ditch flow. There are localized flooding problems requiring improvements in the Village of Morriston and east of Village of Freelton. The Provincial Road Section Appraisal sheet rates overall drainage as only fair.

2.2.3 Purpose of the Undertaking

Based on the identified transportation related problems, the purpose of the undertaking is to **introduce transportation system improvements in the Highway 6 corridor between Freelton and the City of Guelph which contribute to a reduction in the growth of road congestion, accident potential and associated costs, as well as support municipal Official Plan objectives.**

In summary, there are both the **need** for improvements, based on the inability of portions of the transportation infrastructure to accommodate existing and future travel demand. and an **opportunity** to introduce transportation improvements in support of economic development goals and objectives, as well as make better use of portions of existing transportation infrastructure which are underutilized.

2.2.4 Project Objectives

The primary Project Objectives related to the foregoing statement of purpose are :

1. Improve the current Highway 6 jog along Highway 401, thereby providing a higher degree of Highway 6 continuity and superior route in terms of level of service and travel time.

2. Optimize utilization of the Hanlon Expressway by making it more attractive to traffic now using County Road 46.

3. Induce removal of through traffic from existing Highway 6 through the Village of Morriston, thus reducing the overall impact of noise, accidents, congestion and enhancing opportunities for community growth.

4. Induce removal of through traffic along County Road 46 to create similar benefits to the Village of Aberfoyle and the south end of the City of Guelph.

5. Provide the most efficient, cost-effective solution, while limiting adverse environmental impacts to the greatest degree possible.

2.3 BACKGROUND

2.3.1 Previous Studies

The following section provides a chronological description of previous planning and design exercises directly related to the current study. This is the only formal one stage environmental assessment report that has been prepared and submitted for this section of Highway 6. The widening of Highway 401 from 4 lanes to 6 lanes falls within the subject study area. ESR's have been prepared for the Highway 401 widening projects (see page 2-7).

The 1978 Highway 6 (Millgrove to Highway 401) Feasibility Study (WP 65-76-00) established the need for a 4-lane facility from Millgrove northerly to Highway 401. It investigated by-passing the Hamlets of Puslinch and Morriston with north terminals at either the Hanlon or at the existing Highway 6-County Road 46/Highway 401 interchange. Recommendations were for a 4-lane facility from Millgrove to by-pass Morriston on the west side and terminate at the County Road 46 interchange. The local municipalities rejected the County Road 46 interchange terminal but accepted the Millgrove to Freelton recommendation which was subsequently implemented. Construction was completed in 1981.

The concurrent MTO highway development program recommended widening Highway 6 in the study area from two to four lanes (MTO Priority Development Branch Program Justification Report, November 22, 1978).

In 1980, a study of Highway 6 route alternatives between Freelton and Highway 401 recommended widening existing Highway 6 from Freelton to Highway 401 to four lanes with a by-pass of the Village of Morriston. This study has not been published and was terminated pending the outcome of a more comprehensive corridor study.

The 1982 Highway 6 (Freelton to North of Guelph) Corridor Study (WO 80-23015) was initiated as a result of the 1978 rejection of the north terminal at County Road 46. An enlarged study area from Freelton to north of Guelph was required to complete the study, which was directed by a Steering Committee of local municipal representatives and funded by MTO.

This study reviewed the transportation needs in the corridor because of municipal concerns over increased traffic volumes on County Road 46 (Brock Road) between Highway 401 and the City of Guelph. It was considered undesirable to encourage such increases into Guelph along this route by providing additional traffic lanes on Brock Road and Highway 6 just south of Highway 401. Apart from creating additional unused capacity on the Hanlon Expressway, such widening also had the potential to create significant adverse impacts on the settlement areas of Aberfoyle, Morriston and Puslinch.

The study examined traffic projections on viable routes within the area and, based on an evaluation of these, identified a corridor encompassing several routes that would satisfy transportation needs.

The Corridor Study concluded that the remaining routes failed to attract traffic volumes because they were not within reasonable proximity of the desire line for the majority of trips and consequently were considered incapable of relieving traffic congestion within the southern area of the City of Guelph.

The study recommendations, which were accepted, included widening the existing route from Freelton to Puslinch Road 35 and constructing a new route from that point, west of Morriston to the Hanlon Expressway north of Highway 401. It was also recommended that the Route Location Study for the new route be conducted.

The Preliminary Design Report for 4-laning Highway 6 from Freelton to Puslinch Road 35 was prepared in 1983. Prior to completion of this study the Township of Puslinch objected to the design through the Hamlet of Puslinch which straddles existing Highway 6 in the vicinity of the CP Rail Galt Subdivision crossing. It was then agreed that the current Highway 6 Route Location and Preliminary Design Study (WP 65-76-05), initially intended to select a new route from south of Morriston to Highway 401, would be extended to include the review of a by-pass for the Hamlet of Puslinch. This consideration was incorporated in the 1984 Joint Study Advisory Committee Terms of Reference (refer to Section 3.3.1 - Study Appraisal and Appendix A).

2.3.2 Related Studies and Projects

The following is a selective chronological synopsis of events and associated documentation from which the current Route Location and Preliminary Design Study has evolved.

1970 *The Official Plan for the Guelph Planning Area*

The Plan establishes six Land Use Policy Areas. The limits of each Policy Area are indicated on the maps forming part of the Plan. The Plan was supplemented by 14 Official Plan Amendments between 1971 and 1980 and replaced by a new Official Plan in 1987.

1971 *Highway 6N - Highway 401 to Guelph South Limits*

Four options were analyzed, from which the proposal for construction of the Hanlon Expressway, as it now exists, was adopted. The other design proposals were discarded due to cost, heavy property damage, interference with a (then) proposal for a satellite city and geometrics that do not meet safety standards. The selected route (the existing) was recommended for its minimum cost, minimum property severances and tangential alignment on all approaches to the Highway 401 interchange.

1973 *Conversion of the Hanlon Expressway to Freeway Standards (WP 76-33-001)*

This study was undertaken by the Planning Division of the Ministry of Transportation to determine the requirements for conversation of the Hanlon Expressway to freeway standards within the City of Guelph, particularly in the event that the new Highway 7, west of Guelph, connects to the Hanlon Expressway at or north of Woodlawn Road. The study concluded that it is feasible to provide interchanges on major street crossings and to grade separate the minor street crossings without changing either the existing or proposed profile of the Expressway. This conclusion was contingent on two major factors.

i) Closing of the two railway spur crossings at the Expressway between Speedvale Avenue and Woodlawn Road;

ii) Land use pattern adjacent to the Expressway must be compatible with a freeway.

1973 *The Official Plan of the Guelph and Suburban Planning Area*

The Plan establishes general policies to guide future development within the Study Area. It also provides a framework of policy reference for both public officials and residents of the study area within which to make decisions concerning future land use, development and investment.

The Plan identifies land use policy areas, extractive industry policy areas, urban and rural development areas, government and conservation authority lands, soil capability for agriculture, aggregate resources, hazard lands and environmentally sensitive areas.

The Plan was updated by a "Planning Study Review" dated January, 1980 and replaced by a new Official Plan in 1987.

1974 *City of Guelph Transportation Plan (To 100,000 Persons and Beyond)*

The study is an update of the Guelph Transportation Plan. Among the key recommendations of the study is adopting a Recommended Road Plan for 80,000 and 100,000 persons as the short and medium term strategies for the City. The horizon years for the Recommended Road Plan are 1981 and 1991 respectively.

1974 *Protecting the Option for Future Interchanges and Grade Separations in the Hanlon Corridor*

This study, prepared for the City of Guelph, identifies a scheme of upgrading the Hanlon Expressway to freeway standards from Stone Road to Highway 7.

1974 *Hanlon Expressway Northerly Extension - Technical Report (WP 25-72-00)*

This report designates a route for extending the Hanlon Expressway from Highway 7 to the connection of Highway 6 and County Road 7. The route selected is designated as Route "E". It has a 76 metre (250') right-of-way and has been designated as King's Highway and Controlled Access Highway.

1974 *Highway 24 Feasibility Study (Cambridge to Guelph - WP 67-72-00)*

This study was initiated in 1973 to determine a route for a transportation facility in the Highway 24 corridor. The selected route is a 4-lane inter-urban expressway which by-passes Hespeler and connects to Stone Road. An alternative to the Stone Road connection, as cited in a previous study, is the upgrading and utilization of Wellington Street.

1975 *Highway 7 Feasibility Study (Kitchener to Guelph - WP 81-71-00)*

The study recommends the introduction of a controlled access inter-urban expressway by upgrading the existing highway for most of its length, with the exception of a new alignment north of existing Highway 7 within the City of Guelph limits.

1976 *Guelph Area Transportation Study*

This study presents a transportation plan to 1985 with a long range plan to indicate the development which will occur in 1995 within the boundaries of the City of Guelph.

1976 *Guelph Traffic Operations Review*

The report identifies the signalized intersections in the City of Guelph and determines the existing level of service operation at each intersection.

1978 *Highway 6 - Millgrove to Highway 401 Feasibility Study (WP 65-76-00)*

This study established the need for a four-lane facility from Millgrove northerly to Highway 401. It studies bypassing the Hamlets of Puslinch and Morriston with north terminals at either the Hanlon or at the existing Highway 6-County Road 46/Highway 401 interchange. Recommendations were for a four-lane facility from Millgrove to bypass Morriston on the west side and terminate at the County Road 46 interchange. The local municipalities rejected the County Road 46 interchange terminal but accepted the Millgrove to Freelton recommendation which was subsequently implemented. Construction was completed in 1981.

1980 *Analysis and Projection of Guelph's Population - 1976-2001*

The report analyzes the existing population of Guelph and its recent growth history and provides alternative forecasts of future population growth.

1980 *Analysis of the Hanlon Expressway and Brock Road - Origin-Destination Survey*

This study, conducted by the Ministry of Transportation and Communications, summarized and analyzed the data collected at two O-D stations. It concluded that both County Road 46 and the Hanlon Expressway provide about equal utility in serving the needs of Guelph. The majority of traffic on the two facilities originates from Highway 401 east and Highway 6 south of Highway 401. The study also concluded that a southerly extension of the Hanlon Expressway from Highway 401 to Puslinch would benefit neither of the major moves from Highway 401 east or from Highway 6 south.

1980 *Highway 6 Route Alternatives - Freelton to Highway 401*

This study recommended widening the existing Highway 6 from Freelton to Highway 401 to four lanes with a bypass of the Hamlet of Morriston. (Note : This study has not been published and was terminated pending the outcome of the 1982 Corridor Study).

1982 *Highway 6 - Freelton to North of Guelph Corridor Study (WO 80-23015)*

A corridor study was initiated as a result of the 1978 rejection of the north terminal at County Road 46. An enlarged study area from Freelton to north of Guelph was required to complete the study which was directed by a Steering Committee of local municipal representatives and funded by MTC. The study recommendations, which were accepted, included widening the existing route from Freelton to Puslinch Road 35 and constructing a new route from that point, west of Morriston to the Hanlon Expressway north of Highway 401.

1983 *Highway 6 - Freelton Northerly to Puslinch Road 35 (WP 65-76-02)*

The Preliminary Design Report for four-laning Highway 6 from Freelton to Puslinch Road 35 was prepared in 1983. Objections by the Township of Puslinch to the design through the Hamlet of Puslinch led to extension of the aforementioned Route Location Study to include consideration of a bypass of Puslinch. This work could be superseded by the current route location and preliminary design study.

1984 *Highway 6 - Caledonia By-Pass Northerly to Hamilton (WP 36-84-00)*

Route Location and Preliminary Design Study to provide an alternative location for existing Highway 6 south of Hamilton. Although remote from the study at hand, these proposals may have regional traffic implications.

1984 *Township of Puslinch Roads Need Study*

A Roads Needs study prepared for the Township in 1984 contains traffic counts on the major township roads and recommends an improvement and maintenance program.

1984 *Highway 401 Assessment Report (WO 83-23029)*

This report, prepared by MTO, examined the operations along Highway 401 across the study area, assessed the levels of service, identified accident prone areas and offered recommendations for improvements, including construction and monitoring timeframes.

1993 *Highway 401 Widening - Townline Road to Hanlon Expressway (WP 450-89-00)*

The Detail Design for widening Highway 401 from 4 to 6 lanes was completed and an Environmental Study Report submitted to MOEE. Construction was completed in the Spring of 1995.

1993 *Highway 401 Widening - Brock Road to Guelph Line (WP 453-89-00)*

The Detail Design for widening Highway 401 from 4 to 6 lanes was completed and an Environmental Study Report submitted to MOEE. Construction was completed in the summer of 1995.

1994 *Highway 401 Widening - Hanlon Expressway to Brock Road (WP 451-89-00)*

Detail Design for the widening of Highway 401 from 4 to 6 lanes has been initiated on this section. The contract award date has been deferred to 1996.

1994 *Guelph and Area Transportation Study*

Study to prepare an updated Transportation Plan for the City of Guelph and southern County of Wellington. Includes road improvement recommendations for the next 20 years and an implementation schedule. The need for the proposed relocation of Highway 6 from Freelton to Highway 401 has been reconfirmed in the study.

TABLE OF CONTENTS

Page

3.0 STUDY ORGANIZATION & THE ONE-STAGE ENVIRONMENTAL ASSESSMENT PROCESS

3.1 Introduction 3-1
3.1.1 Update and Supplementary Investigations 3-1

3.2 Pre-Submission Consultation 3-2
3.2.1 Purpose 3-2
3.2.2 Project Team 3-3
3.2.3 Internal Team 3-3
3.2.4 Government Ministries and Agencies Involvement 3-4
3.2.5 Municipal Involvement 3-4
3.2.6 Public Involvement 3-6
3.2.7 Railway Companies 3-14
3.2.8 Utility Companies 3-14

3.3 Development of Study Design 3-14
3.3.1 Project Appraisal and Pre-Study 3-14
3.3.2 Definition of the Study Area 3-15
3.3.3 Development and Review of Study Design 3-15
3.3.4 Study Staging and Timeframe 3-16

3.4 Determination of Environmentally Significant Issues 3-17
3.4.1 Definition 3-17
3.4.2 Identification 3-17

3.0 STUDY ORGANIZATION & ONE-STAGE EA PROCESS

3.1 INTRODUCTION

This chapter provides an overview of the major elements of the One-Stage Environmental Assessment Process used by the Ministry of Transportation for this project.

The following key components embraced by the process are outlined :

i) Pre-submission consultation
ii) Development of the Study Design document
iii) Determination of environmentally sensitive issues
iv) Commitment to further work

This involves a description of the manner in which the various study participants contributed to the development of the study process, the means by which the high level of communication and interaction between the Project Team and other participants was maintained and the action taken by the Project Team to address participants' concerns at each stage of the study. In addition, this chapter discusses the approach used by the Project Team in determining outstanding issues and addressing them on a continuing basis.

The study documentation has been prepared to demonstrate that the planning process has been conducted in conformance with the following key requirements contained in the Environmental Assessment Act and outlined in the Ministry of the Environment and Energy's "Interim Guidelines on Environmental Assessment Planning and Approvals" (1989):

- Consultation with affected parties
- Consideration of reasonable alternatives
- Consideration of effects on all aspects of the environment
- Systematic evaluation of net environmental effects
- Preparation of clear, complete documentation

3.1.1 Update and Supplementary Investigations

The pre-submission consultation process included circulation of the Draft Environmental Assessment Report to Official Government Reviewers for the purpose of securing agreement in principle on the proposed undertaking prior to formal submission to MOEE. The findings contained in that Draft EAR are hereinafter referred to as the "Initial" conclusions and recommendations.

The pre-submission review of the Draft EAR was substantially completed by early 1990 and it was determined that most of the comments received could be readily addressed (Pre-submission comments are included in Appendix B of this report). However, the Ontario Ministry of Natural Resources expressed continuing concern with respect to the following principal components :

- the proposed location of the new Hanlon Expressway/Wellington County Road 34 interchange;

- description and justification of impacts related to woodlands/forestry, fisheries and wetland resources, particularly as related to the preferred alignment of the new route segment between Crieff Road and Highway 401 (woodlands/forestry) and the County Road 34 interchange (fisheries and wetlands).

As a result, MTO made a commitment to undertake additional investigations for these components; this work was conducted between 1992 and 1994.

Also, new initiatives, guidelines and policies for Stormwater Management, Fisheries and Wetlands had to be addressed.

In addition to addressing the Pre-Submission comments, it was determined that additional work was needed to meet new requirements and update the data base prior to the formal submission of the EA Report. The following major components of the data base had become outdated during the pre-submission period :

- traffic
- property ownership
- official plan and land use information
- Highway 401 widening information*

The approach to and results of the Update and Supplementary Investigations Phase of the study are described in Chapters 4, 5 and 6 of this report.

---

* MTO had decided to replace the inner N-E loop ramp at the Highway 401/Hanlon Expressway interchange with a fully directional ramp and accelerate the widening of Highway 401 through the study area such that these improvements would precede the proposed Highway 6 improvements instead of vice versa as assumed at the time of the pre-submission review. These developments had significant implications relative to the initial findings in terms of traffic operations in the Highway 401 corridor, operation and proposed location of the Hanlon/County Road 34 interchange, as well as property requirements and associated impacts to affected owners.

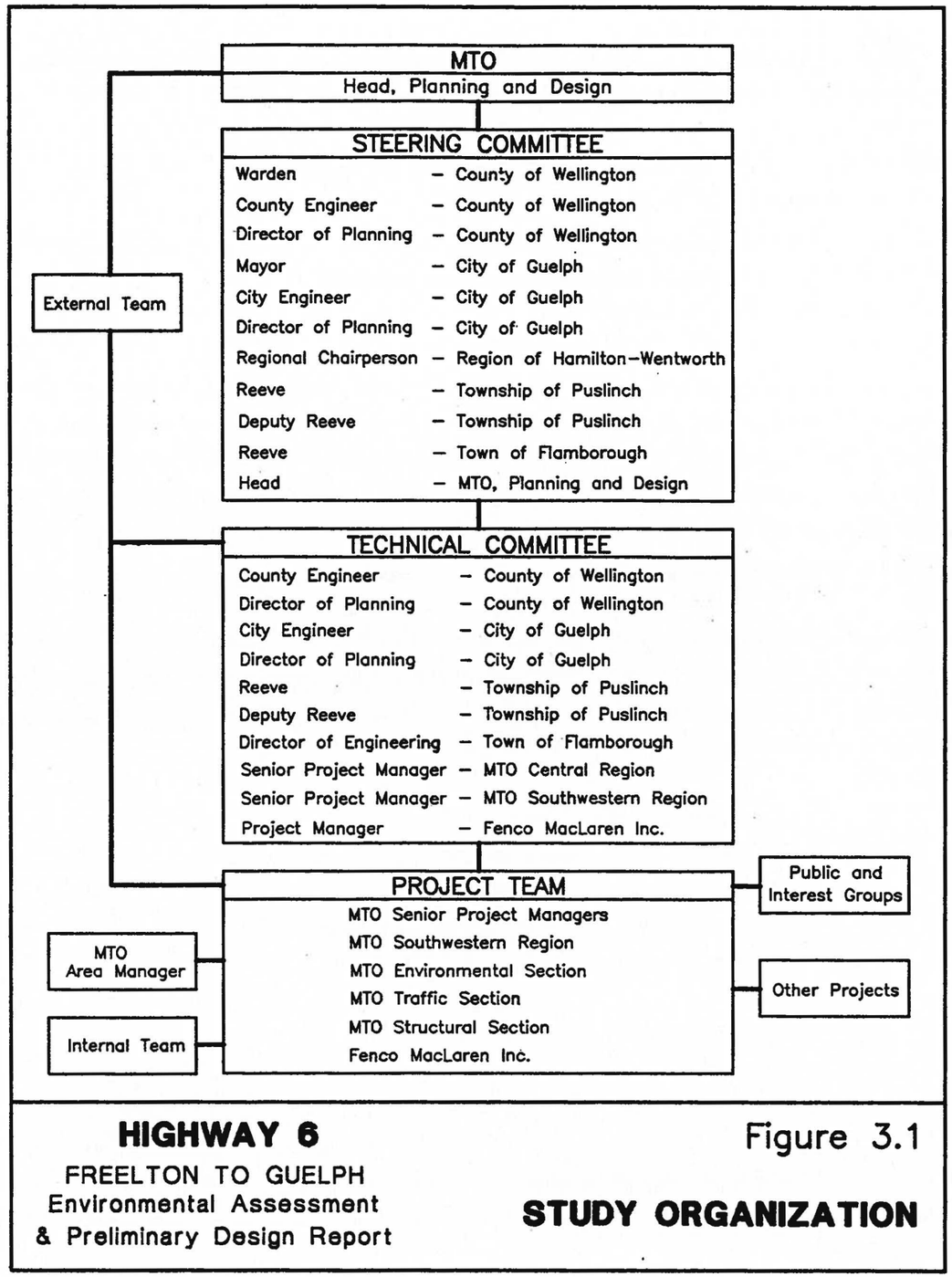
3.2 PRE-SUBMISSION CONSULTATION

3.2.1 Purpose

The basic principle of pre-submission consultation is the promotion of dialogue between the proponent and potentially affected parties in order that all viable alternatives may be identified and agreements regarding impacts and commitments to mitigation measures and further work may be established, to the greatest extent possible, before final design decisions are made. Towards this end it was deemed essential that all such parties be provided with both the information necessary to understand the proposal and the opportunity to react to the proposal and receive the Project Team's reaction to such comments at appropriate points as the study progressed.

A comprehensive pre-submission consultation program involving Official Government Reviewers was established early in the planning process to confirm appropriate contacts and secure a clear statement from reviewers as to their desire to participate further. A similar concurrent consultation program was conducted in order to facilitate interaction with affected municipalities, the general public, interest groups, private property owners, railway companies and utility agencies. The mechanisms and general conduct of the pre-submission consultation programs relative to each of these external groups are dealt with in this section of the report. Major concerns and comments and the manner in which these concerns have been addressed are considered in detail in subsequent portions of this report dealing with existing conditions, development and evaluation of alternatives, and project description. Selected correspondence and selected minutes of meetings are included in Appendices B and C respectively.

The following sub-sections describe how the study was organized and the manner in which participants interacted with and responded to each other by formal means, as well as on an ad hoc basis. The general structure of this inter-relationship is illustrated in Figure 3.1. The extent and timing of involvement by study participants in the context of the study progress if described in the following sections.



3.2.2 Project Team

The study was conducted by a Project Team comprising MTO and Consultant staff under the day-to-day management of the designated MTO Senior Project Manager/Engineer, H. Vander Kooij and H. Wojcinski (Planning and Design Section, MTO Central Region).
Other MTO members of the Project Team have included:

J. Desrochers - Senior Project Manager, MTO Southwestern Region
K. Bentley - Senior Project Engineer, MTO Southwestern Region
C. Southey - Senior Environmental Planner, MTO Central Region

The responsible MTO Area Managers (L. Dutchak/R. Hanmer) provided direction and input at appropriate points during the course of the study.

Fenco MacLaren Inc. was the engineering consulting firm assigned responsibility for conducting the Route Location and Preliminary Design Study and reported directly to the MTO Senior Project Manager at regularly scheduled Project Team meetings, and at working meetings convened as necessary, to discuss technical aspects of the project, progress and other related matters.

Consultant members of the Project Team have included:

L. House - Project Manager
A. Minchev - Project Manager/Senior Transportation Engineer
I. Upjohn - Senior Environmental Co-ordinator

3.2.3 Internal Team

In addition to the Project Team and the study Technical/Steering Committee (refer to Section 3.2.5), technical input was contributed by two supplementary groups - the Internal and External Teams.

The Internal (MTO) Team provided resource services, normally via MTO Central Region Planning and Design Section, throughout the study and comprised personnel from the following MTO offices:

Central Region

- Engineering Office
  - Environmental Section
  - Geotechnical Section
  - Property Administration Section
  - Structural Section
  - Surveys and Plans Section
- Regional Maintenance Office
  - Traffic Section

Southwestern Region

- Liaison with Central Region at Senior Project Manager level on Project Team
- Supplementary data as required (e.g. traffic, control of access information)

Head Office

- Urban and Regional Planning Office
- Transportation Demand and Forecasting Office
- Structural Office
- Surveys and Design Office
- Estimating Office
- Resources Planning Office
- Maintenance Office

Presentations were made to the Internal Team and MTO Central Region management at the following study junctures :

1) At the point where viable alternatives had been identified and subjected to a preliminary assessment;

2) At the point where viable alternatives had been evaluated and the technically preferred option identified;

3) At the point where preliminary design of the preferred option had been completed (Initial Recommendation).

4) At the point where preliminary design of the preferred option had been completed (Final Recommendation).

5) At the point where alignment and interchange alternatives developed in the Update and Supplementary Investigations Phase had been developed and subjected to a preliminary assessment; and

6) At the point where viable alignment and interchange alternatives developed in the Update and Supplementary Investigations Phase had been evaluated and the technically preferred options identified and refined (preliminary design).

3.2.4 Government Ministries and Agencies Involvement

Representatives of all Government Ministries who have responsibility for review and comment on environmental assessments (Official Government Reviewers or delegated contacts) and public/private agencies comprised the External Team for the project. A list of constituent External Team members is presented below*.

Federal Department of Fisheries and Oceans
Management Board Secretariat
Ministry of Agriculture and Food
Ministry of the Attorney General
Ministry of Colleges and Universities
Ministry of Community and Social Services
Ministry of Culture Tourism and Recreation
Ministry of Education and Training
Ministry of Economic Development and Trade
Ministry of the Environment and Energy
Ministry of Health
Ministry of Labour
Ministry of Municipal Affairs
Ministry of Housing
Ministry of Natural Resources
Ministry of the Solicitor General and Correctional Services
Halton Region Conservation Authority
Hamilton Region Conservation Authority
Grand River Conservation Authority
Ontario Hydro
CP Rail
TransCanada Pipelines
University of Guelph

* Listing based on 1993 Ministerial portfolios

Presentations were made to the External Team as follows :

1) At the outset of the study to apprise them of the study limits, timing and tentative study outline. This meeting also served to establish their involvement, responsibilities and expectations, as well as to stimulate thinking and seek input on environmentally significant issues;

2) At the point where alternatives had been identified and subjected to a preliminary assessment;

3) At the point where viable alternatives had been evaluated and a technically preferred option identified; and

4) At the point where preliminary design of the preferred option had been completed.

In addition, External Team participants were invited to attend all Public Information Centres.

Comments and additional information were sought during each phase of the study. In addition to critical path External Team presentations, further contacts (e.g. working meetings and formal negotiations) were made with individual ministries and agencies as required or requested to deal with specific project related concerns and in an effort to secure agreements prior to proceeding to subsequent phases.

3.2.5 Municipal Involvement

This study was atypical of most major MTO Route Location investigations, in that it was established as a joint provincial/municipal study as opposed to being exclusively a provincially

directed study. MTO has, however, retained the role of designated proponent for the undertaking for the purpose of seeking Environmental Assessment approval.

The following municipalities were formally represented on the project and played a major role in defining the study Terms of Reference and in the decision-making process :

- City of Guelph
- County of Wellington
- Regional Municipality of Hamilton-Wentworth
- Township of Puslinch
- Town of Flamborough

The study was conducted under the auspices of a Steering Committee, comprising elected and appointed municipal representatives, which provided direction and information related to municipal concerns, and reported directly to their respective Councils. The Committee also included MTO representation.

The following designated individuals constituted the Steering Committee :

K. Hammill, Chair (1984-89)	-	Alderman, City of Guelph
W. Benson/M. Bridge/W. Quanz/ R. Wilson	-	Warden, County of Wellington
A. Holmes/G. Ough	-	County Engineer, County of Wellington
G. Cousins	-	Planning Director, County of Wellington
R. Funnell	-	City Engineer, City of Guelph
M. Venditti	-	Planning Director, City of Guelph
J. Pavelka/T. Gill/H. Salatandre	-	Transportation Planning, Regional Municipality of Hamilton-Wentworth
A. MacRobbie, Chair (1992-94)	-	Reeve, Township of Puslinch
R. Cook/T. Bacigalupo/ B. Whitcombe	-	Deputy Reeve, Township of Puslinch
K. Hood	-	Councillor, Town of Flamborough
D. Smith	-	Director of Engineering, Town of Flamborough
A. Wittenberg	-	Head, Planning and Design Section, MTO Central Region

Access to specific input related to municipal concerns was through designated representatives sitting on a Technical Committee. Municipal representatives on this Committee directed Project Team information requests to their respective staff as deemed appropriate.

The Technical Committee comprised the following members :

A. Holmes/G. Ough	-	County Engineer, County of Wellington
G. Cousins	-	Planning Director, County of Wellington
R. Funnell	-	City Engineer, City of Guelph
M. Venditti	-	Planning Director, City of Guelph
A. MacRobbie	-	Reeve, Township of Puslinch
T. Bacigalupo/B. Whitcombe	-	Deputy-Reeve, Township of Puslinch
D. Smith	-	Director of Engineering, Town of Flamborough
J. Lane	-	Works Superintendent, Town of Flamborough
H. Vander Kooij	-	Senior Project Manager, Planning & Design, MTO Central Region
H. Wojcinski	-	Senior Project Engineer, Planning & Design, MTO Central Region
J. Desrochers	-	Senior Project Manager, Planning & Design, MTO Southwestern Region
N. Bot	-	Area Engineer, Planning & Design, MTO Southwestern Region
K. Bentley	-	Senior Project Engineer, Planning & Design, MTO Southwestern Region
L. House/A. Minchev	-	Project Manager, Fenco MacLaren Inc.

The overlap between the Steering Committee and the Technical Committee was instituted for the purposes of establishing and maintaining continuity between the two groups at the municipal level. The Technical Committee met at points when review and ratification of Project Team action and recommendations was necessary prior to review at the Steering Committee level. At milestone points in the study, full Steering Committee meetings were convened.

As part of this schedule, presentations were made to the Steering Committee to secure endorsement at four points in the study, as follows :

1) At the outset of the study to present the Study Design;

2) At the point where route alternatives had been developed and subjected to a preliminary assessment;

3) At the point where the viable alternatives had been evaluated and the technically preferred option identified;

4) At the point where preliminary design of the preferred option had been completed (Initial Recommendation);

5) At the point where alignment and interchange alternatives developed in the Update and Supplementary Investigations Phase had been developed and subjected to a preliminary assessment; and

6) At the point where viable alignment and interchange alternatives developed in the Update and Supplementary Investigations Phase had been evaluated and the technically preferred options identified and refined (preliminary design).

Further municipal involvement included formal joint presentations to Councils for endorsement. These presentations occurred as follows :

September 20, 1985 - presentation of route alternatives proposed for detailed investigation

June 19, 1986 - presentation of Technically Preferred Route alternative

November 19, 1987 - presentation of Technically Preferred Alignment and Preliminary Design (Initial Recommendation)

May 11, 1994 - presentation of Technically Preferred Alignment and Interchange Options and associated Preliminary Design (Update and Supplementary Investigations)

Formal resolutions of Council endorsement at these study junctures are included in Appendix B Selected Correspondence.

Councils were also invited to preview public display material prior to information centres. All Steering Committee presentations and Council previews were scheduled to precede the corresponding information centres (refer to Section 3.2.6) in order that the respective bodies might anticipate and prepare for public response, as well as have the opportunity to contribute input.

Additional involvement by Councils is detailed in Section 5.4 Alternative Methods of Carrying Out The Undertaking.

3.2.6 Public Involvement

Public involvement includes the general public, special interest groups and directly affected private property owners. Information was provided to, and input received from these groups through information sessions at scheduled points during the planning and design process, as well as on an as required basis.

General Public

Formal contact with the general public was made at the following juncture in the study :

Stage 1 - To advise the public that the Route Location and Preliminary Design Study had been initiated, outline the problem, the planning done to date, the planning schedule and indicate that the study is being done in accordance with an approved environmental assessment process; to provide contact/liaison channels for public input; and to afford the opportunity of forwarding early information relative to local goals, values, preferences, attitudes, opinions and knowledge.

Modes - information brochure, press release, newspaper advertisement (all in February 1985).

Stage 2 - To present the alternative schemes which have been identified for further consideration and solicit input specifically related to the options presented as part of the general evaluation process.

Modes - Information brochures, newspaper advertisements, open house (November 21, 1985), public information centres (June 20, 1985 and January 22, 1986).

Stage 3 - To present the route alternatives evaluation and the technically preferred option to the public and again solicit input as part of the means of refining the selected option.

Modes - Information brochure, newspaper advertisement, public information centre (April 30/May 1, 1986).

Stage 4 - To present the preliminary design of the preferred route (Initial Recommendation)

Modes - Information brochure, newspaper advertisement, public information centre (September 30, 1987)

Stage 5 - To present the preliminary assessment of alignment and interchange alternatives developed in the Update and Supplementary Investigations Phase.

Modes - Information brochure, newspaper advertisement, public information centre (June 15, 1993).

Stage 6 - To present the evaluation of alignment and interchange options and refinement (preliminary design) of the technically preferred alternative emerging from the Update and Supplementary Investigations Phase.

Modes - Information brochure, newspaper advertisement, public information centre (January 18, 1994).

Public notification at each stage in the program was undertaken through newspaper advertisement and direct mailing of information brochures to study area residents and businesses, non-resident property owners, as well as interest/advisory groups.

The public information sessions were conducted on a drop-in centre basis and provided the opportunity for either afternoon or evening participation. All public information sesions were held at the Puslinch Community Centre.

MTO and consultant staff were available for explanation and clarification, which generally proceeded on an individual basis as attendees reviewed the presentation material. Displays typically included introductory information, photographic mosaics of existing conditions, a plan and profile of alignment alternatives, representative cross-sections at critical locations, an indication of factors for evaluating options (and the evaluation itself in Stages 3 and 5) and the preliminary design (plan and profile) of the new route in Stages 4 and 6.

At each information centre, participants were advised of their rights regarding input to the planning process under the Environmental Assessment Act and were afforded the opportunity to complete a comment sheet, including property ownership address and mailing address, to be left at the centre or mailed to MTO Central Region. Verbal concerns were also noted. The subsequent review and analysis of comments generated further action regarding interaction with the public (i.e. additional meetings and written responses to all comment sheets and correspondence) and served as input to the development and evaluation of planning and design alternatives.

Detailed reports documenting the purpose, conduct and results of the discrete phases of the organized public participation program were prepared in the form of Technical Papers (refer to listing in Appendix D) which were distributed to Technical and Steering Committee members for information purposes and reporting to Council.

Table 3.1 provides a consolidated summary of the comments and concerns received at the milestone public information centres and the manner in which concerns were addressed by the EA process. More detailed synopses of comments and concerns received during the various stages of the planning process are included in Chapter 5.

TABLE 3.1A

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (JUNE 20, 1985)

PRELIMINARY DEVELOPMENT OF CORRIDOR AND ROUTE ALTERNATIVES

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ENVIRONMENTAL		
■ Degradation of surface watercourses	1	2
■ There may be a problem with groundwater storage and recharge	1	2
■ Noise intrusion will occur	1	2
■ Severance of Village of Morriston from Morriston Pond should be avoided	■ Commitment to additional impact analysis	■ Alternative A-3 modified to pass west of Morriston Pond
■ Crieff Hills Community Religious Retreat may suffer deleterious effects from D & E Series alternatives	■ Met with operator on site to discuss concerns	■ E Series route screened out. Only Route D-6 retained from D Series.
■ Alternative A-1 may have negative impacts on Bronte Creek (headwater)	■ Recognition of major environmental impacts but this option retained by Steering Committee based on traffic service benefits	2
■ Puslinch and Morriston growth areas will be lost, visual aesthetics will be disrupted, noise will be increased and safety will be decreased	■ Commitment to additional impact analysis	■ A Series options in vicinity of Morriston refined to account for concerns. A-3 Modified; A-5 reinstated.
SAFETY		
■ Farm and School vehicles crossing Hanlon Expressway on County Road 34 will be at risk	■ MTO Southwestern Region is assessing Hanlon intersection in separate corridor planning study	■ Grade separation recommended
■ Emergency vehicle access must be addressed	■ Investigated needs further with emergency services staff	■ Incorporated in design
■ CN overpass speed limits are excessive	1	■ Noted request that residents of immediate area be kept informed of study progress/design modifications
■ Ponds are reserve sources of water for fire protection. Avoid impacts	1	■ Avoidance of ponds where possible

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1A *(cont'd)*

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (JUNE 20, 1985)

PRELIMINARY DEVELOPMENT OF CORRIDOR AND ROUTE ALTERNATIVES

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ECONOMICS		
■ Property values may decrease	1	2
■ Cost to fill gravel pits near a new Concession Road 7/ County Road 34 interchange	■ Identified initially as a major but not exclusionary factor	■ Alternatives eventually screened out based on impacts, cost
■ Lost agricultural land due to rezoning	■ Land use control is municipal mandate	2
■ Loss of highway business in Morriston	■ Options maintain access to existing highway through Morriston	■ Commitment to investigate signage for increased exposure of businesses
■ Property related concerns with right-of-way acquisition	1	■ Addressed with directly affected owners during Preliminary Design phase
ROADWAY		
■ The Hanlon Expressway is on the wrong side of Guelph	■ Need for/location of Hanlon determined in previous studies	■ Stimulating greater use of Hanlon identified as a key project objective
■ The Hanlon Expressway has too many controlled intersections/ bottlenecks	■ MTO Southwestern Region is assessing Hanlon intersections in separate corridor planning study	■ Hanlon Expressway will be converted to full CAH facility (intersections converted to grade separations)
■ Use existing rights-of-way if possible	1	2
■ Restrict trucks from using County Road 46 into Guelph	■ Restrictions on this route are County/City mandate	■ Addressed during subsequent Guleph and Area Transportation (GAT) Study
■ Victoria Road is a potential eastern bypass	■ Undesirable environmental and traffic impacts	■ Assessed and discarded from further consideration
■ E Series routes are too long	1	■ E Series routes assessed and discarded from further consideration
■ Alternative A-1 is the best for keeping traffic away from Morriston	■ Traffic benefits of A-1 recognized as its primary advantages	■ Carried forward to detailed analysis and evaluation

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1B

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (JANUARY 22, 1986)

DEVELOPMENT OF ADDITIONAL ROUTE ALTERNATIVES

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ENVIRONMENTAL		
Drainage problems in the strip between Freelton and Highway 6 bypass	Problems are caused by downstream damming of West Bronte Creek	Included as critical element of Detail Design (1994) drainage strategy
Flooding of Fielding Lane in spring due to underpass	Can be avoided with strategic design	Avoidance through design of structure and development of drainage strategy
Distant houses should be weighted more heavily than those proximate (to existing roadways) for impact analysis	This consideration is built into approved noise modelling	Noise impacts to homes in quieter areas recognized as being more significant
Alternative A-1 displaces model railway display and archaeological sites	Further investigation of model railway display at Aberfoyle	Route ultimately not selected
Impact on Fletcher Creek Swamp ESA	1	Preferred route minimizes impacts
SAFETY		
Alternative C-7 is unsafe for Morriston Park Nursing Home residents	Right-of-way can be made secure; traffic on Calfass Road not expected to increase significantly due to route location	Right-of-way fencing restricts pedestrian access
Alternative A-1 may lead to hazardous waste transport through Aberfoyle and Morriston	Route would not pass through Morriston or Aberfoyle or provide direct access from roads which do	Route ultimately not selected
There is a crossing problem over Highway 6 at Campbellville Road and at County Road 36 (Morriston)	Investigated further. Concern at Morriston discounted since significant volume of traffic will be diverted from hamlet	Special study of Campbellville Road/Gore Road corridor resulted in greater offset of intersections at Highway 6 for safer crossing

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1B *(cont'd)*

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (JANUARY 22, 1986)

DEVELOPMENT OF ADDITIONAL ROUTE ALTERNATIVES

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ECONOMICS		
Use Victoria Road as an alternative for study	Included in study of alternative corridors	Discarded due to adverse effects in City of Guelph
Carpool parking at the Hanlon Expressway/Highway 401 interchange	Access will be maintained and use encouraged	Access improved under another MTO work project
Alternatives A-1 and C-5 impacts to Capital Paving	1	Routes ultimately rejected
Long Lane Farms (Hollenbach) is a locally significant agricultural operation and should be accommodated if possible	Further meetings with owner to determine any unique features/ requirements	Access and outdoor barn needs addressed in assessment of alignments (preliminary design)
Local manufacturing at the Brock Road/Highway 401 interchange will be affected	1	Route A-6 rejected from further consideration
Concern with severance of working agricultural fields	1	Included as key consideration in assessment of agricultural impacts
ROADWAY		
Investigate an eastern connection to the City of Guelph more thoroughly	Several eastern corridors investigated as part of Alternative Methods	Highway 401-Guelph East Corridor Study and GAT Study were initiated by City/County/ MTO
Trucks prefer Alternative A-1	1	2
Grade separate Crieff Road from Alternatives C-5 and C-7	Investigated need and possible intersection options	Special study confirmed grade separation as preferred scheme due to safety concerns, lack of demand for connection
Connect Alternative A-1 to Clair Road in Guelph	Direct terminal connection to City roads not included in study Terms of Reference	No further consideration
Rework the existing Highway 6/ Highway 401 interchange to force use of new interchange (southbound ramps)	All concepts make use of new route the most attractive option	Recommended design optimizes highway continuity while maintaining opportunity for access to Morriston and County Road 46 north
Connect any chosen route directly to Hanlon Expressway	Highway 6 continuity and increased use of the Hanlon are project objectives	All options are connected to the Hanlon

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1C

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (APRIL 30, 1986)

EVALUATION OF ROUTE ALTERNATIVES

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ENVIRONMENTAL		
■ Possible impacts on Fletcher Creek	1	■ Recognized and weighted accordingly in evaluation
■ Homes on County Road 36 will show effects of noise, air pollution and loss of privacy	■ Crossing of Road 36 may be grade separated (no access) based on lack of demand for connection	■ Associated route (Alternative A-1) ultimately rejected
■ Impacts to wetland in the northwest quadrant of the Hanlon/County Road 34 interchange	1	■ Initial interchange scheme configured to reduce impacts. 1994 scheme avoids significant encroachment
■ There will be problems with noise and safety at the Morriston Park Nursing Home	■ Noise assessment indicates no major concern. Right-of-way can be secured; traffic on Calfass Road not expected to increase significantly due to route location	■ Right-of-way fencing restricts pedestrian access
SAFETY		
■ Control speeding on Highway 6	■ Policing is not MTO mandate	■ Project benefit is diversion of high speed regional traffic to new route
■ Problems for school bus and pedestrian crossing at Freelton	■ Acknowledged but pedestrian crossing of 4-lane highway is discouraged	■ Monitor crossroad traffic for future signalization needs
■ Severance of farming operations in Con VII with concerns for farm vehicle and animal crossings	■ Preferred concept minimizes severances in Con VII	■ Concept includes provision for alternate access or acquisition of landlocked parcels
ECONOMICS		
■ Any grade separation at Calfass Road will affect highway businesses in Morriston	■ Concept maintains highway access to Morriston	■ Investigate highway signage for increased exposure of businesses
ROADWAY		
■ C-7 is the preferred alternative for safety and environment	1	■ Carried forward to preliminary design
■ The A series are best as they parallel existing roadways	■ A Series exhibits undesirable impacts to property, businesses and natural environment	■ Ultimately rejected
■ Any cross country route should connect directly with the Hanlon Expressway	■ Project objectives include maximizing use of the Hanlon Expressway	■ Preferred route (C-7) connected to Hanlon Expressway via new "extended ramps" in Highway 401 corridor

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1D

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (SEPTEMBER 30, 1987)

PRELIMINARY DESIGN - ALIGNMENT/INTERCHANGE OPTIONS

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ENVIRONMENTAL		
Property impacts of Hanlon Expressway/County Road 34 interchange	Interchange scheme included equitable balance of natural environment and property impacts	Initial scheme ultimately rejected in favour of relocated interchange
Connection Road will increase rear yard noise levels on Calfass Road	Acknowledge but noise attenuation for individual homes deemed unwarranted	Refinement of road profile may provide additional attenuation. Investigate use of Open Friction Course pavement to reduce noise levels (1-2 dBA reduction achievable)
A pond severed near the Highway 6/Highway 401 interchange is used for training by several dog clubs	Loss of pond appears to be unavoidable	No further consideration during this design phase
SAFETY		
Discourage trucks from using Freelton Road	Continuity of new 4-lane highway section should achieve this objective	No direct action taken
Operations at Hanlon Expressway signalized intersections are currently unsafe	Signalized intersections will eventually be replaced with interchanges/grade separations	Documentation of concerns for consideration by MTO Southwestern Region
Gore Road and Campbellville Road intersections are unsafe at Highway 6	Acknowledged continuing concern	Preliminary design developed initial and ultimate intersection treatment to provide safer operation
Control excessive speed levels on Highway 6	Policing is not MTO mandate	Project benefit is diversion of high speed regional traffic to new route
ECONOMICS		
Excessive consideration has been afforded to agricultural operations at the expense of other business operators and residents	Assessment recognized agricultural operations as the major and most extensive economic activity in the study area	Process recognized all economic and social activity in study area and applied appropriate weightings to issues as they emerged to obtain a balanced set of project benefits and impacts

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1D *(cont'd)*

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (SEPTEMBER 30, 1987)

PRELIMINARY DESIGN - ALIGNMENT/INTERCHANGE OPTIONS

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ROADWAY There should be a direct connection from the Hanlon Expressway to Highway 6, not a trip along Highway 401	More direct connections were rejected based on their environmental impacts and/or traffic service characteristics	Concern was addressed during route selection phase in selection of Alternative C-7 as preferred option
Why use a Connection Road north of Morriston rather than introducing moves to/from the east at the new Highway 401 interchange?	MTO made previous commitment to retain basic configuration of existing Highway 401/County Road 46 interchange. Connection Road is the best means for completing bypass of Morriston and linking to existing interchange	Recommended design optimizes operations while retaining existing 401 interchange configuration. Note: 1994 scheme did improve interchange operation by introducing directional Highway 6S - Highway 401E ramp

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1E

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (JUNE 15, 1993)

DEVELOPMENT OF ALIGNMENT/INTERCHANGE ALTERNATIVES DURING SUPPLEMENTARY INVESTIGATIONS

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ENVIRONMENTAL There will be intrusive noise generated by the new Hanlon/ County Road 34 interchange	Acknowledged moderate to significant impacts for several homes (Sideroad 20)	Option with most significant effects was screened out
There will be noise/pollution impacts on Telfer Glen	Telfer Glen was not approved during initial alignment selection	Commitment to investigate noise reduction measures
Alternatives 3 and 5 produce the least impacts to County Road 34 interchange area	Incorporate in screening process	Alternative 5 (Modified) ultimately selected as preferred interchange option
SAFETY There are concerns over the high accident rate on Highway 6	Acknowledged concern	Timeframe for widening of existing Highway 6 accelerated
Accelerate interim work and improvements to existing Highway 6	Advised of accelerated timeframe	High degree of continuity provided between preliminary and detail design phases
Access for emergency vehicles must be considered	Requested detailed requirements from emergency services staff	Obtained details at January 1994 PIC
ECONOMICS There will be severe property value impacts with the proposed County Road 34/Highway 401 interchange	Evidence shows new interchange and improved access may increase property values	Meet with concerned owner to discuss specific concerns
Concerns with property value for various areas, particularly at Telfer Glen	Developer was aware of impending highway project in proximity to Telfer Glen	Commitment to investigate reduction of intrusive effects (noise)
Concerns with severance of viable farmland	Alignment options include tradeoffs between natural features and agricultural resources	Severances were minimized in preferred option and alternative field access designs were investigated (Fielding Lane)
Access to working fields may be compromised		

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1E *(cont'd)*

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (JUNE 15, 1993)

DEVELOPMENT OF ALIGNMENT/INTERCHANGE ALTERNATIVES DURING SUPPLEMENTARY INVESTIGATIONS

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ROADWAY Preference for the original Technically Preferred alternative (Alternative 1)	Acknowledged preference	Alternative 1 selected as preferred alignment
Maintain all moves at the existing Brock Road/Highway 401 intersection	Reaffirmed previous MTO commitment in this regard	Investigated means of improving preferred design (directional S-E ramp)

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1F

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS (JANUARY 18, 1994)

EVALUATION OF ALIGNMENT/INTERCHANGE ALTERNATIVES PRELIMINARY DESIGN DURING SUPPLEMENTARY INVESTIGATIONS

Comment/Concern	Response	Manner in which EA Process Addressed Concern
ENVIRONMENTAL There will be destruction of woodlots with preferred scheme	Acknowledged concern	Commitment to minimize woodlot displacement and impacts to woodlot interior
Impacts on Mill Creek and the wetlands at 401/Hanlon interchange	Preferred scheme minimizes direct impacts to Mill Creek in Hanlon Corridor	Groundwater monitoring program will be developed. Fisheries compensation package to be developed
There will be problems with drainage from Highway 6 widening onto properties	Proposed scheme incorporates curb-and-gutter sections to prevent/ minimize	Investigate refinements in detail design of widening section
Visual and noise intrusion on Slovenski Park	Met Executive members on site to discuss concerns further	Commitment to replace any visual screening displaced. Investigated use of urban cross-section to reduce property taking
Visual and noise intrusion on Telfer Glen	Visual effects mitigable with optimum retention of existing vegetation and appropriate landscaping	MTO will prepare a strategic grading and landscaping plan during Detail Design phase
	Noise attenuation adjacent to Telfer Glen Subdivision may be warranted/effective but would require 10 m high barrier depending an availability of excess material to fill low areas	MTO will investigate feasibility of noise barrier/berm and warrants for use of Open Friction Course pavement to reduce noise impacts
ROADWAY Accelerate project completion	Timeframe for widening of existing Highway 6 accelerated	Provide high degree of continuity between preliminary and detail design
Access from existing roads to new roads should be maintained	Road network continuity has been maintained	Satisfied continuity needs while inducing desired traffic diversion

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

TABLE 3.1F ***(cont'd)***

SUMMARY OF PUBLIC INFORMATION CENTRE RESULTS
(JANUARY 18, 1994)

EVALUATION OF ALIGNMENT/INTERCHANGE ALTERNATIVES
PRELIMINARY DESIGN DURING SUPPLEMENTARY INVESTIGATIONS

Comment/Concern	Response	Manner in which EA Process Addressed Concern
SAFETY		
Incongruous posted speed limits on Highway 6 through Highway 401 interchange area	Acknowledged concern. There is dual jurisdiction through the area	MTO investigating further with County of Wellington
The turning movements requirement to travel along Gore Road/Campbellville Road corridor are unsafe	Recommended design provides safe offset of Highway 6 intersections as an initial stage. Ultimate scheme developed involves Gore Road and Campbellville Road intersections opposite each other	Ultimate scheme is considered to be a municipal initiative
There is need for traffic lights at Campbellville/Gore Road	Acknowledged safety concern	Investigations determined signals are not warranted based on traffic volumes
Emergency vehicle access through Fielding Lane structure	Ascertained emergency vehicle requirements	Incorporated 4.0 x 4.25m opening in structure
Emergency vehicle turnaround provisions required	Acknowledged concern	Incorporated provisions in Highway 401 corridor and at 401/6 New interchange
Traffic volume and speed on Highway 6 should be controlled	Acknowledged concern but policing is not MTO mandate	Project benefit is diversion of high speed regional traffic to new route
Limit traffic through Morriston	70% of northbound Highway 6 traffic is expected to divert to new route	Design scheme maintains access to Morriston but makes new route more attractive than existing route
ECONOMICS		
There are impacts on quarry operations near 401/Hanlon interchange	Acknowledged concern. Met with owners/operators to discuss mitigation potential	Avoid resource sterilization. Replace displaced screening
Property values at Telfer Glen will decrease	No empirical evidence supports this contention	Investigate means of reducing intrusive effects (noise)

1 General comments and concerns were acknowledged
2 Incorporated in refinement, analysis and evaluation of alternatives

Interest Groups

Contact was established with groups representing interests in the various settlement areas and the study area as a whole. Ratepayers associations, advisory committees and organizations which address provincial concerns are typical of the groups in this category.

The following organizations were identified and contacted :

- Guelph Field Naturalists
- Hamilton Naturalists' Club
- Guelph Environmental Council
- Kitchener-Waterloo Flyfishers
- Ontario Federation of Naturalists
- Ontario Federation of Agriculture
- National Farmers Union
- Ontario Corn Producers Association
- Ontario Cattlemen's Association
- Guelph Development Council
- Aggregate Producers Association of Ontario
- Provincial and Local Architectural Conservation Advisory Committees and Historical Societies (Architectural Conservancy of Ontario, Ontario Historical Society, Ontario Agricultural Museum, Guelph Historical Society, Head-of-the-Lake Historical Society, Waterdown-East Flamborough Heritage Society, Wellington County Historical Research Society, Wellington County Local History Council, Wellington County Museum, Guelph Civic Museum, Women's Institute Tweedsmuir History, Town of Flamborough and City of Guelph LACAC's)

Private Sector

Private property owners were approached during the course of the study at their request or at the discretion of the Project Team. Generally, this included agricultural and business operations directly affected by the route alternatives.

In addition, it was deemed necessary to meet with all directly affected owners on an individual basis as property impacts of the selected alignment became more evident during Preliminary Design and the need for pre-property acquisition discussions and agreements emerged. During

the period leading up to the Initial Recommendations, meetings were held with 34 owners on December 10, 1986 at the Puslinch Community Centre. This was in addition to a number of site visits and interviews conducted. Further, during the finalization of the initially recommended alignment between Crieff Road and Calfass Road, a subsequent, joint presentation to directly affected adjacent owners was held at the Puslinch Municipal Offices on June 11, 1987 to explain how concerns expressed in December 1986 had been addressed. During the Update and Supplementary Investigations phase, meetings with 11 directly affected property owners were held either on site or at a convenient alternate location to discuss the project proposals and owners' concerns.

3.2.7 Railway Companies

CP Rail was the sole railway company involved in the study and, as a member of the External Team, was apprised of progress at critical study junctures. This was accomplished through forwarding of minutes of meetings since the railway company chose to rely on liaison through the Consultant rather than attend the External Team meetings due to the geographical separation of their regional office (London) and the meeting venue (Toronto).

3.2.8 Utility Companies

The following utility companies were contacted and met with to ascertain the location of existing plant, any proposed expansion or improvements to existing facilities and significant relocation or plant modification requirements :

- Ontario Hydro (member of External Team)
- TransCanada Pipelines (member of External Team)
- Bell Canada
- Union Gas Limited

The absence of major municipally owned and operated services in the study area obviated the need to establish staff contacts in this regard.

3.3 DEVELOPMENT OF STUDY DESIGN

3.3.1 Project Appraisal and Pre-Study

In appraising existing conditions and consolidating background material, relative to establishing parameters and information requirements for this study, the Project Team relied primarily on the following material and associated documentation :

i) Joint Study Advisory Committee Terms of Reference formulated by MTO (1984) (Refer to Appendix A);

ii) Highway 6 - Freelton to North of Guelph Corridor Study (1982)

iii) Highway 6 - From Freelton Northerly to Puslinch Road 35 Preliminary Design (1983)

Other background material used is described in Section 2.4.

In addition, discussions with municipal technical and elected representative during the fall of 1984 provided valuable insights as to local perceptions of previous studies and requirements for further study.

These preliminary discussions and the review of previous related work was supplemented by Project Team field reconnaissance and culminated in the expansion of the Joint Study Advisory Committee Terms of Reference.

Information Requirements

A "selective" approach, as established by MTO in cooperation with Provincial Review Agencies, was used in defining study information requirements. This selective approach was based upon the purpose of the undertaking, project objectives and an appreciation of study area conditions and environmentally sensitive issues identified in the project appraisal phase.

Information requirements were categorized relative to major study components and were expressed in terms of inventory and in relation to potential impacts to be assessed. Anticipated information sources and contact agencies were also identified.

Special Studies

The special studies expected to be required during the Route Location phase were also identified. These involved terrain, soils and local drainage problem areas, primarily to identify required engineering design and environmental protection measures and the approximate cost of these measures.

The impact of potential traffic increases along the Hanlon Expressway on the level of service at the intersections within the City of Guelph was a separate special study requirement identified at the outset of the project.

Special Studies dealing with interchange configuration, land management and access to various affected properties were identified as requirements for the Preliminary Design phase as the engineering of the selected alignment evolved. These included consideration of measures such as road closures, road extensions and access relocations/modifications.

The results of these Special Studies are included in Chapters 5 and 6 of this report.

3.3.2 Definition of the Study Area

The limits of the study area were initially derived in accordance with the Terms of Reference as determined by the Joint Study Advisory Committee, and were based on the recommended route location corridor identified in the 1982 Corridor Study. Discussions between MTO and the Ministry of the Environment confirmed that this was a satisfactory definition (refer to MOE correspondence March 1, 1984 in Appendix B). However, the Terms of Reference were sufficiently flexible as to allow expansion of the study area as deemed necessary by the Committee.

The project appraisal phase of the study included consideration of the maximum anticipated extent of alignment shifts and associated potential direct impacts. The study area was subsequently expanded to encompass Highway 6 and vicinity from Freelton northerly to the south limits of the City of Guelph, including County Road 46 (Brock Road) and the Hanlon Expressway (refer to Figure 3.2).

It was determined that the study would also include the following limited coverage :

a) Traffic Impact Study - Hanlon Expressway within the limits of the City of Guelph;

b) Review of the 1982 Corridor Study findings and recommendations, combined with the preliminary discussions with municipal representatives, suggested that an overview of the Watson Road corridor should be conducted to re-assess the results of the Corridor Study. Therefore, a general assessment of transportation planning, engineering and environmental aspects of this "Eastern Corridor" was introduced (refer to Figure 3.2).

Although this corridor was essentially rejected in the 1982 Corridor Study and does not directly meet the study objectives, there appeared to be some merit in examining an eastern access to the City of Guelph (as identified by municipal representatives and Project Team members in study initiation discussions during fall 1984). This corridor may meet longer term network objectives. However, it was determined that further study related to corridor control should be pursued as required at the municipal level as more definitive network needs are identified.

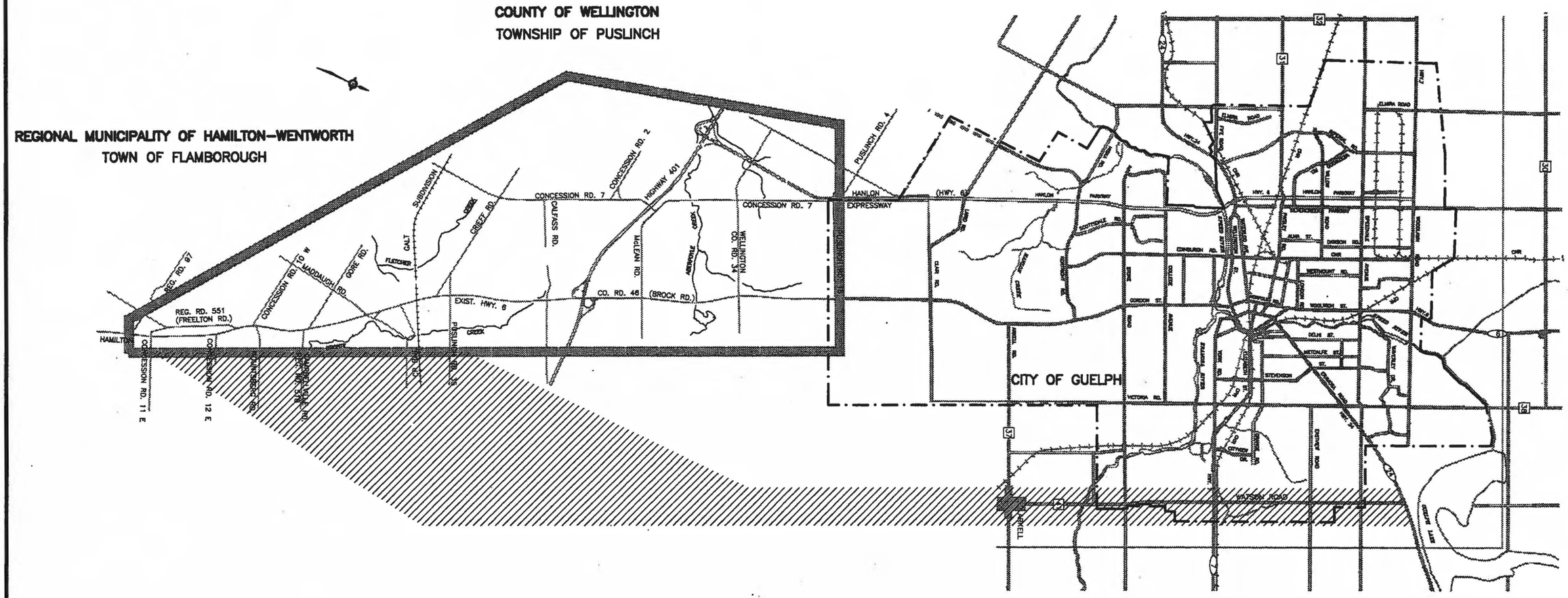
3.3.3 Development and Review of Study Design

Initial Study Design

The Study Design document evolved from the project appraisal and study initiation activities, with a certain degree of overlap into the data collection stage of the work. The document and associated work programs were predicated upon the fact that, although previous planning and design work had been completed, no related approvals under the Environmental Assessment Act have been received.

The following major components constituted the core of the Study Design, providing the direction and scope for the work and the basis upon which discussion and agreements between the proponent (MTO) and review agencies and between MTO and the Consultant were to be predicated.

i) Study Purpose and Rationale
   - purpose of the study
   - study rationale
   - study need and justification



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

STUDY AREA

EASTERN CORRIDOR

Figure 3.2
STUDY AREA

ii) Preliminary Planning Criteria
- guidelines and design criteria for the development of alternatives
- evaluation criteria for the assessment of alternatives

iii) Study Scope and Data Requirements
- study scope
- data requirements and information sources
- special studies

iv) Study Approach
- route location phase
- preliminary design phase
- documentation phase

v) Study Organization
- internal participants
- external participants

vi) Study Activities and Schedule
- study timeframe
- schedule of major activities
- formal submissions
- construction timing

The Study Design was submitted to the Steering Committee, MTO management and the External Team which were requested to respond with comments on any and all elements contained therein. The timeframe for the development of the Study Design and review of the document by relevant study participants was as follows :

October-November 1984	-	Preparation of Draft Study Design by Consultant
December 1984-January 1985	-	Review and revision of Draft Study Design at Project Team level
January 1985	-	Submission of Study Design to MTO management and Steering Committee
February 1985	-	Submission of Study Design to External Team; formal endorsement of Study Design by Steering Committee
February-April 1985	-	Comments on Study Design by External Team

Specific comments related to information requirements and the development, analysis and evaluation of alternatives are documented in Chapters 4 and 5.

Study Design for Update and Supplementary Investigations

A self-standing Study Design document was prepared for the work plan established to address comments and concerns emerging from the 1989-90 pre-submission review of the Draft Environmental Assessment Report. The coverage required for the various components, as identified in the Preamble to this report, is illustrated in Figure 3.3. The results of the additional work conducted in these areas are documented in the respective sections of Chapters 4, 5 and 6 of this report.

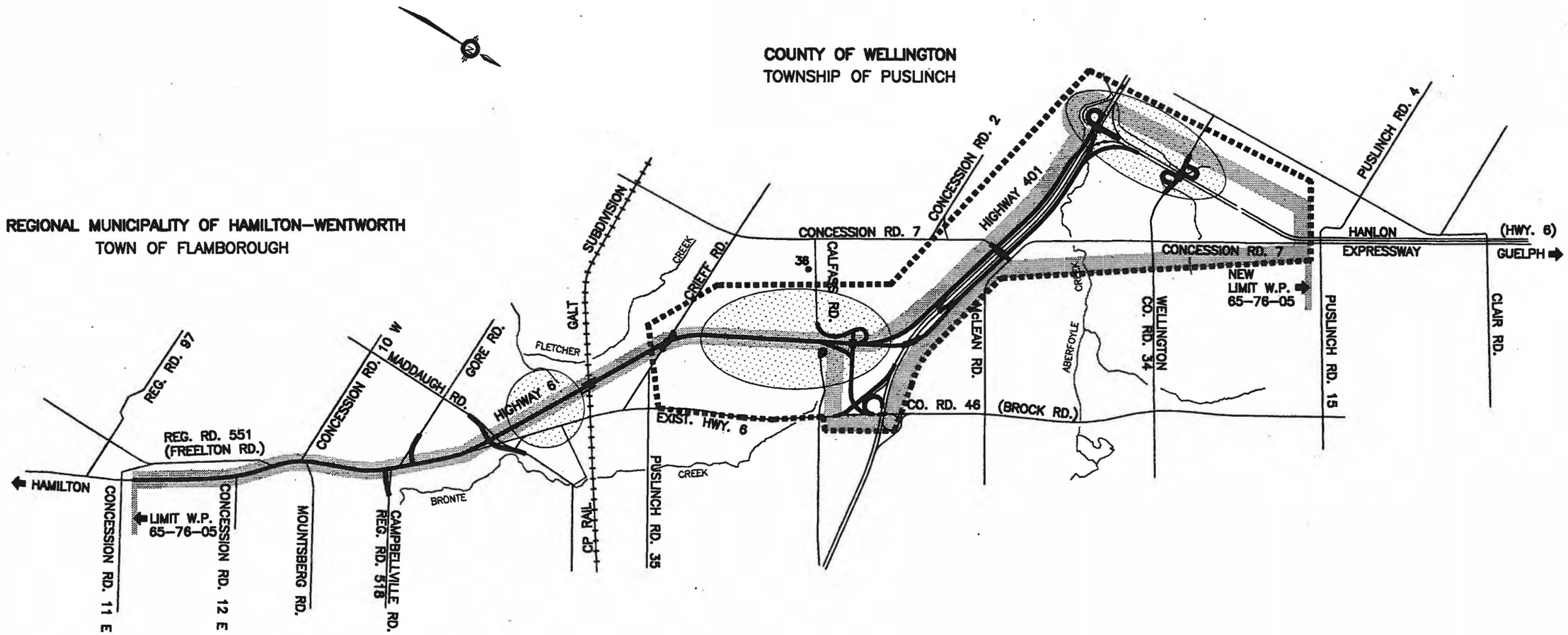
Figure 3.4 illustrates the steps which occurred in the environmental assessment process, including incorporation of the activities in the Update and Supplementary Investigations Phase.

3.3.4 Study Staging and Timeframe

The initial study conclusions and project recommendations were developed over the 42-month period between August 1984 and January 1988. Subsequent to the Pre-submission Review period, the Update and Supplementary Investigation Phase of the study was conducted between September 1992 and April 1994.

The following indicates the timeframe for milestone points during the course of the study.

- January 1985 - Preparation of Study Design
- May 1985 - Preliminary Development of Alternatives completed
- February 1986 - Viable Route Location Alternatives confirmed
- April 1986 - Technically Preferred Route identified
- August 1986 - Route Location confirmed and endorsed in principal
- September 1987 - Technical elements of Initial Preliminary Design completed



HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

- 1988 Technically Preferred Route
- Focus of Supplementary Forestry, Wetland Work
- Coverage of Supplementary Fisheries, Land Use/Property Work
- Coverage of Supplementary Noise, Agriculture Work

Figure 3.3

STUDY AREA COVERAGE FOR UPDATE AND SUPPLEMENTARY INVESTIGATIONS (1992-1994)

ROUTE LOCATION | PRELIMINARY DESIGN | UPDATE AND SUPPLEMENTARY INVESTIGATIONS | FORMAL EA REVIEW AND APPROVAL

Municipal/ External Input/ Ratification

Assemble Base Data
STEP 1

Study Design Preparation/ Endorsement

Formulate Evaluation Criteria
STEP 2

Evaluation Criteria Refined

Identify and Develop Alternatives
STEP 3

Analyse Alternatives
STEP 4

Screening

Screening

Evaluate Alternatives
STEP 5

Technical Preference/ Endorsement
STEP 6

Refine Selected Alternative
STEP 7

Documentation
STEP 8

Pre-Submission Review of Draft EA Report
STEP 9

Update Data Base

Develop Additional Alternatives

Analyse and Evaluate Alternatives

Refine Selected Alternatives

Revise Documentation

STEP 10

EA Report Submission, Review and Approval
STEP 11

To Detail Design

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Municipal / External Input Legend
- □ Government Reviewers
- ■ External Team
- ▽ Steering Committee
- ▼ Technical Committee
- ⊙ Council
- ○ Public

Figure 3.4
ENVIRONMENTAL ASSESSMENT PROCESS

- January 1988 - Initial Preliminary Design confirmed and endorsed in principal by participating municipalities
- January 1990 - Completion of EAR Pre-submission Review by government ministries/agencies
- September 1992 - Initiation of Update and Supplementary Investigation Phase
- May 1993 - Viable alignment alternatives between Crieff Road and Highway 401 and interchange alternatives at Hanlon Expressway/County Road 34 identified and subjected to preliminary analysis
- November 1993 - Technically preferred alignment and interchange options identified
- March 1994 - Technical elements of Revised Preliminary Design completed
- May 1994 - Revised Preliminary Design confirmed in principle by participating municipalities

3.4 DETERMINATION OF ENVIRONMENTALLY SIGNIFICANT ISSUES

3.4.1 Definition

In the context of this Environmental Assessment Report - One-Stage Submission, environmentally significant issues are defined as :

"Issues of natural, cultural, economic and social environment for which the reviewing ministries/agencies/the public, require detail relative to specific environmental impacts and commitment to mitigation. This information is necessary to facilitate decision making relative to the acceptance of the environmental assessment and approval of the undertaking."

3.4.2 Identification

As outlined in the preceding sections, interaction with appropriate external groups occurred at various points in the study, both on the basis of meetings scheduled to coincide with critical junctures and on an as required basis.

The process for eliciting input from participants, relative to identifying environmentally significant issues, involved presentation of viable alternatives or proposals and reiteration of previously identified concerns. This was accompanied by a request for comments and, where practical, prioritizing of concerns based on consideration of explicit policy statements (in the case of government agencies), operational and development opportunities and constraints (in the case of the private sector) and specific perceptions of impacts (in the case of public groups).

Involvement in the technical aspects of the study on a day-to-day basis and the opportunity to undertake new research enabled the Project Team to contribute a very significant portion of the input in identifying environmentally significant issues. This was facilitated by continual liaison with the External Team and the Technical Committee which were requested to review Technical Papers prepared by the Consultant with a view towards commenting on data collection, analytical methodology and evaluate conclusions.

Discussions with, and comments received from external participants during the pre-submission consultation process, including action taken, are incorporated in Chapter 5 (Alternatives and Evaluation) and Chapter 6 (Description of the Project).

TABLE OF CONTENTS

Page

4.0 EXISTING AND PROJECTED CONDITIONS

4.1 Natural Environment 4-1
4.1.1 Geology and Geomorphology 4-1
4.1.2 Soils 4-4
4.1.3 Hydrogeology 4-4
4.1.4 Hydrology 4-6
4.1.5 Fisheries 4-8
4.1.6 Forestry Resources 4-12
4.1.7 Environmentally Sensitive Areas/Wildlife 4-13
4.1.8 Climate 4-15

4.2 Social Environment 4-17
4.2.1 Communities 4-17
4.2.2 Noise 4-19
4.2.2.1 Initial Recommendation Phase 4-19
4.2.2.2 Update and Supplementary Investigations Phase . . . 4-20
4.2.3 Visual Aesthetics 4-21

4.3 Economic Environment 4-22
4.3.1 Regional and Local Growth Strategies 4-22
4.3.2 Industrial, Commercial and Agricultural Activity 4-25

4.4 Cultural Environment 4-30
4.4.1 Heritage Resources 4-30
4.4.2 Archaeological Resources 4-32

4.5 Transportation Facilities and Utilities 4-33
4.5.1 Road Network 4-33
4.5.2 Public Transportation 4-34
4.5.3 Utilities 4-35

4.6 Summary of Identified Environmentally Significant Issues 4-35

4.0 EXISTING AND PROJECTED CONDITIONS

4.0 EXISTING AND PROJECTED CONDITIONS

This chapter provides a description of existing and future baseline conditions against which potential changes created by implementation of the proposed undertaking and its alternatives have been assessed.

It should be noted that the majority of the information relates to conditions as of 1985-1987. It is this information that formed the basis for the planning and decision making process relative to the Initial findings and recommendations. Updates required to address more recent federal and provincial legislation, regulations and policy have been integrated with the original information base and cited accordingly.

It should be noted that, in the context of the Update and Supplementary Investigations phase, references to the highway improvements proposed in the Initial Recommendations are included in the following descriptive text. Any changes to those proposals are described in Chapter 5, which addresses the rationale for the undertaking, and Chapter 6, which describes the proposed undertaking and its effects.

The description is organized on the basis of the established factor groups and factors employed in the assessment of potential condition changes and effects associated with project implementation. These include:

Natural Environment

- Geology and Geomorphology
- Soils
- Hydrogeology
- Hydrology
- Fisheries
- Forestry Resources
- Environmentally Sensitive Areas/Wildlife
- Climate

Social Environment

- Communities
- Visual Aesthetics
- Noise

Economic Environment

- Regional and Local Growth Strategies
- Industrial, Commercial and Agricultural Activity

Cultural Environment

- Heritage Resources
- Archaeological Resources

Transportation Facilities and Utilities (Traffic Service and Engineering)

- Road Network
- Public Transportation
- Utilities

Within the various factor descriptions, information sources are cited; a more detailed listing of references is included at the end of this Chapter and in Appendix F.

4.1 NATURAL ENVIRONMENT

4.1.1 Geology and Geomorphology

Data Sources, Reliability and Information Gaps

The geology and geomorphological history of the study area were determined from available literature, supplemented by air photo interpretation and field reconnaissance. Specifically, Ontario Geological Survey papers (1,2) Ministry of Natural Resources, Cambridge District inventory maps (3, 4) and an MTO Remote Sensing general assessment of study area landforms (5) were referenced. In addition, general reference was made to Chapman and Putnam (1966) (6) and Karrow (1968) (7).

Description

Underlying bedrock in the study area consists of Silurian dolostone of the Amabel and Guelph Formations. The bedrock is relatively flat and dips gently to the southwest.

The physiography and distribution of surficial material are primarily the result of glacial activity in the Lake Wisconsin Substage of the Pleistocene Epoch which was characterized by the repeated advance and melt of extensive continental ice sheets, and the Lake Ontario Lobe in particular. The study area lies primarily within two physiographic areas: the Horseshoe Moraines, comprising two major moraines (Paris and Galt), and the Flamborough Plain. These areas contain a variety of landforms, including end moraine deposits, ground moraine deposits, kame deposits, flat outwash deposits, eskers, swamps and drumlins.

Identified Environmentally Significant Areas/Issues

Emphasis has been placed on selected sand and gravel resources (highest potential for crushable gravel), with lesser attention paid to selected bedrock resources. Potential condition changes are related to the opportunities for developing these resources. The study area inventory and the analysis and evaluation of project alternatives also included regard for MNR's Mineral Aggregates, Resources Policy Statement (May 1986) (8), which establishes the extraction of mineral aggregate resources as a matter of provincial interest and concern.

Consideration is also afforded Earth Science Areas of Natural and Scientific Interest (ANSI's), as identified by MNR, and their value as geomorphological resources.

Table 4.1 indicates the characteristics and sensitivities of the primary landform features with respect to the possible introduction of a new highway alignment.

Selected Sand and Gravel Areas - The geographical position of the Township of Puslinch relative to the major regional growth centres of Toronto, Kitchener-Waterloo and Burlington-Hamilton has created pressures on the municipality to supply one of its most abundant natural resources - mineral aggregates. This is countered by the perceived need to preserve high quality agricultural land, much of which overlays selected aggregate reserves. This is a contentious issue in the Township of Puslinch.

The study area contains a large proportion of the Township's most important natural aggregate deposit which is an outwash deposit suitable for a wide range of road-building and other construction purposes. The southern portion of the study area (Flamborough) contains a moderate sand and gravel reserve of secondary importance.

The study area contains in the order of 160 million tonnes of significant selected sand and gravel reserve in the Aberfoyle area. This is exclusive of licensed pit reserves. Construction of a new route over these reserves will sterilize the resource while at the same time locating the road close to a readily available aggregate supply. The reserves in the study area are all Class 1 (> 6 m) and Class 2 (3-6 m) thickness deposits.

There were five major licensed pits located in the Aberfoyle area during the initial investigations, as illustrated in Figure 4.1 (Telephone City Gravel, Dufferin Aggregates, Custom Aggregates, Capital Paving, S. NcNally & Sons), which have a collective area of 326.3 ha (56% of Township's licensed area) and a substantial investment in fixed plant facilities. In addition, 13 of 19 of the Township's unlicensed pits are located in the study area. These are small and are generally abandoned or wayside pits.

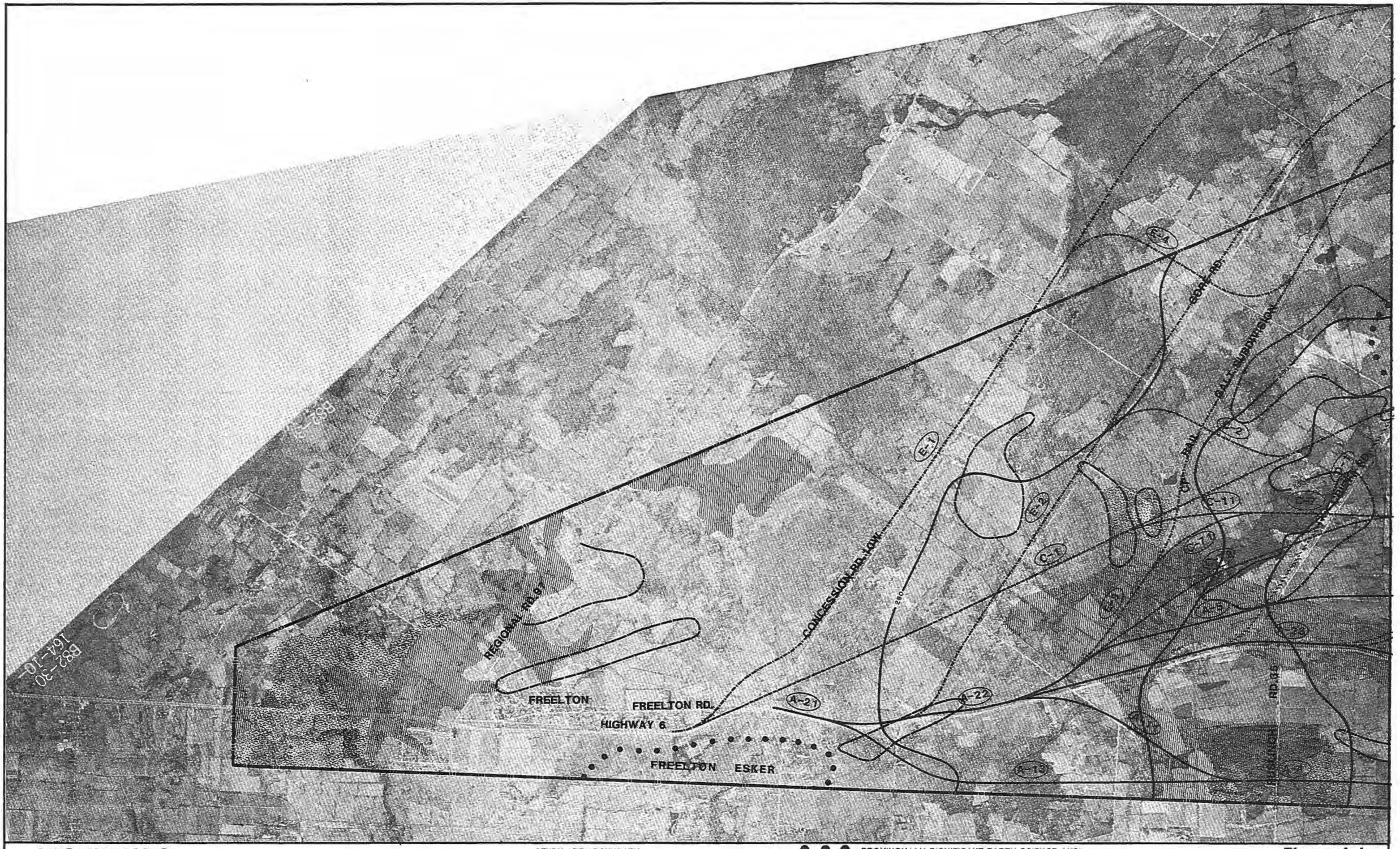
During the Update and Supplementary Investigations phase, additional licensed areas opened up in Concessions I and II Puslinch (Dufferin, Warren Bitulithic, TCG). Further reference to mineral aggregate extraction operations is included in Section 4.3.2 Industrial, Commercial and Agricultural Activity.

Selected Bedrock Resource Areas - There are no operating licensed quarries in the study area. However, there is a significant reserve (109 million tonnes) of "available" material in the Puslinch/Crieff area which extends into the Town of Flamborough. This comprises primarily Guelph Formation material, with an average thickness of 16 m and overburden of 1 m, which is a buff coloured fine-grained dolostone usually of high purity. It is not usually suitable for the production of crushed stone aggregate because of its low resistance to breakage and wear. However, it is a valuable raw material for numerous metallurgical products and is normally mined for manufacture of dolomitic lime used in the production of quicklime and high quality white hydrated lime. The major problem associated with access to these bedrock reserves is the over-riding influence of the Fletcher Creek Swamp Forest and associated environmental sensitivity.

TABLE 4.1

STUDY AREA
LANDFORM CHARACTERISTICS

	Texture	Topography	Drainage	Erosion	Engineering Features
End Moraine Deposits	Calcareous coarse sandy till with some sorted pockets of gravel or sand. High content of cobbles and boulders.	Hummocky and irregular short hills in ridges. Pitted surface by numerous kettle holes.	Surface drainage good to excessive. Internal infiltration is rapid. Some water filled kettle holes.	Steep slopes susceptible to surface erosion.	Alignment will require heavier cuts and fills due to hilly topography. Poor source of granular but good boulders should be expected. Erratic changes in material composition and irregular ground water table may occur throughout this land form. Deep organic deposits in some kettle holes.
Ground Moraine Deposits	Calcareous sandy till with considerable content of cobbles and boulders, but not as stony and more uniform than end moraines.	Well defined relief with some scattered drumlin hills with 6% - 15% slope.	Variable drumlins and crests have good drainage, but swales and depressions are poorly drained. Large patches of swamp are common. Infiltration moderately rapid.	Some problems due to erosion on steeper flanks of the drumlins.	Alignment will require only small cuts and fills, but watch for stagnant swamps and bedrock outcrops. Probably non-frost-susceptible and good source of borrow for swamp backfill. Widely scattered drumlin hills can be avoided.
Kame Deposits	Coarse, poorly sorted sand and gravel material, bouldery.	Rolling with short steep hills in some sections.	Good surface drainage and rapid rate of infiltration.	Surface erosion along steeper slopes very common.	Alignment over rolling relief will require moderate cuts and fills. Predominantly poorly sorted materials but some pockets of usable granular exist. Excellent borrow for swamp backfill. Cuts are very susceptible to erosion and along deeper cuts seepage may occur. Bearing capacity good but watch for local variations.
Outwash Deposits	Well sorted and stratified calcareous sand and gravel. Some silt and shale may be present.	Flat	Surface drainage good. High infiltration ratio. High water table in depressions.	Unprotected cuts very erodible.	Excellent source of granular material. Good bearing capacity. Water table variable and seepage in excavation may occur. Watch for possible quicking condition in low excavations.
Bedrock	Dolomite or shale outcrop covered by shallow overburden of soil or muck.	Flat	Poor, depressional mostly undrained and covered by permanent swamps.	NA	Bedrock outcrops at approximate elevation of 260 m to 290 m. Difficult to drain and should be avoided where possible.
Swamps	Variable accumulation of organic material in kettle holes, channels or over bedrock outcrop.	Flat	Poor	NA	Some kettle holes have deep accumulation of organic material and excavation and backfill will be required. Organic accumulation over bedrock is shallow.
Drumlins	Calcareous silty-sand till material with some pebbles and boulders. Fairly consistent in texture.	Elongated hills approximately 20-30 m high with 6% - 16% slopes, westerly orientation.	Surface drainage good; internal drainage is moderately rapid.	Steep slopes susceptible to erosion.	Good alignment over drumlins will require heavy earth grading due to hilly terrain. Good source of borrow, probably non-frost-susceptible. Good bearing values. Watch for seepage zones in excavations.



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE:
0 500 1000m

STUDY AREA BOUNDARY
MAJOR LICENCED SAND & GRAVEL OPERATIONS
CLASS 1 AGRICULTURAL SOILS
CLASS 2 AGRICULTURAL SOILS

PROVINCIALLY SIGNIFICANT EARTH SCIENCE ANSI
300 OVERBURDEN STATIC WATER LEVEL ELEVATION
MAJOR UPLAND GROUND WATER RECHARGE AREAS

Figure 4.1 a

GEOLOGICAL RESOURCES, SOILS AND HYDROGEOLOGY


CONCESSION RD. 2
HIGHWAY 401
COUNTY ROAD 34
PUSLINCH ROAD 4
TCG
WARREN
CRIEFF
D.C. of C.
(DUFFERIN AGGREGATES)
SIDE RD.25
SIDE RD.20
HAMILTON EXPRESSWAY
GALT MORAINE
TCG/
S.McNALLY & SONS LTD.
TCG
MATERIALS
LTD.
CONCESSION RD.7
CAPITAL
PAVING
LTD.
GALLEAS RD.
McLEAN RD.
TCG MATERIALS LTD.
REGATES
GGREGATES
ABERFOYLE
COUNTY RD.34
PUSLINCH RD.
CLAIR ROAD
MORRISTON
COUNTY RD.46
BROCK RD.
HIGHWAY 401
E-2
E-3
D-1
D-2
D-4
D-5
D-6
C-1
C-2
C-5
C-6
C-7
B-1
B-3
A-1
A-2
A-3
A-4
A-5
A-12
A-13
A-14
A-15
A-16
A-17
A-18
A-19
A-20
A-21
A-22
A-23
A-24
A-25
A-26
A-27
A-28
A-29
A-30
A-31
A-32
A-33
A-34
A-35
A-36
A-37
A-38
A-39
A-40
A-41
A-42
A-43
A-44
A-45
A-46
A-47
A-48
A-49
A-50
A-51

Earth Science ANSI's - The only features of concern are the Provincially Significant Galt Moraine, located generally in the area bounded by Side Road 25, Concession Road 2, Concession Road 7 and Crieff Road, and the Freelton Esker in the extreme southeast corner of the study area. In addition, excellent cross-sections of the Horseshoe Moraines are visible along sections of Highways 401 and 6. MNR has indicated that impacts would have to be extremely severe (i.e., deep excavation over a large area) to be of any significance.

4.1.2 Soils

Data Sources, Reliability and Information Gaps

In addition to the sources cited in Section 4.1.1 (1,2,4), Soils Surveys for Wellington and Wentworth Counties (9, 10) and 1:50,000 scale Canada Land Inventory mapping for the agricultural capability of soils (11) in the study area were used to identify soil conditions and sensitivities.

Description

The thick layer of glacial till deposited in the study area by the Ontario Lobe is referred to as the Port Stanley Till and consists of gravelly sandy loam till parent material. Surficial soil types comprise those primarily from the Grey-Brown Podzolic Group, with secondary representation from the Organic Group in the major wetland areas.

The northern half of the study area is characterized by well drained and fertile Burford loam and Dumfries loam with minor pockets of poorly drained Parkhill loam east of Highway 6 south of Highway 401 and well drained Guelph loam straddling Highway 6 north of Highway 401.

The southern half of the study area contains extensive amounts of Guelph loam and Dumfries loam south of Morriston and muck in the Fletcher Creek Swamp Forest and Beverly Swamp northwest of Freelton and on the West Bronte Creek system east of Freelton.

Identified Environmentally Sensitive Issues/Areas

The Dumfries and Burford loam soils represent the highest quality (Class 1 and 2) agricultural soils in the study area. Retention of these soils is of major concern to the Ontario Ministry of Agriculture and Food (11). Table 4.2 provides an indication of the soil types in the study area and their general capability with respect to agricultural productivity.

TABLE 4.2
STUDY AREA SOILS

Soil Type	Great Soil Group	Soil	Drainage	Capability for Agriculture
Burford loam	Grey-brown podzolic	Gravel	Good	Class 1, Class 2
Brisbane loam	Grey-brown podzolic	Gravel	Imperfect	Class 2
Donnybrook sandy loam	Grey-brown podzolic	Gravel	Good	Class 6, Class 4
Dumfries loam	Grey-brown podzolic	Stoney,	Good	Class 3, Class 5
Guelph loam	Grey-brown podzolic	Loam till	Good	Class 1
London loam	Grey-brown podzolic	Loam till	Imperfect	Class 1
Muck	Organic		Very poor	
Parkhill loam	Grey-brown podzolic	Loam till	Poor	Class 2

Erosion potential of soils exposed by highway earthworks will be a concern both in the construction and post-construction periods. As indicated in Table 4.1, the MTO Remote Sensing Section's assessment of the study area identified erosion potential associated with the soils of the major landform features.

An additional concern involves the possibility of encountering property waste/contamination, should there be a need to acquire additional right-of-way and/or engage in extensive earth excavation. The results of preliminary investigations in this regard, with respect to land use and site characteristics associated with the preferred solution, are included in Chapter 6 of this report.

4.1.3 Hydrogeology

Data Collection, Reliability and Information Gaps

Hydrogeological matters of this study were related to the general sources, flow patterns and quality of ground water and the distribution of domestic wells in the study area with a view to establishing existing and potential water quality problems and supply interference concerns. Primary reliance was placed on a study of ground water resources conducted on behalf of the Township of Puslinch (13) and Ministry of the Environment and Energy water well records for Wellington (14) and Hamilton-Wentworth (15). There was a general paucity of data for the portion of the study area in the Town of Flamborough. However, as the study proceeded, this deficiency became relatively insignificant.

Description

The hydrogeologic units in the study area can be divided into three major categories comprising discrete geologic units, as indicated in Table 4.3, with the bedrock and granular materials comprising the major sources of ground water supply and behaving as a single aquifer where they are hydraulically connected. The till complex locally retards and confines ground water movement.

TABLE 4.3

STUDY AREA HYDROGEOLOGIC UNITS

GEOLOGIC UNIT	HYDROGEOLOGIC UNIT	AQUIFER POTENTIAL
1) Stream deposits 2) Swamp and bog deposits 3) Lake and pond deposits 7a) Wentworth Till 7b) Port Stanley Till	Undifferentiated Till Complex	Aquitard
4) Lacustrine, kame, outwash and ice contact sand 5) Ice contact, outwash gravel 6) Kame and esker and sand and gravel	Granular material (sand and gravel)	Overburden Aquifer
Guelph Formation Lockport/Amabel Formation	Bedrock	Bedrock Aquifer

Source : Gartner Lee Associates (13)

The bedrock underlying the study area is part of a major regional aquifer (Guelph-Amabel Aquifer) which extends from the Bruce Peninsula to the Niagara Peninsula. The majority of deeper water wells in the area are completed in the bedrock which is capable of supplying high capacity municipal wells. The northeast-southwest pattern in study area stream channels appears to be related to the major fracture patterns in the underlying bedrock and potentiometric surface mapping which shows the flow of ground water in bedrock to be in a southwest direction at elevations of 320 m in the northeast to 260 m (extrapolated) in the southwest (13). Estimated specific capacity of study area bedrock wells tested in the Gartner Lee Ltd. investigation range from 0.04 l/s/m at the northern end of the study area to 8.0 l/s/m south of Aberfoyle (13).

The ground water quality from bedrock is generally reported as "fresh", with some sulphurous water reported in the Morriston area. Water quality from bedrock is considered adequate for potable purposes, although a trend towards increasing sodium levels has been observed in recent years. The degree of hardness of the bedrock ground water reflects the dissolution of the constituent primary minerals (calcite and dolomite) (13).

Saturated granular materials are reported to directly overlie the bedrock, with apparent hydraulic connection in the Mill (Aberfoyle) Creek area south of Highway 401. This phenomenon may also occur elsewhere in the study area where these materials are in direct contact or are separated by only a thin discontinuous layer of till. Virtually all domestic water supply in the study area is via ground water sources and yields from overburden of up to 7.6 l/s have been reported (13). The only measure of overburden hydraulic properties completed in the study area (south of the Hanlon/401 interchange) indicated a thickness of 8.5 m and hydraulic conductivity of 88 m/day (13).

Ground water quality from the overburden wells is also reportedly "fresh", with a minor incidence of "mineralized" water. Movement within the overburden is also to the south, with local movement from high areas (e.g., along the axis of the Galt and Paris moraines) towards low lying riverbeds and swamps. Overburden thickness ranges from under 1 m in the southern portion of the study area (north of Freelton) to 30 m at the north limit. Static water levels in the overburden are generally within 15 m of the surface and nearer the surface in the southern section of the study area (2, 13).

Ground water recharge areas are generally coincident with topographically elevated areas and are associated with coarse textured soils. The most extensive recharge area extends from the Village of Aberfoyle southwesterly through the Hanlon/401 interchange area and is associated with the Mill (Aberfoyle) and Galt Creek systems. Other, more localized, recharge areas occur northwest of the Puslinch (Crieff Old Field Complex) and east of Morriston and are associated with the Fletcher Creek and West Bronte Creek systems respectively.

Identified Environmentally Significant Issues/Areas

Ground water resources in the study area are part of a sub-regional complex recognized as one of the best high quality aquifers in the Province and are of a general concern to the Township of Puslinch relative to potential effects on the long term supply created by the demands of adjacent municipalities and local mineral extraction operations.

There have been localized reports of ground water (well) contamination from highway and industrial salts adjacent to Highway 6 and Brock Road (at Dufferin Aggregates) and water level modifications in the vicinity of the Capital Paving mineral extraction operation. Provincial agencies contacted have expressed no specific concerns in terms of ground water quality. However, it should be noted that areas with highly permeable soils (i.e., granular materials in the northwest area), wetlands (northwest and south central areas) and areas where bedrock is close to the surface (southern section) will be susceptible to the rapid movement of contaminants in the ground water. The other major concern with respect to individual wells will be the potential for alterations in supply quantities through draw-down effects in cut sections or where dewatering is required.

The major ground water recharge area in the study area has already been extensively affected by mineral aggregate extraction operations and only encroachment (i.e., cut sections) on undisturbed areas will be of concern. The Crieff Old Field Complex (South Wellington Environmentally Sensitive Area #5) has been identified as a probable recharge area for the Fletcher Creek system a short distance to the south.

4.1.4 Hydrology

Data Sources, Reliability and Information Gaps

Hydrologic considerations include overland drainage patterns and the characteristics of major surface watercourses, as well as hydraulics and water quality. As suggested in the description of hydrogeologic resources, these elements may be directly related to the ground water attributes of the study area. In this regard, previously cited information sources (3, 4, 13) were used in a literature search. In addition, unpublished MOEE water quality data were obtained from the Ministry's West Central Region. This information was supplemented by MOEE macrobenthic invertebrate data collected during the spring and summer of 1981 and 1982. The Halton Region, Hamilton Region and Grand River Conservation Authorities also provided input relative to watershed boundaries and sensitivities as well as floodplain and fill line definition for watercourses within their respective watersheds. Localized drainage characteristics and concerns were assessed in the field. Supplementary information was garnered from MNR thermography and site specific hydrogeological and environmental impact studies conducted for the University of Guelph property at the Hanlon Expressway/Highway 401 interchange (18, 19).

Due to the fact that the study area encompasses the headwaters of the Galt/Mill Creek, Fletcher Creek and West Bronte Creek systems, the watershed boundaries between them is ill-defined. Further in this regard, water quality in the headwaters areas has heretofore not been a major concern of the respective Conservation Authorities or MOEE and pertinent data were limited or unavailable for the portions of the Fletcher Creek, West Bronte Creek or Galt/Mill Creek systems within the study area.

During the latter stages of the Update and Supplementary Investigations phase, GRCA initiated a subwatershed management study for Mill Creek in the study area. Information generated during the Mill Creek Study was not available for incorporation in this environmental assessment but should be reviewed prior to further planning and design work on the subject undertaking.

Description

The major watersheds and their constituent watercourses are shown in Figure 4.1. The Lake Ontario/Lake Erie drainage basins divide crosses the study area in a northeast to southwest manner, generally along the height of land which corresponds with the axis of the Galt Moraine, crossing Highway 6 immediately north of the Village of Morriston. North and west of this divide, drainage is via various reaches of Galt/Mill Creek which are tributaries of the Grand River (Grand River Conservation Authority jurisdiction). South and east of the divide, drainage to Lake Ontario is via the Bronte Creek (Halton Region Conservation Authority jurisdiction) and Fletcher Creek/Spencer Creek (Hamilton Region Conservation Authority jurisdiction) systems. For the most part, watercourses arise along the slopes of the Horseshoe Moraines and are fed by ground water discharge.

Galt/Mill (Aberfoyle) Creek is the major watercourse in the study area and is the only one for which extensive streamflow and water quality data were available. This Creek originates in the hummocky upland area east of Aberfoyle and runs southwesterly over the outwash plain between the Galt and Paris Moraines. The streambed gradient is relatively flat, averaging about 0.6% over its length (13).

Discharge rates for the gauging station at Brock Road (Station 2GA107) for what was the most recent continuous monitoring period (1975-1977) range from 0.005 m^3/s in low conditions to 0.867 m^3/s during the spring freshet (16). Flow is controlled to some degree by the water management structure at the Aberfoyle Mill pond. Discharge rates at a point 2 km downstream (Towerline Road) are in the order of two to three times greater. This is partially attributable to reception of dewatering from the major licensed aggregate extraction operations immediately upstream. Mean annual flows in Galt/Mill Creek in this area are reported to be in the order of 0.849 m^3/s (18).

Water quality data for Galt/Mill Creek near the Hanlon/401 interchange (19) suggest that the watercourse is typical of those in unmanaged agricultural and suburban watersheds. The water is alkaline, hard and exhibits moderately high concentrations of total and dissolved solids, becoming extremely turbid during periods of higher flows. Phosphorous and chlorophyll levels indicate at least seasonal inputs of nutrients. Interpretation of macrobenthic data suggests that the Creek supports the type of community associated with alternating riffle/pool habitat exhibiting good to slightly polluted water quality.

Water quality in the Galt/Mill, Fletcher and Bronte systems in the study area has been reported as good during stream inventories for fisheries conducted by MNR (refer to Section 4.1.5).

Due to the fragmented nature of study area physiography, a number of natural kettle ponds, which are intermittently wet and dry, have been formed. These are concentrated in the hummocky area of the Galt Moraine west of Morriston. Man-made lakes have been formed as a result of aggregate extraction below the water table in the Highway 401/Hanlon Expressway area and in the southwest corner of the study area (Emerald Lake is a former quarry).

The local road network is drained by roadside ditches which flow to adjacent watercourses via strategically located culverts.

Identified Environmentally Sensitive Areas/Issues

Concerns were expressed by review agencies over existing surface water quality issues, including the impacts which the Aberfoyle Mill pond and the mineral aggregate extraction operations exert on Galt/Mill (Aberfoyle) Creek in terms of increased water temperature. Measures being taken to rectify this situation and to enhance water quality in terms of fisheries habitat are discussed in Section 4.1.5 Fisheries. Concerns expressed by MOEE and the Conservation Authorities relate to possible impacts resulting from new watercourse crossings (e.g., construction and long term effects on drainage patterns and water quality) and potential effects on the hydrologic functions of the major wetlands in the study area.

Local drainage problems exist near Freelton as a result of downstream damming on the West Bronte Creek which has created ponding and flooding on the west side of Highway 6 south of the Freelton Road intersection. At Morriston, the Halton Region Conservation Authority has identified drainage problems in the vicinity of Morriston Pond. In addition, there is an extensive poorly drained depression in the Brock Road/Highway 401 interchange area which may be a design consideration.

There are concerns in terms of hydraulic characteristics of Aberfoyle Creek and Galt/Mill Creek in the vicinity of the Hanlon Expressway. Under Regional storm conditions the Hanlon Expressway/Highway 401 interchange area may be partially submerged. Any highway design changes in the interchange area (ie raising the profile of Highway 401, Hanlon Expressway or any of the ramps) has the potential of altering the hydraulic characteristics through the interchange area (ie increasing uptream flood levels). This was further investigated for the technically preferred alternative (See section 5.5.8).

The Hanlon Expressway/County Road 34 intersection is also an area of concern in terms of hydraulic characteristics since 1.4 km of the County Road east of the Hanlon serves as a dike and spillway in Regional Storm conditions. The Grand River Conservation Authority has indicated that this situation will be sensitive to changes in the profile of County Road 34 in that upstream flooding conditions would be exacerbated (in the case of a profile raise) or downstream flood protection would be reduced (in the case of lowering the crown) (17).

Areas susceptible to ground water contamination have been identified in Section 4.1.3. These include the major wetland areas - Galt Creek and Forest, the Fletcher Creek Swamp Forest, the Beverly Swamp and, to a lesser degree, wetlands along the West Bronte system. Wetlands are significant contributors to the high water quality in the study area through active filtering processes which exclude contaminants from runoff before it enters other water systems. In terms of hydrologic function, they also reduce flooding by decreasing runoff velocity and retaining it during peak flow periods for gradual subsequent release. An important feature of these wetland complexes are the source springs. The wetlands and major identified springs are shown in Figure 4.1.

4.1.5 Fisheries

Data Sources, Reliability and Information Gaps

Previously cited literature pertaining to hydrologic considerations (19) as well as specific unpublished fisheries investigations in the study area (21, 22, 23, 24, 25, 59, 60) were used most extensively to determine existing conditions and trends. In addition, MNR Cambridge District Land Use Guidelines (20) and MNR resource inventory mapping for the Township of Puslinch and Town of Flamborough (26, 27) were referenced.

Consultation with MNR district staff and the participating Conservation Authorities also served as a basis for identifying sensitivities and updating habitat rehabilitation programs. Stream inventories were available for Bronte Creek, Fletcher Creek and Galt Creek. In addition, invertebrate data for Mill (Aberfoyle) Creek were supplied by MOEE.

Subsequent to the above noted data collection, new legislation, policies and management initiatives have been developed which apply to Ontario's natural resources. In particular the federal *Policy for the Management of Fish Habitat* has been more broadly applied to fisheries investigations in Ontario. This policy, and other legislation, policies and guidelines which apply to the Province's fisheries, have been taken into account. An update of fisheries and aquatic resources was completed in the spring of 1993 and is included in Appendix F of this report. The objective of this update was to provide supplementary inventory information of current fisheries resources of the study area, including fish habitat, based on published and unpublished mapping, reports, data files, personal communications and field investigations.

Field reconnaissance was conducted during November and December of 1992 to verify and complement information obtained from other sources. Fish habitat assessment investigations were undertaken at a number of watercourses following the habitat assessment procedures described by the MNR *Manual of Instructions* (58). A length of 100 m was evaluated at each assessment site. Hydrogeological field investigations were also undertaken as a component of the fisheries assessment due to the inter-relationship between the two.

Data sources reviewed during the 1993 supplementary investigation are considered generally reliable. However, data gaps may exist since some published information sources, such as resource mapping, may be out-dated. For further detail refer to "Background Fisheries Information and Impact Assessment-Environmental Technical Paper No. 9" in Appendix F.

Description

Fisheries resources of the study area are found in the streams and tributaries of three watersheds. They are:

- Bronte Creek Watershed;
- Fletcher Creek Watershed; and
- Galt/Mill Creek Watershed.

Headwaters of all three watersheds arise in the same general area in the Township of Puslinch and the Town of Flamborough. Groundwater upwelling/discharge in this area is the predominant source of clear, cool water for the upper reaches of these watersheds. Virtually all of the major watercourses in the study area are coldwater streams, supporting recreational fisheries to varying degrees (refer to Figure 4.2 for stream, spring and primary spawning areas).

The Bronte Creek Watershed drains a large area bounded roughly on the north by Highway 401 and on the west by Highway 6 South. The headwaters of one of the watershed's principal watercourses, Bronte Creek, are located generally east of and parallel to Highway 6 south of Highway 401 from the source near Morriston to Freelton. Fish collections made within and downstream of the Highway 6 study area have documented the presence of brook and brown trout, as well as other coolwater fish populations (see Table 4.4). A spawning and nursery area for coldwater species has been identified on the Bronte Creek system immediately east of Highway 6 roughly between Campbellville Road and Mountsberg Road. Redside dace, a nationally "vulnerable" species, was collected downstream of the study area in 1984 and 1989.

Bronte Creek is crossed only once by the existing alignment of Highway 6, at Morriston. General observations of fish habitat made this location indicated that Bronte Creek is approximately 0.8 m wide. Minimal flow was noted during field observations. The stream channel was largely overgrown with emergent vegetation. Based on these observations, this area of Bronte Creek appears to be more important as a contributor of clear, cool baseflow to downstream areas than as productive salmonoid habitat.

The Fletcher Creek Watershed drains the portion of the study area roughly bounded by Highway 401 to the north and Highway 6 to the east. Headwaters of Fletcher Creek arise just west of Highway 6 south of the CP Rail Galt Subdivision in the Fletcher Creek Swamp Forest. This swamp is classified as an Environmentally Sensitive Area (ESA) and a Class 1 wetland. The

portion of Fletcher Creek within the ESA/wetland is designated as a coldwater stream by the MNR. An extensive system of coldwater streams arise a considerable distance west of the study area from groundwater discharge areas found in the Fletcher Creek Swamp Forest and the Beverly Swamp to the south.

Field work conducted in 1984 (25) at stations immediately south of the study area on Fletcher Creek documented the presence of brook trout. Other significant fish species collected downstream of the study area within the Fletcher Creek Watershed include:

- brook trout (coldwater species)
- green sunfish (regionally rare species)
- redside dace (nationally vulnerable species)

Other fish species collected from this watershed are listed in Table 4.4.

One of the headwater tributaries of Fletcher Creek is crossed by Fielding Lane, just south of the CP Rail line. As part of the Update and Supplementary Investigation, a fish habitat assessment was conducted downstream of this crossing. At this location the watercourse is characterized by a small channel through dense emergent vegetation. The channel morphology was predominantly a run (one small riffle area only). A partly open canopy was provided, over the majority of the assessment length, by attendant shrubs and tall emergent species. Stream substrates were largely dominated by "soft" sediments of muck and silt. Flows were observed to be seasonal during field assessment. As fish habitat, this crossing site was rated as having low potential.

Galt/Mill Creek and its tributaries drain primarily agricultural areas in the northern and western portions of the study area. The creek and several of its tributaries have been designated by the MNR as coldwater streams. The fisheries of the Galt/Mill Creek system have been surveyed in at least three separate studies since the Hanlon Expressway was completed in 1976 in order to determine the effects of the highway facility on the watercourse and the need for habitat rehabilitation. Both brown and brook trout have been collected within the Highway 6 study area (see Table 4.4).

Areas of Galt/Mill Creek, and its tributaries primarily downstream of the study area have been subject to extensive rehabilitation efforts by local fishing clubs, the OMNR and others (refer to Figure 4.2). As part of the supplementary investigations, habitat assessments were conducted throughout the Galt/Mill Creek area and its tributaries potentially affected by proposed highway improvements.

Galt/Mill Creek Tributary #1 (West Branch)

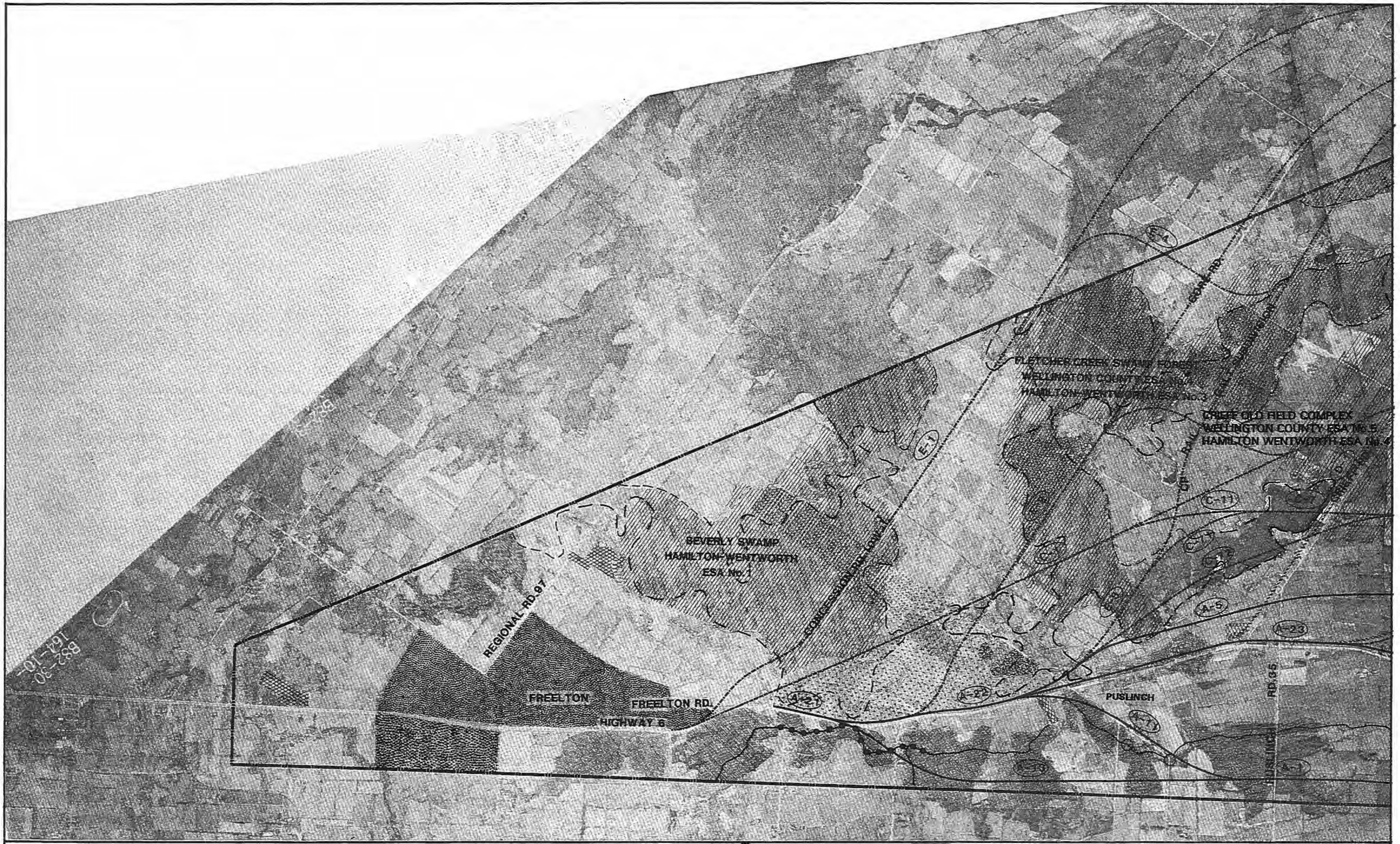
This tributary is located in the northwest quadrant of the Hanlon Expressway and County Road 34. Upstream there is evidence of groundwater discharge. Due to shallow depths, braided stream channels, absence of riparian vegetation and abundance of detritus and silts, it was concluded the area is not likely suitable as salmonoid habitat. Closer to County Road 34 the area was suitable for a variety of fish species, including trout. Fish habitat in this area was characterized by dense cedar cover, gravel and sand substrates and slightly wider and deeper stream dimensions than upstream.

Galt/Mill Creek Tributary #1 (East Branch)

This tributary traverses the northeast and southeast quadrants of the Hanlon Expressway and Country Road 34 intersection. Upstream of Country Road 34, existing fish habitat is considered to be of marginal to moderate value. While this area is considered to be a groundwater discharge zone, the braided channel, dominance of detritus and muck substrates and the absence of varying channel morphology reduces the value of this habitat. However, the presence of watercress in this segment suggests water quality conditions are good. Immediately downstream of County Road 34, conditions are similar. Further downstream, fish habitat was characteristized by abundant riparian and instream cover, more suitable stream dimensions and flow, and favourable substrates. Approximately 10 - 15 redds were noted in the 100 m length of stream assessed in the southeast quadrant.

Galt/Mill Creek Tributary #1 (Combined Flows)

The aforementioned east and west branches of this tributary converge in the southwest quadrant of the Hanlon Expressway and County Road 34 intersection. The combined flows of this tributary have been referred to, by others, as McCrimmon's Tributary. In this area fish habitat is considered excellent. Habitat characteristics such as instream and riparian cover, stream morphology, and substrate composition and condition were highly favourable to coldwater fish species. Numerous brook and brown trout were observed.



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE:
0 500 1000m

- STUDY AREA BOUNDARY
- MUNICIPAL ENVIRONMENTALLY SENSITIVE AREA (ESA)
- PROVINCIALLY SIGNIFICANT WETLAND
- OTHER WETLAND AREAS
- COLD WATER FISHERY
- MAJOR SPAWNING AREA
- SIGNIFICANT SPRINGS
- MAJOR DEER HABITAT
- HIGH QUALITY (CLASS 1-3) WOODLOTS
- RURAL/AGRICULTURAL
- RURAL SETTLEMENT AREA
- COMMERCIAL
- INDUSTRIAL/COMMERCIAL
- EXTRACTIVE
- POLICY AREAS
  - AGRICULTURAL/EXTRACTIVE
  - PUSLINCH ECONOMIC DEVELOPMENT AREA (1993)
  - STUDY AREA LANDS ANNEXED BY CITY OF GUELPH (APRIL 1993)
- PUBLIC/PRIVATE OPEN SPACE,CONSERVATION

Figure 4.2 a

EXISTING / DESIGNATED LAND USE AND ENVIRONMENTALLY SENSITIVE AREAS



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 500 1000m

- STUDY AREA BOUNDARY
- MUNICIPAL ENVIRONMENTALLY SENSITIVE AREA (ESA)
- PROVINCIALLY SIGNIFICANT WETLAND
- OTHER WETLAND AREAS
- COLD WATER FISHERY
- MAJOR SPAWNING AREA
- SIGNIFICANT SPRINGS
- MAJOR DEER HABITAT
- HIGH QUALITY (CLASS 1-3) WOODLOTS
- RURAL/AGRICULTURAL
- RURAL SETTLEMENT AREA
- COMMERCIAL
- INDUSTRIAL/COMMERCIAL
- EXTRACTIVE
- POLICY AREAS
  - AGRICULTURAL/EXTRACTIVE
  - PUSLINCH ECONOMIC DEVELOPMENT AREA (1993)
- STUDY AREA LANDS ANNEXED BY CITY OF GUELPH (APRIL 1993)
- PUBLIC/PRIVATE OPEN SPACE, CONSERVATION

Figure 4.2 b

EXISTING / DESIGNATED LAND USE AND ENVIRONMENTALLY SENSITIVE AREAS

TABLE 4.4

FISH COLLECTION RECORDS FOR STUDY AREA WATERSHEDS

Scientific Name	Common Name	Bronte Creek Watershed		Fletcher Creek Watershed	Galt Creek Watershed	
		A[1]	B[1]	B[2&3]	A[4]	B[5]
CYPRINIDAE	**Carps and Minnows**					
Clinostomus elongatus	redside dace		X	X		
Notropis cornutus	common shiner			X	X	X
Margariscus margarita	pearl dace			X		
Notropis heterolepis	blacknose shiner		X	X	X	X
Phoxinus eos	northern redbelly dace		X	X		
Phoxinus neogaeus	finescale dace			X		
Pimephales notatus	bluntnose minnow			X		
Pimephales promelas	fathead minnow		X	X		
Rhinichthys atratulus	blacknose dace		X	X	X	X
Rhinichthys cataractae	longnose dace		X			X
Semotilus atromaculatus	creek chub		X	X	X	
CATOSTOMIDAE	**Suckers**					
Catostomus commersoni	white sucker			X	X	X
Hypentelium nigricans	northern hognose sucker					X
ESOCIDAE	**Pikes**					
Esox lucius	northern pike			X		
UMBRIDAE	**Mudminnows**					
Umbra limi	central mudminnow			X	X	X

TABLE 4.4 *(cont'd)*

FISH COLLECTION RECORDS FOR STUDY AREA WATERCOURSES

Scientific Name	Common Name	Bronte Creek Watershed		Fletcher Creek Watershed	Galt Creek Watershed	
		A[1]	B[1]	B[2&3]	A[4]	B[5]
SALMONIDAE	**Trouts**					
Salmo trutta	brown trout		X		X	
Salvelinus fontinalis	brook trout	X	X	X	X	X
GASTEROSTEIDAE	**Sticklebacks**					
Culaea inconstans	brook stickleback			X	X	X
COTTIDAE	**Sculpins**					
Cottus bairdi	mottled sculpin			X		
CENTRARCHIDAE	**Sunfishes**					
Ambloplites rupestris	rock bass				X	X
Lepomis cyanellus	green sunfish			X		
Lepomis gibbosus	pumpkinseed			X		
Micropterus salmoides	largemouth bass			X		
PERCIDAE	**Perches**					
Etheostoma caeruleum	rainbow darter				X	X
Etheostoma nigrum	johnny darter			X		
Perca flavescens	yellow perch			X		

Note: A = collection records for Highway 6 study area
B = collection records for downstream of Highway 6 study area

Data Sources:
1 C. Portt and Associates, 1981
2 Halton Region Conservation Authority Stream Survey records, 1979
3 unpublished M.Sc. thesis data, 1984
4 Hamilton Region Conservation Authority Stream Survey records, 1993
5 FaunAquatics Canada, 1981
6 MNR Stream Survey records, 1976

Galt/Mill Creek Tributary #2

This small tributary is located on the east side of the Hanlon Expressway, just north of Highway 401. It meanders through pastured and cultivated lands and enters a small wetland on the east side of the Hanlon Expressway. Although fish habitat is minimal, the presence of watercress suggests that flow may be derived from ground water sources, which may be important to downstream fish habitat.

Galt/Mill (Aberfoyle) Creek

Fish habitat surveys were conducted on Galt/Mill Creek upstream and downstream of Highway 401. Both locations represented excellent fish habitat. The upstream station was wider, shallower and more open than the downstream station. Both assessment locations had diverse instream cover provided by fallen logs and trees, and diverse and abundant substrates comprised of rubble, gravel and sand. Dimensions of Galt/Mill Creek averaged 4.5 m wide and 18 cm deep at the upstream station, and 3.0 m wide and 25 cm deep downstream of Highway 401. The combination of increased instream structure and meanders downstream of Highway 401 provide more opportunities for salmonoid spawning. Numerous redds were noted in the section of stream assessed, as well as downstream. Both areas examined, and extending upstream and downstream, are considered to be high potential groundwater discharge zones. Again the presence of watercress was indicative of the clear and coolwater qualities of this watercourse. Reaches of this watercourse upstream of the detailed assessment have been rehabilitated to improve fisheries habitat.

Identified Environmentally Sensitive Areas/Issues

The headwater and coldwater streams and tributaries found within the study area represent environmentally sensitive areas. Coldwater fisheries resources are highly valued in southern Ontario for several reasons. Firstly, these watercourses support high quality fish species desired by recreational fishermen. Secondly, development pressures in southern Ontario are affecting critical coldwater habitat parameters primarily through reductions in baseflow, removal of riparian vegetation and measures which lead to elevated water temperatures. The MNR expects that angler demand for coldwater species will exceed the natural production of these species (20). The strategy then is the protection and rehabilitation of sensitive headwater areas or coldwater streams to sustain the coldwater fishery of the area. All three study area watersheds share a similar geographic source of ground water which provides baseflow to their coldwater streams.

Additional to the sensitivity of coldwater fish species, the federal Department of Fisheries and Oceans' *Policy for the Management of Fish Habitat* serves to protect the habitats of all fish species. This includes coldwater and warmwater fish and their habitats, as well as provincially and nationally significant fish species, such as the redside dace.

On the Bronte Creek system, there are two areas of particular importance :

- designated spawning and nursery area east of the existing Highway 6 alignment between Mountsberg Road and Campbellville Road;
- tributaries to Bronte Creek which cross Highway 6 between Freelton and Campbellville Road.

Downstream of the study area, redside dace have been collected.

Sensitive issues related to the Fletcher Creek watershed are primarily related to potential impacts on groundwater discharge areas which provide baseflow to more sensitive downstream watercourses. Redside dace have also been collected in Fletcher Creek (1993 collections), although well downstream of the study area.

The most sensitive area in terms of concentration of fisheries resources is located in the northwest corner of the study area. These heavily wooded areas represent areas of groundwater discharge and presently support populations of brook and brown trout. Direct evidence of ground water discharge (mid-stream upwelling), as well as abundant indications of circumstantial evidence (topographic location, coarse subsurface soils, swampy surface soils, cool water vegetation) suggest that much of the area contributes a substantial baseflow to the nearby watercourses. Evidence of trout spawning on realigned sections of a Galt/Mill Creek tributary (presumably realigned due to Hanlon Expressway construction) indicate that this habitat can be restored and utilized by native coldwater species.

The main branch of Galt/Mill (Aberfoyle) Creek is also considered to be sensitive. Evidence of spawning was abundant, particularly downstream of Highway 401. Spawning habitat and rehabilitation efforts downstream would be susceptible to the impacts of Highway 401 corridor improvements. As existing culverts which convey Galt/Mill Creek flows already extend well beyond the existing highway right-of-way, sensitivities of the watercourse are somewhat reduced since construction requirements (i.e. any culvert extension) will be reduced. MNR has suggested

that, based on its current fisheries management strategy, the productive capacity of this watercourse to support coldwater fish species cannot be compromised.

4.1.6 Forestry Resources

Data Sources, Reliability and Information Gaps

The consideration of vegetation units herein is related primarily to major woodlots and their significance as forestry resources. Other sensitivities, relative to study area flora and wildlife, are addressed in Section 4.1.7 Environmentally Sensitive Areas and important additional details are included in Appendix F of this report.

In determining existing conditions, reliance was placed primarily on Ministry of Natural Resources (MNR) resource inventory mapping (29, 30, 55), Canada Land Inventory (CLI) Capability for Forestry) (31), selected literature (20, 28), field investigations, and discussions with affected agencies (primarily MNR).

Site specific field work was carried out in summer and fall of 1987 (66) during the initial preliminary design phase to ascertain the condition and species content of the affected portions of major vegetation units to satisfy concerns in this regard expressed by MNR and the participating Conservation Authorities (refer to Appendix F). Also, a terrestrial resources update was carried out in the summer and fall of 1992 during the Update and Supplementary Investigations phase. Information for this supplementary investigation was obtained from literature and map sources, personal communication with the MNR and GRCA personnel, and from field observation. Considerable reliance was also placed on the 1987 study. Further details of the results of these investigations are presented for the technically preferred solution in Chapter 6 and in Appendix F.

The data sources are considered generally reliable, but some information gaps may exist (e.g. ESA reports and forest resources mapping may be outdated; also MNR and Conservation Authority personnel, naturalist groups and local residents likely could provide additional anecdotal information about wildlife, especially birds, and perhaps rare and otherwise unique plants). Some Wetland Data Records were not available at the time of the supplementary investigation, however field invetigations to assess characteristics and value of these wetlands were carried out and relevant discussion were held with MNR staff. Wetland Records which were available were examined. A systematic and intensive year-round floristic survey has not been done. Such a survey, while yielding a larger inventory than compiled in, say, the Fenco 1987 report (Appendix F) and the various ESA studies, probably would not add measurably to an appreciation of system sensitivity. In brief, additional information of this sort is not likely to alter the basic conclusions of the completed study.

Description

The study area lies on the fringe of the Niagara section of the Deciduous Forest Region and the Huron-Ontario Section of the Great Lakes - St. Lawrence Forest Region (28). Both sections are relatively densely settled or have been extensively cleared for agricultural purposes and thus exhibit primarily remnant woodlots.

Approximately 18% of the study area is forested with stands ranging from lowland successional to upland mature hardwoods, much of the former being associated with major wetland forests.

The upland woodlands are dominated by sugar maple, with varying combinations of beech, white ash, black cherry, hop-hornbeam and basswood with the larger beech and maple specimens ranging in diameter from 45-60 cm.

The lowland forests are characterized by a variety of woody species, including white cedar, trembling aspen, willows, balsam poplar, balsam fir, white birch, red-osier dogwood, chokecherry, hawthorns and staghorn sumach. Herbaceous vegetation, for the most part, is typical of upland and lowland forests, respectively, in this part of Ontario.

Other dominant vegetation communities within the study area include old field complexes, hedgerows and plantations. There are several plantation forests in the study area, some of which are being managed under the Woodlands Improvement Act (WIA). Most are planted with coniferous species such as white spruce, Norway spruce, white pine, red pine and larch.

The MNR manages the largest plantation in the study area, an approximately 50.0 ha triangular MTO-owned parcel (Morriston Tract) in the southwest quadrant of the Highway 401/Highway 6 interchange area comprising primarily red pine, but with some white ash and red oak. This area is also recognized for its capability to support recreational activities such as hiking, horseback riding, hunting, and cross-country skiing.

Identified Environmentally Sensitive Issues/Areas

The MNR has identified five classes of woodlands relative to forestry potential, as follows, with Classes 1 and 2 representing the highest existing or potential productivity.

Class 1	Upland hardwood - high productivity
Class 2	Upland hardwood - potential high productivity
Class 3	Lowland hardwood - high productivity
Class 4	Plantation
Class 5	Low productivity cover types (upland and lowland).

Figure 4.2 illustrates the location of Class 1-4 woodlots, WIA areas and the MNR Morriston Tract within the study area. The higher quality woodlots represent a substantial investment in resources and time that a less three-dimensional plant community does not. The replacement of large tree specimens may require in excess of 200 years, and properly managed woodlots represent a significant renewable economic resource (firewood, pole trees, board/furniture lumber).

In terms of reforestation potential, the MNR resource inventory mapping indicates that external to the major wetland areas, much of the study area is suitable for planting. However, the obvious conflict with agricultural and mineral aggregate extraction operations exists and the Ministry ranks the potential for forest management as only moderate. Similarly, CLI mapping suggests that the highest capability for the growth of commercial forests in the region is located southwest of the study area in the Galt Forest and northwest of Guelph to Fergus, respectively.

Woodlots and hedgerows associated with agricultural operations provide local relief from prevailing climatic conditions (shade, windbreaks) and several contain black walnut specimens, formerly considered nationally and provincially rare (32). In addition, woodlands in general provide habitat for a diversity of wildlife forms and exert beneficial influences on watercourses and other aquatic resources through water retention and thermo-regulatory effects. Severance of, or encroachment on, woodlots may extend adverse effects beyond the area removed for highway right-of-way purposes in the form of various stresses (sunscald, windthrow) on adjacent trees and fragmentation of the woodlot into economically non-viable units as a result of access restriction or size limitations.

4.1.7 Environmentally Sensitive Areas/Wildlife

This section describes the attributes of portions of the study area identified as Environmentally Sensitive Areas (ESAs) in studies conducted for the Guelph and Suburban Planning Area in South Wellington (SW) County (36) and the Regional Municipality of Hamilton-Wentworth (H-W) (37, 38). In addition, MNR sources (3, 4, 20) were used to identify Life Science Areas of Natural and Scientific Interest (ANSIs) of regional and provincial significance. Earth Science ANSIs have been identified in Section 4.1.1 Geology and Geomorphology. In the case of major wetland areas, the regional and provincial designations overlap, as do the two municipal designations in boundary areas. Important additional details regarding vegetation, wildlife and wetlands in the study corridor are provided in Appendix F.

There is considerable overlap between those areas designated ESAs, ANSIs, and provincially significant wetlands, respectively (refer to Figure 4.2). Although boundaries may not be precisely congruent, the following ESAs also have these other designations as indicated:

ESA	Provincial ANSI	Regional ANSI	Provincially Significant Wetland
Beverly Swamp	–	Beverly Swamp	Class 1
Fletcher Creek Swamp Forest	–	Fletcher Creek Swamp Forest	Fletcher Creek Swamp - Class 1
Crieff Old-Field Complex	–	–	–
Galt Creek and Forest	–	Galt Creek and Forest	Galt/Mill Creek Wetland Complex - Class 1
Aberfoyle Woods	–	–	Galt/Mill Creek Wetland Complex - Class 1

It is intended that a description of EASs, *per se*, also will apply generally to the other designations in the same areas.

In addition to the aforementioned sources, selected literature dealing with provincially or regionally rare flora and fauna were cited (32, 33, 35, 56, 57), as were special studies conducted on behalf of the participating Conservation Authorities relative to biological inventories of existing and prospective properties (39, 40, 41) and wetland assessment/ classification in accordance with the approved provincial evaluation system (42).

Provincially significant wetlands have been considered with obvious regard to the OMNR 1992 Wetlands Policy Statement (64,65). More detailed considerations are presented in Appendix F.

To supplement the cited sources and to ascertain the location of the various potentially affected sensitivities within the ESA, Fenco MacLaren conducted detailed field investigations along the 1987 technically preferred alignment, with updating by Fenco MacLaren in 1992-93, the results of which are included in Chapter 6 and Appendix F. Detailed lists of flora and fauna found in each of the ESAs are also included in Appendix F, as are lists of common and scientific names of plants and animals mentioned otherwise in this report.

There are five municipally designated ESAs either wholly or partially encompassed by the study area whose general characteristics are as follows (refer to Figure 4.2).

Beverly Swamp (H-W ESA No. 1)

Beverly Swamp is located in the northern portion of the Town of Flamborough and extends westerly to the Region of Waterloo covering an area of 1,940 ha, the easterly 15% of which lies in the study area. The ESA comprises an extensive conifer-dominated (primarily cedar) wetland forest which, in places, is similar in structure to boreal forest and several species here nearly reach their southern limit for Canada (e.g. black spruce, snowshoe hare, woodland deer mouse, porcupine, water shrew and northern flying squirrel). Most of Beverly Swamp is an MNR designated "waterfowl area" and "deer wintering range". The eastern portion of the swamp is fragmented by crossings of Flamborough Concession Road 10 West and the Ontario Hydro 115 kV transmission line.

The portion of Beverly Swamp in the study area lies within the jurisdiction of the Hamilton Region and Halton Region Conservation Authorities since it serves as the headwaters for Spencer Creek and Bronte Creek. The Authorities have joint interest in a large (36.5) parcel known as the Knight Tract in Concession IX Flamborough; the remainder within the study area is in private ownership.

Fletcher Creek Swamp Forest (H-W ESA NO. 3; SW ESA No. 4)

The Fletcher Creek Swamp Forest lies on the border between the County of Wellington (Puslinch Township) and the Regional Municipality of Hamilton-Wentworth (Town of Flamborough) and covers an area of 690 ha, about 70% of which lies within the study area. The ESA is fragmented to some degree within the study area by the CP Rail Galt Subdivision line, the Hydro 115 kV line and the local municipal road network. The area is within the jurisdiction of the Hamilton Region Conservation Authority, as it is a headwater area for both the Fletcher Creek and Spencer Creek systems. Most of this area is designated by MNR as waterfowl area and deer wintering range.

The swamp forest is situated between the Galt moraine and the Moffat moraine, in a depression created during the formation of these two features, and serves as a discharge area for drainage from the Galt moraine to the north.

The Crieff Bog is a smaller area within the ESA and actually is a sedge meadow characterized by unique assemblages of rare/sensitive herbaceous flora and geologic attributes (the area exhibits shallow-water and underlying sandy, lacustrine and outwash gravels, whereas muck and organic soil prevail over much of the remainder of the swamp). The northern portion of the swamp is underlain by an outcrop of Guelph dolomite, the upper 20 m of which is potentially valuable for its industrial uses.

Crieff Old Field Complex (H-W ESA No. 4; SW ESA No. 5)

This ESA is a 144 ha section of the Galt moraine located entirely within the study area in the vicinity of Crieff Road west of Highway 6. The area is privately owned, comprising primarily former agricultural fields recolonized predominantly by oldfield herbaceous plants and provides unique avian habitat. The eastern portion of this ESA also is currently under active agricultural use.

Gravelly till is up to 30 m deep on top of limestone bedrock and surficial drainage characteristics make this area a high infiltration zone for both bedrock aquifer and Fletcher Creek headwater recharge.

Galt Creek and Forest (SW ESA No. 2)

The Galt Creek and Forest ESA covers 1,466 ha of privately owned land and extends into the northwest corner of the study area (from the southwest), where it forms the headwaters of Galt/Mill Creek. The main spring areas are located in the Hanlon Expressway/County Road 34 intersection area. A large area of Galt Creek and Forest southwest of the intersection of the

Hanlon and Highway 401 is a waterfowl area. Nearly all of the wetland forest attendant to this interchange is deer wintering area.

Four main habitats are discernible:

i) lowland swamp forest near the creek;
ii) upland maple-beech forest;
iii) cedar swamp forest which is predominant in the study area, in which the majority of rare flora are found and which is an important white-tailed deer wintering area; and
iv) an old-field complex south of the Highway 401.

This area is also the provincially significant (Class 1) Galt/Mill Creek Wetland Complex.

The fisheries attributes of the area have been cited in Section 4.1.5.

Aberfoyle Woods (SW ESA No. 9)

This ESA is an extensive square-donut-shaped area 1,185 ha in extent, 17% of which lies in the northeast corner of the study area in the headwater area of Galt/Mill (Aberfoyle) Creek to the east of the Village of Aberfoyle. It consists of a wide range of successional vegetation communities, from old field and marsh, to wet and dry mature woods and it provides extensive habitat for deer and many uncommon or rare plants and birds in the County.

Identified Environmentally Sensitive Areas/Issues

Table 4.5 presents the significance and associated sensitivities of each of the aforementioned ESAs relative to the manner in which they meet established criteria for inclusion (36) as highly sensitive areas and ANSIs.

Eight other Class 4 to 7 wetland areas occur on the Bronte Creek system (refer to Figure 4.2 and Appendix F), and a number of small unclassified wetlands are located variously in the study area. Although these areas have been classified below the level of provincial significance they serve an important function as a headwater area and provide flood storage capacity, flow augmentation (ground water discharge), recreational opportunities and wildlife habitat for such species as muskrat, raccoon, beaver, red fox, coyote, eastern cottontail, snapping turtle and bullfrog. The Class 7 wetland (HRCA #223-3) west of Highway 6 north of Morriston is used by the Niagara Retriever Club, Lab Owner's Club and Golden Retrievers Club to train dogs.

Characteristics and sensitivities of mature woodlots in the study area are discussed in Section 4.1.6 and Appendix F.

4.1.8 Climate

Data Sources, Reliability and Information Gaps

Climatic information sources included Environment Canada data on climate norms from the Guelph Ontario Agricultural College Station (44) and for Ontario in general (43). These records have employed an accepted time interval (30 years) for the computation of averages and are considered reliable in this regard. The Guelph OAC figures are based on the period between 1951 and 1980 while the latter reference is based on the 1931-1960 period; there are no discernible incongruities between the two. In addition, the Gartner Lee hydrogeological studies (13, 18) provide information relative to the water budget in the study area.

Description

The study area lies on the fringe of the South Slopes and Huron Slopes climatic regions within Southern Ontario. The boundary of the two regions is roughly coincidental with that between Wellington County and the Region of Hamilton-Wentworth in the study area. Generally, climatic norms are similar to other upland areas in Southern Ontario outside the immediate influence of the Great Lakes. The mean annual temperature is 7°C with mean daily ranges for January and July of-14 and 22 respectively (43).

Conditions are considered favourable for agricultural purposes. The mean annual frost free period is in the order of 140 days which is above the median value for the various climatic regions considered in Southern Ontario (maximum 170; minimum 100) (43). The growing season extends from mid-April to the end of October. Mean annual heat units available for corn (2700 CHU) approximate the mean value for Southern Ontario but again reflect the absence of the moderating effect of the Lakes.

TABLE 4.5

ENVIRONMENTALLY SENSITIVE AREA ATTRIBUTES[1]

ESA	CRITERION 1	CRITERION 2	CRITERION 3	CRITERION 4	CRITERION 5	CRITERION 6	CRITERION 7	CRITERION 8	CRITERION 9	OTHER
Beverly Swamp	NA	• Bronte Creek, Spencer Creek Fairchild Creek headwaters • Primary recharge area	• One of the three largest swamps in Ontario west of Lake Simcoe • Species near southern limit in Canada	• Northern wetland forest • High quality fisheries habitat	• Large variety of vegetative communities, and high diversity of plant and animal species	• Large number of rare flora/fauna	• Large relatively unfragmented forest landscape	• Applied ecology research potential • Hydrologic interpretation	• Excellent vistas of large unbroken forest	• Class 1 wetland • IBP site • Provincially significant Life Science ANSI
Fletcher Creek Swamp Forest	NA	• Spencer Creek Fletcher Creek headwaters • Secondary bedrock aquifer recharge area	• Five distinct communities, including both upland and wetland.	• Crieff Bog, a sedge meadow	• Wide diversity of communities and a broad range of rare and uncommon plant species	• Regionally rare species of birds and plants, many northern in breeding preferences	NA	NA	NA	• Class 1 wetland • Extensive winter deer range(4.7 km^2) • Extensive water-fowl area • Regionally significant Life Science ANSI
Crieff Old Field Complex	NA		• Avian habitat/ nesting area	NA	NA	• Several rare avian species are probable breeders here	NA	NA	NA	• Part of Fletcher Creek recharge area
Galt Creek and Forest	NA	• Galt Creek headwater • Hydrologic balance (water retention)	NA	• Gore Galt Creek Forest represents habitat with limited repre-sentation in the County	• High diversity of biological communities	• Nine plant species considered regionally rare	• Extensive forest cover is unique in South Wellington	• Killean wet forests a natural scientific preserve candidate area	NA	• Class 1 wetland • Regionally significant Life Science ANSI • Extensive water-fowl area • Extensive winter deer range(4.4km^2) • Important fisheries habitat at rehabilitation area
Aberfoyle Woods	NA	• Aberfoyle-Galt Creek headwaters • Major surficial aquifer recharge area	• Woodland pools, cattail-sedge marsh • Lowland deciduous woods	NA	• High diversity of biological communities	• 16 plant and 17 bird species uncommon to the County	• One of the largest ESAs in the County • Undisturbed conditions promoting forest regrowth	NA	• Diversity of landscape	• Significant fisheries spawning area • Extensive water-fowl area • Extensive winter deer range(3.6km^2)

ESA CRITERIA

Criterion 1 - Distinctive and unusual landform
Criterion 2 - Serves vital ecological function
Criterion 3 - Plant and/or animal communities which are unusual or of high quality
Criterion 4 - Area is an unusual habitat
Criterion 5 - Unusually high diversity of biological communities
Criterion 6 - Habitat for rare or endangered species
Criterion 7 - Large and undisturbed area
Criterion 8 - Provides vital link between blocks of natural areas
Criterion 9 - High aesthetic value

[1] As per South Wellington ESA study (36) and Hamilton-Wentworth Region ESA Study (37)

Mean annual rainfall is near the highest for this part of the province (690 mm) as is the mean annual snowfall (144 cm) (44). Accounting for evapotranspiration, the mean annual amount of rainfall available for infiltration and runoff has been estimated to be 260 mm(18).

Winds in the study area are predominantly from the west on an annual basis. This pattern is reflected in winter, with southwesterlies and northwesterlies considered as secondary and tertiary influences respectively (44).

Identified Environmentally Sensitive Areas/Issues

Climatic characteristics are not considered a primary factor in assessing the undertaking, with the exception of possible changes in local or micro-climatic effects (i.e., wind protection and influence of same in exposed woodlots) and implications regarding winter maintenance requirements (snow drifting patterns).

4.2 SOCIAL ENVIRONMENT

4.2.1 Communities

Data Sources, Reliability and Information Gaps

A determination of community definition and hamlet-rural area social linkages was made on the basis of designated hamlets and police villages within the planning areas of the participating municipalities, as described in their official plans (45,46,47,48).

The Wellington County, Wellington County Separate School, the Wentworth County and the Hamilton-Wentworth Roman Catholic School Boards provided information related to school catchment areas and bus routes.

In addition, valuable input was garnered with respect to local community attitudes, values and goals through interaction with the Steering Committee, the public involvement program and a survey of business operators both on Highway 6 and in adjacent rural areas.

Description

Within the study area there are four settlement areas in the form of hamlets or police villages -the Hamlet of Puslinch and the Police Villages of Freelton, Morriston and Aberfoyle (refer to Figure 4.2). Aberfoyle is the focal point of the Township of Puslinch by virtue of the fact that the community centre, municipal office, fire department, roads department and library are located in the village.

The Hamlet of Puslinch comprises essentially strip residential development on either side of existing Highway 6 in the vicinity of the CP Rail Galt Subdivision Line. Due to the automobile oriented nature of the area and the physical barrier imposed by Highway 6, there is limited social interaction by way of pedestrian movements. This level of interaction is increased somewhat in Freelton, Morriston and Aberfoyle due to the closer proximity of residences, greater variety and number of business operations and ostensible reduction in speed limits. However, the largest proportion of social (shopping, recreation, leisure, etc.) interaction is directed towards the larger centres of Guelph, Cambridge, Kitchener-Waterloo and even Hamilton/Burlington and Toronto, with the villages serving very local needs for lower order convenience goods and services.

In addition to the aforementioned settlement areas, the small "four corners" community of Crieff (located at the intersection of Puslinch Road 35 and Sideroad 25) was recognized for its historic significance and communal integrity characterized by the Presbyterian church and cemetery and surrounding residences.

Apart from the rural farm community, other "communities" or social entities outside the recognized hamlets and villages are related to the study area's role as a seasonal recreational retreat. The fact that the Canada Land Inventory rates most of the study area as exhibiting moderately low (Class 5) to low (Class 6) capability for outdoor recreation makes it attractive to groups seeking relative isolation. In this respect, major identified areas include :

Crieff Hills Community - is a 100 ha site in the northeast quadrant of Crieff Road and Sideroad 25. The property has been developed into a year-round retreat and conference centre for both religious and secular groups.

The retreat currently has capacity to sleep approximately 80 people in two lodges, three houses and a one-man "hermitage". About 40 ha of the property is still leased to a local farmer who grows mixed grains and raises pigs and cows (there is a barn on site). The Director's residence is also on site. The administrative centre is located in MacLean Hall on Crieff Road 35. There is also a prayer shelter and a conference centre (with meeting rooms, library, recreational facilities and improved administrative offices). The property is heavily wooded, particularly in the north and east portions, providing general open space use, day camping activity areas and well-marked hiking trails. Encroachment on these areas and noise/visual impacts are concerns which have been expressed by the operator.

Mini-Lakes Country Club Trailer Resort - a 40 ha private mobile home/trailer community located on Galt/Mill (Aberfoyle) Creek east of Aberfoyle and contains 200 serviced sites capable of accommodating 13 m units. Adjacent Mill Creek Camping and Country Club offers recreational and social amenities.

Morriston Park Nursing Home - is a nursing and retirement home located 1 km west of Morriston on Calfass Road. The operation houses 40 residents (and is planning seniors condominium units) and supports 35 employees. The operator of the Home has expressed concerns regarding noise, visual intrusion and safety.

Slovenski Park - is a private trailer park / campground located in the northwest quadrant of Highway 401 and Puslinch Sideroad 25. Land use within the Park, adjacent to Highway 401, includes a soccer field in the southeast corner and a passive recreation (walking) and tenting area set in a wooded (predominantly cedar) area in the south central portion of Park. There is an existing treed berm which acts as a visual/noise screen from Highway 401. Park representatives expressed a general concern that constructing the travelled highway lanes closer to the Park, could result in loss of amenity areas (tenting, soccer field) and treed portions of the site thereby increasing nuisance effects of the highway corridor, particularly noise.

The Park executive has indicated that it intends to expand the site's existing communal hall during the Park's 30th anniversary year (1994) to include a garage and change room/shower facilities.

Identified Environmentally Sensitive Areas/Issues

The Aberfoyle-Morriston area had an existing population of approximately 820 at the time of the initial inventory and will experience very limited growth due to restrictions on the provision of both urban communal services and individual lot servicing. Freelton, Aberfoyle and Morriston have defined growth areas and encroachment into these areas will establish undesirable boundary definitions and confine social interaction and economic productivity. However, based on the limited extent of these areas, such constraints would not be significant on a study area basis.

During the Update and Supplementary Investigations phase, the development/land use schedule for Aberfoyle was amended to include two major residential subdivisions (Bridle Path and Fox Run Estates) north of the Village. Similarly, the Plan of Subdivision for Telfer Glen (41 single family residential lots), which has access to existing Highway 6 and Calfass Road, was registered. During the supplementary investigation period, between 5 and 10 lots in the Telfer Glen Subdivision were actually occupied. While the new areas in Aberfoyle did not represent a constraint to the development of alignment alternatives, the Telfer Glen Subdivision became a significant consideration with respect to both alignment option development and assessment of net environmental effects.

In terms of community services, the most critical service involved is the provision of school bus transportation. The study area includes catchment areas for four school boards and approximately 22 schools. Aberfoyle P.S. and Millgrove Unit School are the only schools located in the study area. New transportation infrastructure could have the effect of redefining catchment areas and service routes, thereby resulting in at least short term disruptions of rural community communications and social interaction patterns.

The other important aspect of school bus service is safety considerations related to additional highway crossings, especially unsignalized ones. The is particularly important on County Road 34 which serves the heaviest volume of school bus traffic.

Local safety levels in Morriston and Aberfoyle emerged as a concern. This is related to improved local vehicular and pedestrian movements in village areas resulting from traffic reductions and is not particularly significant on an area wide basis. However, there is growing concern over local property access and pedestrian safety in crossing Highway 6 (particularly for school children in Aberfoyle) in light of relatively high percentages of speeding traffic observed in both villages.

Rural social ties outside the settlement areas also warrant consideration in view of potential severance or alteration, particularly within the central and northern portions of the study area where land ownership patterns and the interaction of agricultural operators have established strong linkages. Accessibility could be improved with additional road links or restricted by road closures, but since existing links do not exhibit a high activity level and alternative access routes are considered adequate, impacts should not be particularly significant.

Displacement of residences is also considered to be an element of potential community impacts and has serious consequences in terms of social linkages, economic productivity and project capital costs.

4.2.2 Noise

Data Sources, Reliability and Information Gaps

4.2.2.1 Initial Recommendations Phase

The assessment of the existing and projected noise environment leading to the Initial Recommendations was conducted by the Ministry of Transportation's Highway Design Office and Central Region Environmental Unit for the Route Location and Preliminary Design exercises respectively. The assessment was completed in accordance with the MTO/MOEE Protocol for dealing with highway noise concerns (49) as well as the Ministry of Transportation's policies and directives relative to warrants for providing mitigation from noise impacts (50).

The work involved close liaison with, and concurrence from, MOEE's Environmental Approvals and Land Use Planning Branch with respect to methodology (refer to Appendix B Selected Correspondence), particularly during the Route Location phase of the study when the aforementioned Protocol was in its formative stage. In each phase, the U.S. Federal Highway Administration STAMINA 2.0 model was employed and applied to projected traffic volumes for Year 2004 which were deemed to be representative of the 10-year-after-construction horizon.

Route Location

In determining the noise environment for the study area, the noise modelling procedure assumed a horizontal plane in each alternative corridor which does not take into account the potential beneficial screening effects provided by natural topographic relief and vegetation. Therefore, the conditions created were close to a "worst case" scenario.

The results for virtually all new route alternatives indicate that there would be no significant noise impacts (i.e., increases in excess of 5 dBA over the assumed ambient sound level of 45 dBA for rural condition) beyond the corridor used in the analysis. Given the extensive on-the-ground screening encountered in the study area, it is anticipated that actual increases in the ambient levels at the periphery of the corridor will be less than suggested by the modelling results (e.g., 0 dBA increase). Hence, a corridor width of 550 m was considered appropriate to satisfy the level of detail required for the route location portion of the study.

Correspondence of November 15, 1985 from MOEE indicated concurrence with the proposal to use "typical" sound levels for the existing/future ambient noise environment in rural and hamlet areas (Leq 24 of 45 dBA and 50 dBA respectively).

Investigation of the acoustic environment in rural locations suggested that using the "typical" ambient noise level of 45 dBA for the baseline condition is appropriate. However, based on the heavy forecast traffic volumes on existing Highway 6 and Brock Road for the Year 2004 baseline condition, the use of 50 dBA in hamlet areas was deemed to be non-representative (i.e., lower than actual). Accordingly, the predicted (Year 2004) noise environment for the "Do Nothing" option was determined using the modelling procedure and parameters employed for calculating the impacts of the viable route location alternatives as described below.

1. Noise levels calculated for areas adjacent to a typical tangential section.

2. Assume a right-of-way offset of 25 m from centreline and establish theoretical receivers at between 10 m and 250 m from right-of-way at 20 m intervals.

3. Elevation for groundline at all receivers is equal to road elevation. Receivers located 1.2 m above ground.

4. Based on forecast traffic volumes for year 2004, noise levels calculated for 12,000, 13,000, 15,000, 17,500 and 22,500 AADT (higher than projected SADT).

5. Truck component, as identified by field counts, at 10%, 15% and 18%. Heavy to medium ratio equals 60:40.

6. Operating speeds of 80 km/h and 100 km/h

7. Discount sounds of short duration such as trains and aircraft flyovers.

Preliminary Design

In determining the potential for mitigation, the methodology accounted for topography within 600 m of the selected alignment right-of-way as well as selected roadway cross-section effects. In accordance with the Protocol, the objective sound level of 55 dBA (Leq 24) or the pre-existing ambient sound level for traffic noise generated by the proposed alignment in outdoor recreational areas was recognized. The analysis also considered the absolute resultant noise level with the highway in place (whether less than or equal to 55 dBA; greater than 55 dBA) and the relative significance (number of dBA) of the increase. These warrants are detailed further in Section 6.2 Identified Potential Environmental Condition Changes, Effects and Commitments to Mitigation.

4.2.2.2 Update and Supplementary Investigations Phase

During the Update and Supplementary Investigations phase of the study it was determined that the noise environment should be reassessed for the following sections of the study area based on updated traffic volumes and possible design modifications (refer also to Figure 3.3):

i) new alignment investigations between Maddaugh Road and Highway 401;

ii) Highway 401 corridor between new route section and Hanlon Expressway where Highway 6 extended ramps may have additional impacts due to expanded Highway 401 corridor;

iii) Hanlon Expressway corridor between Highway 401 and north project limit due to MTO intention to introduce new N-E directional ramp and investigate alternative configuration for the proposed Hanlon/County Road 34 interchange.

In 1992, J.E. Coulter Associates Engineering (acoustic specialists) was commissioned to carry out the supplementary noise assessment.

This work was conducted at the Preliminary Design level of detail and involved the following methodological approach :

- Sound level calculations were carried out on Vanderbilt University's *STMA2VU1* (Version 1.20) noise prediction program. This is a modified version of the FHWA Version 3 (March 1983) *STAMINA* program. The Ministry of the Environment and Energy's *ORNAMENT* methodology (*STAMSON 4.1* computer program) was utilized for the extended Highway 401 ramp calculations due to the simple configuration.

- Net increase in environmental sound levels for each property exposed to an impact of at least 3 dB was determined for the alternatives. The analysis was carried out to the lesser distance of 600 m as per the MTO/MOEE Protocol.

- Noise barriers were investigated according to the MTO/MOEE Protocol.

- The future ambient sound level was deemed to be either 45 dBA L_{eq} (typical of rural daytime background sound levels) or the level generated by local road traffic, whichever would be higher.

- The traffic volumes used in the calculations were provided by Fenco MacLaren Inc. as part of the overall study. The projected future sound levels (with and without the project proceeding) are for the year 2011, corresponding to approximately 10 years after project completion as per the MTO/MOEE Protocol. (Note : Use of 2011 versus 2004 used in previous analysis was based on likelihood of deferred construction timeframe. Differences between traffic volumes in the two horizon years did not warrant reassessment of the Route Location findings which were based on the relative difference amongst routing options).

- Variable parameters similar to previous analyses (use of AADT volumes; 100km/h posted speed; 18% commercial vehicles with 60:40 split between heavy and medium trucks).

Both the MTO and Coulter studies are included in Appendix I of this report.

Description

In the study area, there are no major environmental sound sources other than roadways (existing Highway 6, Highway 401 and the local roadways). The CP Rail (Galt Subdivision) line in the southern portion of the study area is a principal mainline carrying freight traffic. The Protocol for determining noise impact does not include short events such as rail and aircraft passbys.

Noise sensitive areas within the study area include residences and recreational/institutional uses within and external to settlement areas (e.g., Aberfoyle P.S., Morriston Park Nursing Home, Crieff Hills Community). Existing ambient noise levels are considered typical of rural and hamlet areas (45 dBA and 50 dBA respectively).

Future ambient noise levels for Year 2004 and 2011 in rural areas are not expected to vary significantly from the "typical" value of 45 dBA due to limited prospective land use and transportation network developments. However, noise in the village areas adjacent to Highway 6 and Brock Road are projected to reach the following levels as a result of anticipated increases in traffic volumes to Year 2004.

Location on Existing Highway 6 and Brock Road	**Predicted Noise Level Leq (24)**
Highway 6 east of the Village of Freelton	66 dBA
Highway 6 at the Hamlet of Puslinch	65 dBA
Highway 6 at the Village of Morriston	65 dBA
Brock Road at McLean Road	63 dBA
Brock Road at the Village of Aberfoyle	62 dBA

Since the existing right-of-way for Highway 6 and Brock Road ranges from 20 m to 45 m in the areas described, and residences, for the most part, have small setbacks (10-15 m), the noise levels cited are those calculated for the band closest to the highway right-of-way (ie., 35 m from centreline).

Identified Environmentally Sensitive Issues/Areas

Potential increases in noise levels are perceived as a significant environmental issue, particularly by residents outside the influence of the major existing transportation corridors. Any new route in these areas has the potential to increase noise beyond the 55 dBA objective which, in effect, would represent a doubling of perceived noise (10 + dBA increase). During the Update and Supplementary Investigations phase, the Telfer Glen Subdivision at Morriston emerged as a particularly sensitive area since new residents indicated that they had no prior knowledge of the project proposal.

4.2.3 Visual Aesthetics

Data Sources, Reliability and Information Gaps

An assessment of visual characteristics of the study area and the potential impacts associated with the proposed highway improvements was conducted by the Ministry of Transportation's Landscape Architecture Unit and generally encompassed all elements and relationships which influence the traveller's sight and associated responses. Equally important in assessing the aesthetics of the area is the perception of changes in the landscape by viewers living or working in the area. Therefore, the visual assessment of the identified route alternatives was related to:

(1) the view from the road; and
(2) the view of the road.

These elements were divorced from considerations of the cultural landscape which is addressed in Section 4.4.1 Heritage Resources.

View From the Road

The criteria used for assessing alternative views from the road included :

- Variety and frequency of spatial enclosure;
- Relationship of highway alignment and landscape character;
- Diversity of landscape types exposed to highway traveller;
- Number of specific visually positive and negative elements.

A quantitative, albeit subjective, assessment of the alternative routes under consideration was conducted to produce a relative ranking of the options.

View of the Road

A quantitative method was also developed to determine the relative visual preference as it relates to physical changes in the landscape. The criteria for assessing impacts as viewed from the surrounding environment are :

- The degree to which the proposed improvements respect the landscape.
- The number of viewers that could observe the degree of fit of the improvements to the landscape. A limit of 1 km was used in determining numbers.

Description

The study area is relatively small (15 km length) from a visual experience perspective (journey time through the area would be about 11 minutes). The limited types of landscape units (primarily agricultural and wetland) produce few variations in visual experience and, of the major ESA's available for viewing, only the Beverly Swamp is noted for its unique visual attributes. There are ample opportunities for active pursuit of scenic viewing on the Niagara Escarpment, a major visual attraction which is in close proximity to the study area.

Identified Environmentally Sensitive Areas/Issues

The character of landscape units is a major component of the highway environment with respect to viewer experience and behaviour. Viewer experience relates to the progression of landscape views, road alignment and cross-section, degree and frequency of enclosure caused by vegetation or topography, landmarks or significant natural or man-made features and the degree of 'fit' of the highway to the landscape.

The opposite, and normally more sensitive viewpoint is that of an observer of the facility and the degree to which the location and alignment is sensitive to the landscape. The perception of 'fit' is often influenced by what are considered the intrusive effects of change and, therefore, 'view of the road' is normally considered negatively. Alignment, road cross-section and landscaping that are sensitive to the character of the landscape can help to reduce the negative impact.

Due to the limited potential for variations in viewing experiences associated with route alternatives and the high potential for mitigating adverse visual impacts on adjacent properties, this factor was not a significant determinant in the route selection process.

Although visual assessments are, by definition, subjective in nature, quantitative values were attached to indicators within each criterion in determining relative preferences during the comparative analysis of route alternatives. These, along with the results of the assessment, are described further in Chapter 5 and Appendix H.

4.3 ECONOMIC ENVIRONMENT

4.3.1 Regional and Local Growth Strategies

Data Sources, Reliability and Information Gaps

Information regarding the nature, scope and phasing of future growth in the study area was garnered from provincial policy statements and guidelines related to mineral aggregate resource development (8) and the preservation of prime agricultural land (12) and from upper and lower tier municipal official plans and associated technical background documents (45,46,47,48). These sources were supplemented by discussions with provincial and municipal staff since most of the technical background is related to 1981 census material. In certain cases, discrepancies between upper tier and local municipal expectations for future growth emerged. In these cases reliance was placed on upper tier proposals since local planning strategies must conform to those of senior government. During the Update and Supplementary Investigations phase, new documentation related to the identification of future economic development needs in the area between Highway 401 and the south end of the City of Guelph were reviewed (62,63).

Description

The economic viability of the study area has traditionally been founded on agricultural sector activities supported by rural service centres and this has been reflected in the area's land base. However, its proximity to the larger urban centres of south central and southwestern Ontario has resulted in the influx of non-farm development, increased pressure for mineral aggregates and major transportation network changes which have substantially altered development patterns over the past two decades. These trends are reflected in current growth and development strategies proposed by both upper and lower tier municipalities. The senior municipalities include the

County of Wellington and the Regional Municipality of Hamilton-Wentworth; the respective area (local) municipalities involved are the Township of Puslinch and the Town of Flamborough.

County of Wellington and Region Hamilton-Wentworth

Both Wellington and Hamilton-Wentworth are strongly committed to supporting the growth of their respective agricultural communities and preserving prime agricultural land and environmentally sensitive areas in keeping with provincial policies and guidelines. However, both also recognize the demand for residential, commercial and industrial land in the Greater Toronto Area and embrace policies which generally direct such uses to rural settlement areas and encourage the infilling and expansion of existing villages and hamlets.

Wellington is expected to grow by approximately 0.5% per year until the year 2001 from its 1985 population of 140,000. It is anticipated that Hamilton-Wentworth will support a population in the order of 550,000 by 2001 which is a 30% increase over its 1985 population.

Township of Puslinch

Inventories conducted in association with preparation of the County of Wellington Official Plan indicate that, although agriculture continues to be the strongest force behind the economy of the Township of Puslinch, the trend towards industrial-commercial development and an increasing role as a bedroom/commuter community is apparent, as reflected by the following characteristics:

- Highest number of commercial and industrial properties outside incorporated towns and villages;
- Highest number of vacant industrial parcels outside incorporated towns and villages;
- Largest area of zoned industrial and commercial land outside incorporated towns and villages;
- Amongst the highest percentage of managerial, administrative and related occupations in the County;
- Highest average family income and per capita (employed) in the County.

The Township's official plan is based on a Year 2005 population of 6,344 (a 40% increase over the 1985 population) and reflects senior governments' agricultural and mineral aggregates protectionist policies. It directs growth primarily to the Aberfoyle-Morriston corridor, although Crieff and Puslinch are defined as hamlets as well (refer to Figure 4.2). However, the plan also recognizes that the growth potential of Aberfoyle and Morriston is limited due to servicing restrictions. In 1986, these two hamlets were to be the focus for all new residential, commercial, industrial and institutional development.

Industrial-commercial users outside Aberfoyle and Morriston will be encouraged to locate in two existing industrial parks flanking Highway 6 between Aberfoyle and Highway 401. In addition, the 1986 official plan identified, amongst others, the following Policy Areas which involve dual land use designations (refer to Figure 4.2).

Policy Area Number 3 - Lands lying to the north of Highway 401 located to the east and west of County Road 46 and south of the Township's two existing industrial parks were identified as Policy Area Number 3 in the Township's 1986 Official Plan.

These properties were given a dual designation of Agricultural and Industrial/Commercial. At such time as the Township is satisfied that the two existing industrial parks are approximately 75 percent developed, consideration will be given to the development of these parcels for Industrial/Commercial uses. Should a single user with unique site requirements that are not able to be satisfied by either of the two existing industrial parks wish to locate in this area, Council shall give serious consideration to the proposal and, if accepted, the development may proceed prior to the 75 percent completion of the two existing industrial parks.

A Policy Area 3 designation was also given to two large parcels of land to both the east and west of the Hanlon Expressway. Industrial development will be permitted to occur within this area should a suitable site be unavailable within the Industrial/Commercial designation, or within the Policy Area 3 lands adjacent to County Road 46. The sequence of development shall be further controlled so that the eastern side of the Hanlon Expressway develops first. The area to the west of the Hanlon Expressway will only be considered should no other suitable site be available in the Industrial designations or other Policy Area 3 areas.

Policy Area Number 4 - In January 1991, the Township of Puslinch completed an Economic Development Strategy Study (62) which defined a 580 ha area, bounded generally by Highway 401, the Hanlon Expressway, County Road 34 and the Brock Road corridor, within which the

short term economic activities of the Township should be concentrated (refer to Exhibit 4.2b). The study report also noted the following with respect to economic growth in the Township.

- The population of the Township will increase more quickly than projected in the 1986 Official Plan (20 year increase between 1986 and 2006 will be 50% resulting in a projection of 7,320);

- Based on labour force residency trends, 20% of the labour force living in the Township will work in the Township the remaining 80% will work in Guelph and elsewhere.

- Due to its strategic location relative to the Greater Toronto Area, Puslinch will be subjected to additional pressure to accommodate economic activity and population spillover from the GTA where 43% of the population growth in Ontario is expected to occur over the 1986-2011 project period.

In 1993, the Township implemented the recommendations of the Economic Development Strategy through enactment of Official Plan Amendment No. 7. This OPA established the Puslinch Economic Development Area (PEDA) and identified it as Policy Area Number 4. This area is to be the predominant location for economic activity in the Township but does not preclude the concentrations elsewhere in the Township.

Areas identified as 'Extractive' that are within the PEDA should be considered for industrial, commercial, institutional and/or recreational activities or natural areas as after-uses when the extractive or aggregate-related activities have either ceased or are incorporated into an after-use.

At the same time, the OPA deleted Policy Area No. 3 and established a single designation (Industrial/Commercial) for former Policy Area No. 3 Lands. OPA 7 also designated the Bridle Path and Fox Run Estates Subdivisions as part of the Aberfoyle Hamlet area.

Between 1988 and 1990, the County of Wellington, the City of Guelph and the Township of Puslinch and Guelph conducted a co-operative planning study to determine the future land needs of the City of Guelph. The study concluded that the City had insufficient industrial land to satisfy its economic growth objectives and would require additional lands (i.e., 400-600 ha) outside its existing municipal boundaries to meet those objectives. The concurrent Wellington County Study (63) indicated that the appropriate primary direction for Guelph's growth over the next 25 years would be to the south, towards the Highway 401 corridor in the Township of Puslinch, with a minor component of expansion to the north in Township of Guelph.

On April 1, 1993, as part of a broader Wellington County restructuring strategy, the City of Guelph annexed 1,740 ha of land from the two townships (1,400 ha from Puslinch), including 300 residents in 124 households. Annexed lands within the Highway 6 study area are shown in Exhibit 4.2b. The designated use of lands within this area has yet to be determined. However, the aforementioned Township of Puslinch designations will be supplanted and it is anticipated that there will be a significant residential component included in addition to the needed industrial lands. This municipal restructuring strategy was an important consideration in the development of Hanlon Expressway/County Road 34 interchange concepts during the Update and Supplementary Investigations phase of the study since it represented a major new growth area requiring access and transportation service infrastructure.

Town of Flamborough

The Region of Hamilton-Wentworth Official Plan suggests that the Town of Flamborough will experience only limited growth to the year 2001 with the focus of growth and development to be in the southern portion of the Town (Waterdown). The study area contains the northeasterly extreme of the Town's area and only 1 of 16 designated rural settlement areas (Freelton). A separate land use schedule for the Village of Freelton indicates that residential uses will predominate and expansion of existing settled areas will generally occur on the western (Carriage Heights, Centennial Heights), eastern (Wildan Estates Phase 2) and southern (Noble Kirk Farm) peripheries (refer to Figure 4.2a).

Outside the Freelton area, land use policies also reflect agricultural and conservation initiatives. The exception is a relatively extensive (140 ha) Rural Industrial designation on the west side of Highway 6 north of Freelton, which includes the existing Benson Chemicals plant. Permitted Rural Industrial uses include manufacturing-processing, warehousing, assembly, repairs and servicing which do not require municipal water and sewer services.

Identified Environmentally Sensitive Areas/Issues

The new highway facility will provide the potential benefit of providing impetus to municipal growth strategies by virtue of increased or improved access. However, any new route segment

must respect the potential effect of distorting or restricting growth patterns by either reorienting settlement area main access points or encroaching on rural settlement area boundaries.

In areas external to rural settlements, any new route may sterilize portions of or fragment industrial parcels. The Kerr and Nicholas Beaver Industrial Parks south of Aberfoyle and the Rural Industrial area north of Freelton were identified as major sensitive areas in this regard.

4.3.2 Industrial, Commercial and Agricultural Activity

Data Sources, Reliability and Information Gaps

The collection of information pertaining to existing and anticipated economic activity in the study area was oriented towards providing an insight into the effects of the Highway 6 route alternatives on business operations.

Existing land use was determined through reference to the municipal documents cited, interpretation of aerial photography at scales of 1:5000 and 1:10000, field investigations and discussions with study area property owners and municipal staff. This combination of sources provided a reasonably reliable record of existing conditions.

An appreciation of the status of business operations and possible expansion was gleaned from continuing discussions with property owners, business interests and municipal staff throughout the development and evaluation of route location and alignment alternatives. Particular attention was afforded agricultural operations (as the major economic contributor) and highway oriented commercial enterprises which could experience business loss resulting from passing traffic diverted to a new route (e.g., service stations, restaurants, convenience outlets, tourism/recreation establishments).

In the latter regard, thirteen active business operations located on Highway 6 south of Morriston and on Brock Road between Highway 401 and the City of Guelph were surveyed. The rationale for concentrating on this corridor is related to the study objective of relieving traffic operational problems on these two facilities. In addition, fully 50% of all active commercial industrial establishments in the study area are located on Highway 6 and Brock Road and of those which are not, virtually none may be classified as highway oriented.

The owners/managers of these establishments were either interviewed or provided comments at the June 20, 1985 information centre with respect to the nature of their operation and perceptions as to existing conditions and possible changes associated with introduction of a new highway route. The detailed results of the survey are included in Appendix B (October 4, 1985 memo to file).

Description and Identified Environmentally Sensitive Areas/Issues

i) Industrial

The major industrial activity in the study area is mineral aggregate extraction which is centred on the well sorted outwash gravel deposits of the Galt and Paris moraines flanking Highway 401 between Highway 6 and the Hanlon Expressway (refer to Figure 4.1). There are four major operators in this area who provided the following information relative to their operations in 1985.

Capital Paving

Owns a 40 ha site fronting on Concession Road 7 and has two accesses, one for service vehicles and one for visitor and employee parking. The east half of the property has been worked out and rehabilitated. A portion of this area is under water (polishing pond and primary settling pond).

The most recently active pit area (in the west central portion of the site) is no longer being worked and is currently under water to a maximum depth of about 12 m and an average depth of 6 m. When active, the pit was being dewatered (approximately 5 million gallons per day) to Galt/Mill (Aberfoyle) Creek which runs along the southern periphery of the property.

The only operations currently on site are the administrative activities in the office building and the asphalt plant in the northwest corner of the property. Aggregate is hauled 12 km from another pit to the site (via County Road 34 and Concession Road 7) for processing. On an annual basis, about 100,000 tonnes of aggregate are brought on site and an equal amount of asphalt shipped out (approximately 40 loads in and out on a daily average).

The major market is Kitchener-Waterloo (75% of finished product) which is accessed via Concession Road 7 - County Road 34 - the Hanlon and 401. The other demand is generated by Guelph and Hamilton in roughly equal proportions (haul route is County Road 34 to Brock Road).

There is a reserve on the property of approximately 400,000 tonnes in two non-contiguous areas which Capital wishes to maintain as reserve. The rehabilitation plan for the site appears to be based upon exhaustion of this reserve and would result in the creation of a substantial area of lakes. Possible post-rehabilitation uses include estate residential lots or aquaculture. Capital has approached the University of Guelph regarding an exchange of lands (Capital site for Guelph research in return for extraction rights on land south of 401/Hanlon) without much apparent success.

Capital considers the asphalt plant to be a long term operation and would prefer that any highway route through the property avoid this portion of the site.

Custom Aggregates/Dufferin Aggregates - began operating on the 73 ha site (located on the south side of Highway 401 south of the Hanlon Expressway interchange - see Figure 4.1) in 1970 and has a crushing operation producing an average of 500,000 tonnes of finished product annually. The material had been imported from a pit east of the study area via Sideroad 23. Extraction of the reserves on the western portion of the property commenced in 1986.

Extraction below the water table, when active, is by dragline. The pond at the rear of the property is 5 to 6 m deep and further excavation will be via new dragline technology which will permit work to a depth of between 15 and 18 m. Custom could not cite any figures with respect to the size of reserves on the property.

The finished products are hauled to Toronto and Oakville (80%) via Highways 401 and 6 and to Hamilton (20%) via Highway 6. Average daily traffic involves about 50-60 loads in and out. Production occurs between April and November, while distribution occurs throughout the whole year.

Of particular interest is the aquaculture operation on the site (Aberfoyle Fishery). This is a trout fishery, involving a number of small ponds and nine raceways in the north central portion of the site. There is also a processing plant adjacent to the raceways which accommodates either fresh or frozen packaging. The market is extensive (as far as Quebec) and includes the major supermarket chains. Production commenced in 1978, is currently is the order of 1 million pounds annually and is growing. This operation initially generated some complaints regarding impacts to local wells but these apparently have abated. Rehabilitation plans involve expansion of the fishery. (Note: In the latter stages of the study, Custom sold the property to Dufferin Aggregates but the Aberfoyle Fishery was retained as a separate operation.)

McNally & Sons - has been on their 56 ha site (located on the south side of Highway 401 west of Concession Road 7 -see Figure 4.1) since 1969. To date, extraction has been limited to Type A material, using a dragline operation below the water table. However, the property has been prepared to the point where they are ready to process a finished product.

About two-thirds of the property (west of Sideroad 25 South) is being held in reserve and is being farmed. No estimate of this reserve was offered but a figure of 10 million tonnes was suggested for the whole licensed area south of Highway 401.

There appears to be no fixed proposals for post-rehabilitation uses. However, cottage lots and aquaculture were mentioned as viable alternatives.

Haulage is via Concession Road 7, McLean Road, Brock Road to Highway 401 (75% to Toronto) and Highway 6 (25% to points south). It was suggested that this directional split will be reversed when processing of finished products commences since Burlington is a growing market. A figure of 200 loads per day (maximum) was mentioned, with the average being considerably lower. It is noteworthy that McNally's production figures to date have been somewhat erratic, based on annual variations in demand. The estimated extraction figure for 1984 was 100,000 tonnes.

There appears to be no major concern with the existing highway access from an operational standpoint but McNally is concerned with perceptions of trucking activities. More direct highway access would therefore be beneficial. Their other concern is that if a highway route is to cross aggregate producing lands, the material should be removed first (i.e., the resource should not be sterilized).

Telephone City Gravel (TCG) - indicated that its Aberfoyle operation (located at Concession Road 7 on both the north and south side of Highway 401 - see Figure 4.1) totals 156 ha north and south of Highway 401. The property was purchased from the previous operator in 1969. Access north of 401 is from McLean Road and Concession 7, while access to the pit south of 401 is from Concession Road 7. The major extraction activity occurs on the northern site. Blending sands (fines) are taken from south of 401 and the extreme northerly portion of the operation. The processing operation, which is located in the southwest portion of the northern holding, is geared to the redi-mix industry, although some raw materials are transported directly to other TCG operations (e.g., block sand to Burlington concrete products operation - formerly Cooke Concrete) or other buyers (e.g., Delta in Hamilton). No material is imported for processing.

TCG owns an additional property on the south side of Concession Road 2 west of Warren Bitulithic.

Approximately 500,000 tonnes of aggregates are extracted/processed annually. The number of loads leaving the site averages 75 daily. The Aberfoyle operation constitutes a significant proportion (25%) of TCG's aggregate activities, which include operations in Brantford, Fonthill and London.

Rehabilitation proposals include two major scenarios - recreational open space or 80 estate lots similar to those on Puslinch Lake. Both proposals involve exhaustion of existing reserves resulting in water over about 80% of the property north of Highway 401. The existing lake has been stocked with trout and bass. The clay knoll in the central portion of the property (to be retained as land area) has been rehabilitated.

During the Update and Supplementary Investigations phase, TCG essentially exhausted reserves north of Highway 401 and acquired the McNally & Sons site south of the Highway, following which intensive extraction operations were initiated and landscaping of the Highway 401 frontage commenced.

Dufferin Aggregates

During the Update and Supplementary Investigations phase of the study, Dufferin Aggregates and the University of Guelph (as lessee/operator and property owner respectively) obtained a licence and commenced operations to extract sand and gravel from the University lands in Concession II Puslinch south of the Highway 401/Hanlon Expressway interchange. During the same period, other lands in the immediate vicinity (Concession I fronting on Concession Road 2) were also designated for extraction and licensed (refer to Figure 4.1b for Warren Bitulithic and TCG sites). The estimated reserve on the University property is 20-30 million tonnes and extraction timeframe is expected to be in the order of 20 years, depending on demand. The area adjacent to and east of the highway interchange is within the section of the site scheduled for Phase I extraction. The pit site plan includes the required 60 m buffer area along the Highway 401 frontage and Dufferin has initiated landscaping (planting). The after-use plan includes two large lakes which will occupy the majority of the site area. Specific project concerns related to this site are described in Chapter 6.

In general terms, beyond the specific concerns cited above, the major issue for aggregate extraction operators relates to site access and circulation. Maintaining internal circulation through the provision of grade separations with a highway route crossing the site could introduce significant additional project capital costs. Similarly, providing the most direct access to major road systems is provincial policy and to frustrate such an initiative would be undesirable.

An additional common issue for pit operators is the maintenance of access between sites on the north and south sides of Highway 401, using the Concession Road 7 bridge over the Highway, since the new supply areas to the south still rely on processing plant to the north.

It is also important to note that as a result of the 1990 OMB decision on aggregate operations in this area, gravel truck traffic across the Highway 401 corridor is restricted to using the Concession Road 7 bridge (i.e. no truck traffic along Calfass Road through Morriston to existing Highway 6). Therefore, the bridge is also the only access to the major haul routes within the immediate area (Highway 401 and Highway 6).

The new operations are generating considerable truck traffic on Concession Road 7 bridge across Highway 401 (estimated by TCG at 500 trucks/day between March and November, with lower volumes during winter due to climatic constraints on construction and extraction activities). A review of peak hour truck volumes in the Warren Bitulithic Class A Licence Report suggests that there will be a very significant increase in traffic using the bridge once the new operations on the south side are fully under way. The peak hour truck volume in a 12-hour day will be 102 and other studies suggest that the peak hour factor for such operations is in the 12-13% range (i.e., 785 trucks per day). Most of the traffic will be generated by the Dufferin pit.

Other industrial enterprises in the study are limited in size (small manufacturing operations) and are located in two industrial subdivisions (Kerr and Nicholas Beaver) which contain 30 and 18 registered lots respectively and are largely unoccupied. Both are located north of Highway 401 with access oriented to Brock Road.

ii) Commercial

Commercial establishments are generally located in the existing Highway 6/Brock Road corridor in close proximity to Morriston and Aberfoyle and are highway oriented. The major operators at the time of the inventory were:

Brock Road

South Guelph . Pergola Inn

Aberfoyle . LeGault's Pioneer Country Restaurant/CANGO Gas Station
. The Village Bake Shoppe and General Store
. Aberfoyle Mill Restaurant
. The Yellow Brick House Restaurant (changed ownership and name since survey)
. Ted's Restaurant/Shell Gas Station
. PetroCan Service Station/Grand River Motors

Highway 6 South of Highway 401

Morriston . Swampman's Antiques
. Multiple Tenant Commercial Plaza
. Envers Restaurant
. Morriston General Store/Esso Service Station

During the Update and Supplementary Investigations phase, uses at the northwest corner of Calfass Road and Highway 6 (Huether's Garage and Hunger Hut) were displaced by a small plaza development which includes uses similar to the pre-development situation.

Of these, 80% depend to some extent on passing trade. Operators have indicated that about half of the highway oriented businesses in question could experience significant reductions in trade volume if large reductions in passing traffic are induced, especially in the Morriston area.

iii) Agricultural

Approximately 52% of the study area is used for active agricultural purposes. This is very significant relative to the amount of land which is not suitable for economic activities (i.e., wetlands) which is substantial. It is fair to say, therefore, that the primary economic activity in the study area is agricultural; the majority of the study area farmers rely on agricultural pursuits as their single sources of livelihood.

Puslinch Township, within which most of the area of concern is located, has the lowest proportion (59.4%) of land with potential for agricultural capability (CLI Classes 1 to 4) and the least good quality agricultural land of any area in Wellington County. Class 1 and 2 lands comprise 7% and 15% of the study area respectively.

There are two important points relative to Class 2 land in the study area. First, much of it is located in the Highway 401 corridor area and is currently occupied by other than agricultural uses (e.g., transportation, utilities, mineral extraction and other industrial and commercial uses). The land with the highest specialty crop potential (Class 2/Burford Loam soils) is also located in this general area. Second, much of the Class 2 land has limitations which reduce its capability for supporting common field crops. These include low moisture holding capacity, low natural fertility (due to the lack of available nutrients, high acidity or alkalinity, low exchange capacity, high levels of calcium carbonate or presence of toxic compounds) and excess water.

The amount of Class 4 land in the study area is negligible. Class 3 land generally comprises 50% Class 5 land with topographic and stoniness limitations as well as those limitations associated with Class 2 lands in the study area (i.e. low natural fertility and low moisture holding capacity).

The following provides an indication of the significance of agricultural activities relative to the indicators used to determine potential condition changes associated with the route alternatives. Priorities and levels of significance have been developed on the basis of discussions with the Ontario Ministry of Agriculture and Food (OMAF), municipal staff and Council, and study area agricultural operators.

Major Priorities

Although OMAF recognizes that not all agricultural resources can be avoided, the following receive the highest level of priority and have been assessed in the context of the provincial Foodland Preservation Guidelines.

Class 1 and 2 Lands - These classifications of land have the highest potential for agricultural production and, whether in production or not, should be avoided simply on the basis of reducing the amount of good quality agricultural land being consumed by non-agricultural uses.

Specialty Crop Lands/Livestock Operations - These elements normally represent the highest intensity use and level of capital investment and are, therefore, of most concern from strictly an economic perspective.

Specialty crops in the study area comprise market gardens and truck farms and are limited in extent. The major area of concern is the Butland farms elderberry operation straddling Highway 401 at Concession Road 7 (Note: this operation had been discontinued by the Update and Supplementary Investigations phase of the study).

In the order of 45 agricultural operations exhibiting some form of animal husbandry have been identified. There are five or six which are more prominent than the others. These are the cattle breeding and dairy operations on Highway 6 between Morriston and Puslinch Road 35, the Hollenbach purebred cattle/horse operation on Crieff Road, the McMillan operations on Concession Road 7 south of 401, and the Visser hog operation on County Road 34 at Concession Road 7.

During the Update and Supplementary Investigations phase, the Visser property was acquired by the Reid Heritage Homes group and the livestock operation was discontinued (including dismantling of farm buildings). The new owner has applied for a mineral aggregate licence for the majority of the site. The use of other agricultural properties remained relatively constant during the supplementary work, although there were indications that Long Lane Farms (Hollenbach) was downscaling its purebred horned Hereford operation to concentrate on its other major interest (purebred Trakehner horses). A detailed inventory of agricultural operations surveyed during the Update and Supplementary Investigations phase is included in Appendix J.

Large Blocks of Farms - Reducing the amount of farmland being taken out of production is directly related to maintaining the integrity of the larger operations because there is normally a high correspondence between the size of the operation and its economic viability in terms of economies of scale.

Farm Severance - This is related to the preceding point in terms of operational viability but is also related to whether the size, configuration and access of the severed parcels make them worth farming.

Other Considerations

The following are generally related to and should be considered in conjunction with the major priority elements.

Amount of Class 3 and 4 Land Out of Production - Relates to other high capability lands affected (besides Class 1 and 2) but it is not particularly significant in the study area for aforementioned reasons.

Main Equipment Routes Affected - Not extensive in the study area but very significant to large operators who rent several hundred hectares, particularly those involved in livestock who must move animals from block to block for feeding/breeding purposes, but also for those in large field crop operations. Crieff Road, Concession Road 7, County Road 34 and Brock Road north of Aberfoyle are sensitive routes. Road closures mean rerouting and new routes on existing rights-of-way mean providing wider shoulders for this use. Disruption of equipment routes can also result in major alterations in farm management practices.

Farm Main Accesses Affected - Related to the preceding but more concerned with access to the business headquarters and fields.

Farm Buildings/Structures Displaced - Primarily related to capital intensive uses but can be very significant to any operation when considered in terms of a) replacement cost; and b) short term economic viability.

Development Pressures - Will likely only be significant, in terms of changing land values, at intersection/interchange areas where there may be pressure to permit service functions. Not a primary determinant.

4.4 CULTURAL ENVIRONMENT

4.4.1 Heritage Resources

Data Sources, Reliability and Information Gaps

Within this element of the cultural environment component, consideration was afforded cultural landscape patterns as well as built environment features from historical and architectural perspectives. A detailed summary of the technical support document for this facet of the study is included in Appendix H.

Information included the results of previous similar investigations on a related project (WP 65-76-02), a windshield survey, archival/literature investigations and verbal and written communication with responsible and interested provincial agencies and public groups.

Responses to contact letters were received from the Ministry of Citizenship and Culture (now Culture, Tourism and Recreation), Flamborough LACAC, City of Guelph LACAC, Puslinch Township Clerk (in lieu of a LACAC), Ontario Agricultural Museum, Ontario Historical Society, The Architectural Conservancy of Ontario Inc., Beverly Heritage Society, Head of the Lake Historical Society, Puslinch Historical Society, Guelph Civic Museum, Wellington County Museum, and the local Women's Institute Tweedsmuir History. No response for the present study was received from the Guelph Township Clerk (in lieu of a LACAC), Millgrove Historical Society, Waterdown-East Flamborough Heritage Society, Wellington County Historical Research Society, or Wellington County Local Historical Council. Additional information was obtained from informal conversations which occurred during the course of the windshield surveys.

The content and level of detail of the information acquired for the investigation of historic, architectural and aesthetic heritage resources was considered appropriate for a route location and preliminary design study.

Description

i) Cultural Landscapes

Cultural landscapes are areas which reflect observable patterns indicative of man's activities over time, in terms of the use and physical appearance of land. In the study area, these patterns are created by the interplay of such components as physical features; land survey organization; transportation networks; land settlement, development and use; and the existence of communities (refer to Figure 4.3). Viewed from the modern context, those patterns which reflect longer-term development are of interest in the consideration of heritage resources. They provide an areal component of a "consultable record" of the study area's history and development. A number of built environment features may be located within a given cultural landscape area.

The study area is largely agricultural in nature, reflecting patterns of agricultural land use and development which originated from the early decades of the nineteenth century and the opening of the area to settlement. The original township surveys, which marked out lot and concessions for settlement and occupation purposes, are still evident in many areas, and continue to form the basis for most agricultural holdings in the study area.

These are especially noticeable along the surveyed lines of the local road system, or in open sections or areas of rolling terrain where they mark farm lot boundaries. They are frequently marked by vegetated fencerows, and in the more stoney sections, by rows of stone piles and mid-concession woodlots. A supporting pattern of field fencelines and tree rows exists, although in some of the more rolling areas, such as west of Morriston, or on the drumlins west of Freelton, regular field patterns have been compromised by the requirement of working on slopes. Large sections of swamp and wetland also create irregular patterns across the varied rectilinear survey patterns.

The local transportation network contributes to the variety of cultural landscape patterns within the study area. Most local roads are based on the original road allowances of the various land survey, the different orientations of which are reflected in numerous angled intersections. In several areas, the local road pattern has been interrupted by physical features. As well, the pattern has been affected by the introduction of Highway 401, where grade separations and road closures occur.

Historically, the most significant roadway in the study area is the old Brock Road (Highway 6 and Wellington County Road 46). From as early as 1805, when its predecessor, the "Aboukir" Road was little more than a winding trail, this route has served as the major transportation corridor between Lake Ontario and Guelph and areas north. Its operation as a commercial toll road through the second half of the nineteenth century, and the inclusion of the road north from Freelton in the 1920's as part of the provincial highway system, were reflective of its importance.

Other cultural landscapes of historical significance are the "clustered" communities of Freelton, Puslinch, Morriston, Aberfoyle, and Crieff. The first four of these communities developed along the old Brock Road, functioning as local as well as long-distance transportation service nodes. The economic prosperity of these communities peaked in the late nineteenth and early twentieth centuries. As the need for long-distance transportation service declined with the advent of the automobile, the communities became primarily residential in nature. Evidence of their former economic prosperity remains in several impressive nineteenth century commercial facades (Morriston, Aberfoyle), as well as in numerous fine stone, brick, and frame residences which date from various periods of the late nineteenth and early twentieth centuries.

The current Highway 6 bypass of Freelton acts to contain the historic community and reinforce its residential nature. Puslinch, once a thriving community focused on the Canadian Pacific Railway crossing at Highway 6, declined following the closure of the station and is now a relatively dispersed community. Morriston's historic focus on Highway 6 remains highly visible, as does that of Aberfoyle; the latter has retained its nineteenth century role as the focus of Puslinch Township's municipal government.

In addition to the communities along the old Brock Road, Crieff (located at Puslinch Road 35 (Crieff Road) and Sideroad 25) retains much of its nineteenth century atmosphere. This small "four corners" community developed to serve as a social and service centre for the surrounding Scottish agricultural community. It still retains its Presbyterian church and cemetery although services and shops, such as a blacksmithy and tailor, no longer exist, and the community's southeast corner is now vacant.

ii) Built Environment Features

Built environment features are generally individual and closely related groupings of buildings, and small or other landmarks, which have some degree of interest or significance by virtue of historic, architectural, or engineering associations. In the study area, they include individual residences, farmsteads (including groups of farmhouses, barns and/or other outbuildings), long-established churches, commercial buildings, and landmarks and areas such as cemeteries, monuments and parks. In several instances, former uses of these features are evident, such as schools which have been converted to residential use. In the study area, over two hundred built environment features were identified (refer to Figure 4.3).

Freelton, Puslinch, Morriston, Aberfoyle and Crieff each contain a unique collection of nineteenth and early twentieth century buildings and other features.

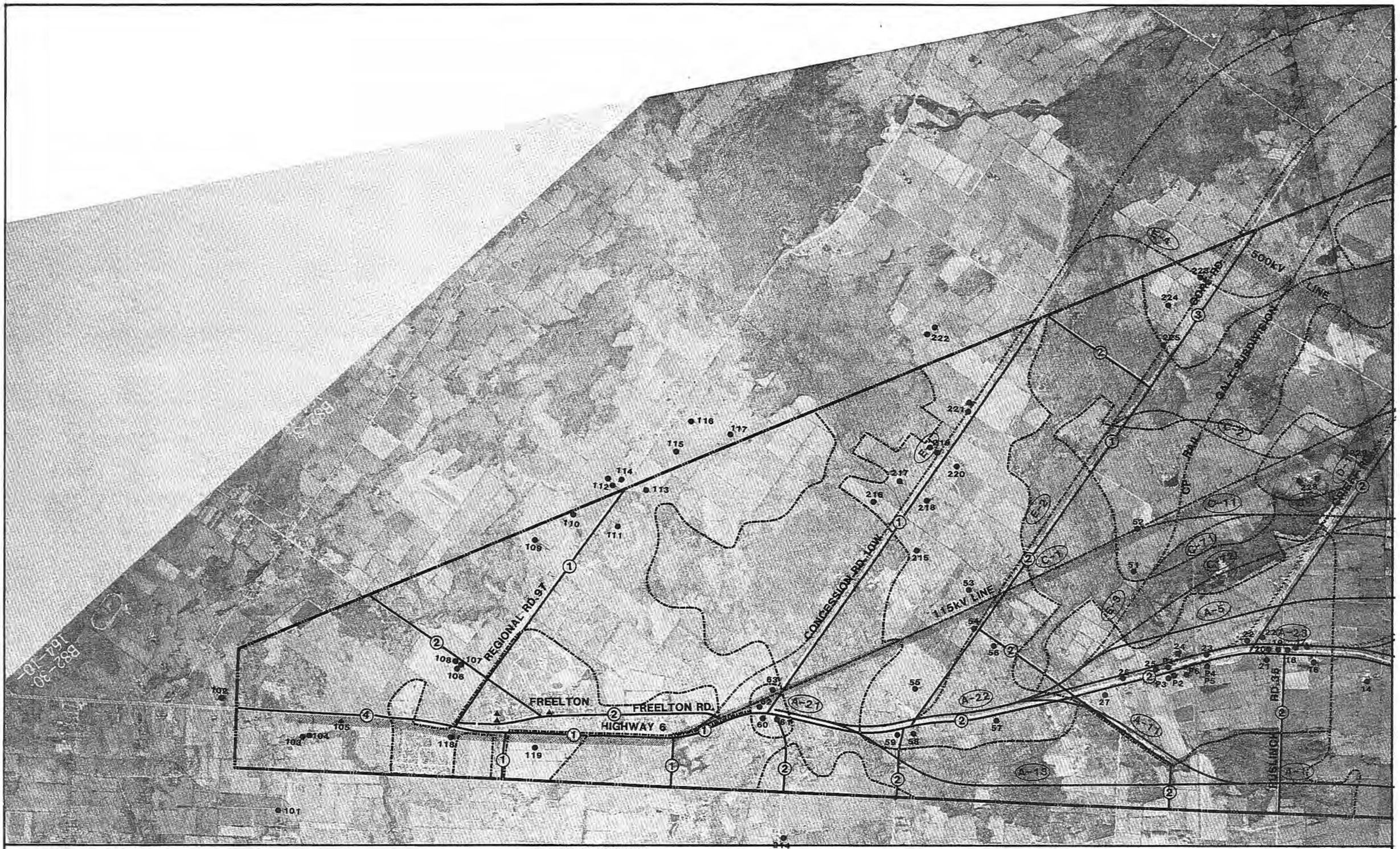
In the remainder of the study area, most built environment features are located within the dispersed pattern created by the area's agricultural development, or along the major through route, the old Brock Road.

The features are predominantly agricultural in origin and in present function, and include a wide variety of residential styles, farmstead buildings, and other features such as former schools. Most buildings in the study area, including in the various communities, are vernacular in nature, reflective of mid to late nineteenth century and early twentieth century architecture. Few original log residential or farm buildings remain.

Identified Environmentally Sensitive Areas/Issues

Cultural landscape areas and built environment features have been identified on their own merits within the context of the study area. No ordinal "ranking" of significance, or degree of interest, was made, as this would vary with the particular interests or perspectives of the individual observer.

However, an indication of the degree of impact was provided for each alternative. In terms of landscape areas and components, this provided a general indication of whether a route location



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 500 1000m

STUDY AREA BOUNDARY
(3) SCHOOL BUS ROUTE
INDICATES NUMBER OF ROUTES USING CORRIDOR
ONTARIO HYDRO CORRIDOR
BUILT ENVIRONMENT FEATURES
CULTURAL LANDSCAPE UNIT

NOTE: REFER TO APPENDIX H FOR VILLAGE CORE AREA DETAILS & NUMBERED BUIL ENVIRONMENT FEATURES

Figure 4.3 a

SCHOOL BUS ROUTES, MAJOR UTILITIES, HERITAGE RESOURCES



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE:
0 500 1000m

STUDY AREA BOUNDARY
(3) SCHOOL BUS ROUTE
INDICATES NUMBER OF ROUTES USING CORRIDOR
ONTARIO HYDRO CORRIDOR
BUILT ENVIRONMENT FEATURES
CULTURAL LANDSCAPE UNIT

NOTE: REFER TO APPENDIX H FOR VILLAGE CORE AREA DETAILS & NUMBERED BUIL ENVIRONMENT FEATURES

Figure 4.3 *b*

SCHOOL BUS ROUTES, MAJOR UTILITIES, HERITAGE RESOURCES

alternative would be expected to have "extreme", "major", "moderate", or "minor" impacts in terms of cultural landscapes.

Individual built environment features have been identified as having generally "exceptional", "moderate", "ordinary" or "minimal" heritage interest or significance, based on their known characteristics.

The communities of Freelton, Puslinch, Morriston, Aberfoyle and Crieff are very sensitive to the introduction of a new highway facility in their immediate vicinity or, for the first four, the upgrading or relocation of the existing highway through them. Impacts would be considered to be most significant where removals of long-standing and other buildings of heritage interest would be required. The degree of visual intrusion into the community would also be important, as would the effect of vibration and noise effects, and changes to the settings of the buildings.

Additionally, the first four communities are sensitive to the removal of their "main street" as a major or regional through transportation route.

This would interrupt the functional relationship between community economy and the road. A loss of a through route would be tempered by the removal of large volumes of heavy commercial vehicles, whose presence detracts from the small-community atmosphere which otherwise exists. This would also include any visual conflicts, noise and vibration problems which currently affect each community's heritage attributes.

The existing patterns and orientations of farm and field lots, local roads, and long-standing wetland areas, are sensitive to disruption. This would occur where an alternative would contrast visibly in orientation, or remove components which provide the existing pattern.

No built environment features were identified during the investigation, by either the Flamborough LACAC or the Puslinch Township Clerk (in lieu of a LACAC), as being designated under the Ontario Heritage Act.

In addition to the many buildings and other features grouped in the communities identified above, features of "exceptional" and "moderate" interest or significance are especially susceptible to direct impacts. Features of "ordinary" interest are less so, due to the replication of their characteristics through the area.

4.4.2 Archaeological Resources

Data Sources, Reliability and Information Gaps

Archaeological planning staff from MTO's Central and Southwestern Regions Environmental Units conducted a phased archaeological resources assessment to comply with conventional level-of-effort requirements in each of the Route Location and Preliminary Design phases of the study.

Investigations during the first phase involved a pre-survey literature search of Ministry of Culture and Communications (MCC) records to identify registered archaeological sites within the study area. The list of identified sites was considered provisional since the study area has never been fully surveyed and the information provided for each site was considered neither extensive nor fully accurate (i.e., the location of 2 of the 5 sites could not be determined from existing records and recorded inferences are limited). However, information on registered sites was considered sufficient to identify potential concerns with respect to encroachment by route location alternatives. MCC was subsequently contacted to supplement the available information for sites where a potential concern was identified.

During the Preliminary Design phase, an archaeological survey of the area affected by the proposed improvements was conducted, the results of which are contained in Appendix H. This entailed shovel testing at 10 m intervals within previously undisturbed portions of the right-of-way over the section of the existing highway to be widened (plus areas outside the right-of-way as required) and similar testing of the entire right-of-way over the section where a new route is proposed.

Areas which could not be assessed due to unsuitable conditions (insufficient light in woodlots) or denial of permission-to-enter are addressed in Section 6.3 Commitment to Further Work.

Description

The pre-survey literature search, conducted in 1984, revealed 5 registered archaeological sites as follows :

AiHa-4	Raymond Reid site
AiHa-6	Campbell site
AiHa-7	Hood site
AiHa-13	Scott site
AiHa-16	Schroeder-Elliott site

Two of these sites (AiHa-4 and AiHa-16) may have been affected by route alternatives and received additional attention.

The second phase investigation, conducted in July 1987, identified an additional registered site (AiHa-24; Segota site) and late nineteenth century artifacts on an adjacent property (Wright).

Identified Environmentally Sensitive Areas/Issues

Sites AiHa-4 and AiHa-16 contain midden deposits and a scattering of artifacts over extensive areas (1.2 ha and 2.5 ha respectively) suggesting use of the sites as Neutral Iroquoian villages.

4.5 TRANSPORTATION FACILITIES AND UTILITIES

Data Sources, Reliability and Information Gaps

Information relative to study area transportation facilities was extracted from MTO related studies and mapping supplemented by field reconnaissance. Details regarding utilities plant location, sizing and expansion proposals were obtained from aerial photography and topographic mapping and information supplied by the agencies and companies.

Description

4.5.1 Road Network

The various local roads, county roads and provincial highways within the study area are shown in Figure 4.4, as are existing and projected Average Annual Daily Traffic (AADT) volumes.

Provincial Highway 401

Highway 401 is a four-lane controlled access freeway and is the most heavily travelled route in the study area. It runs in an east-west direction 5 km south of the south city limits of Guelph. There are two major north-south roads providing access to Guelph from Highway 401 - Highway 6 (Hanlon Expressway) and County Road 46 (Brock Road).

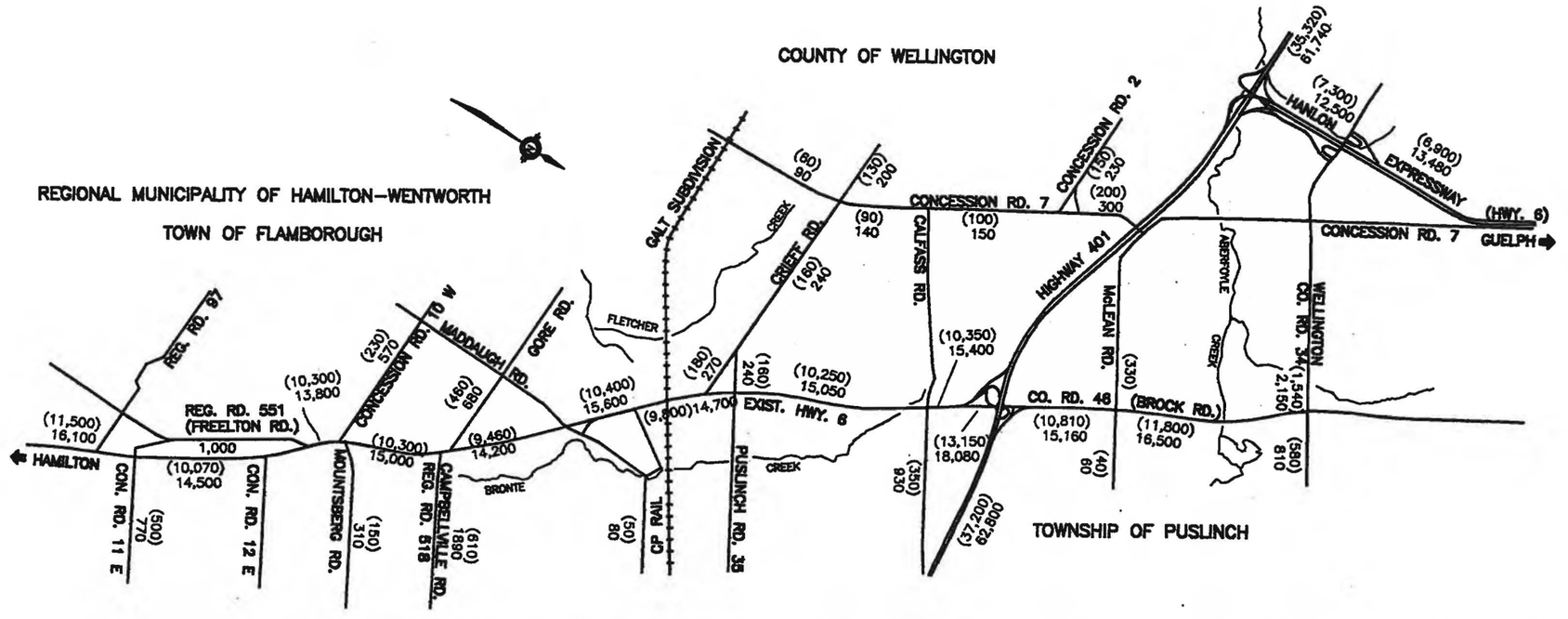
At the outset of this study, MTO's construction program in the study area suggested that improvements to the Highway 401 corridor would not be undertaken until after improvements to the Highway 6 corridor had been completed. However, more recent appraisals of transportation needs in the GTA and surrounding regions indicated that Highway 401 improvements should be given a higher priority. 1991 AADT volumes in the corridor were 65,600 and 2011 volumes are expected to be in the order of 93,600. Consequently, as outlined in Section 2.4.2 Related Studies and Projects, the timeframe for the widening of Highway 401 from 4 to 6 lanes through the study area has been accelerated and improvements are scheduled to be completed in 1996.

King's Highway 6

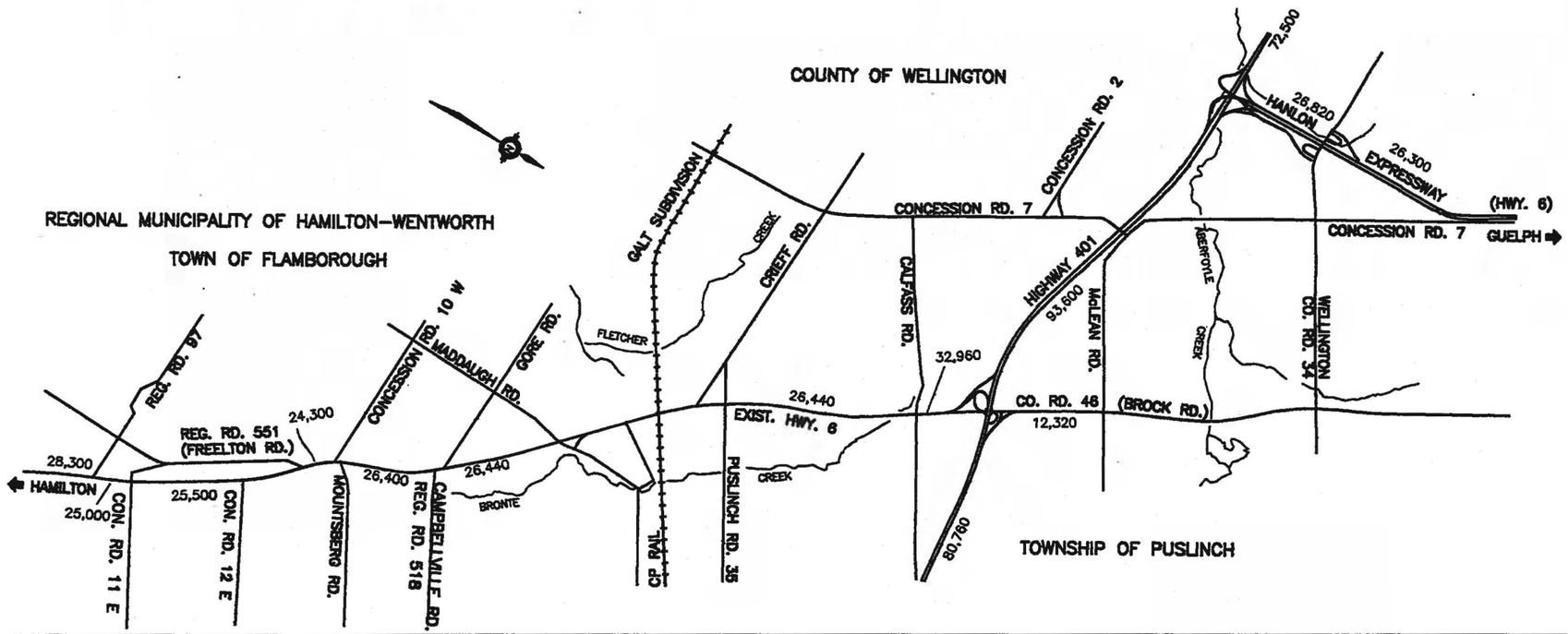
Highway 6 is a major connection between Highway 403 north of Hamilton and Highway 401 south of Guelph, carrying heavy traffic between Hamilton and the Kitchener-Waterloo, Guelph and Cambridge areas. Highway 6 also serves regular traffic to Owen Sound and the Bruce Peninsula.

EXISTING AADT

(0,000) 1984
0,000 1991



FORECAST 2011 AADT



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 4.4
EXISTING AND FORECAST TRAFFIC VOLUMES (AADT)

From Highway 403 northerly to Freelton, Highway 6 has been widened to four basic lanes. However, Highway 6 remains a two-lanes facility from Freelton to Highway 401. At the interchange with Highway 401 (southeast quadrant) there is a 150-space commuter park-and-ride lot owned and maintained by MTO.

Problems on the two-lane section include conflicts resulting from the mix of high speed regional traffic and local (turning) traffic, the high number of private accesses to the highway, and visibility difficulties created by geometric characteristics. Conflicts between local and through traffic are expected to increase. The through traffic along Highway 6 is increasing steadily and is expected to grow from the 1991 AADT volume of 15,000 to 26,400 by 2011. Local traffic is expected to increase further with new development in the area.

North of Highway 401, Highway 6, jogs along Highway 401 westerly to the Hanlon Expressway. The latter is a four-lane divided facility with at-grade intersections, the majority of which are signalized. There are reported peak-hour capacity problems along the expressway which, from initial reconnaissance, appear to be a result of undue constraints imposed by signal timing.

During the course of the study MTO Southwestern Region completed planning and design studies related to improving operations in the Hanlon corridor and has implemented a program for converting this facility to a fully controlled access highway, including replacement of existing intersections with interchanges and grade separations.

County Road 46 (Brock Road)

Prior to construction of the Hanlon Expressway, Wellington Road 46 was the Highway 6 route, and is, in fact, a tangential extension of the southerly section of Highway 6 north of Highway 401. It forms part of a continuous route to Guelph for Hamilton/Niagara traffic northbound on Highway 6 and is the first exit to Guelph for traffic westbound on Highway 401 from Toronto.

County Road 46 was previously a two-lane road with two additional lanes for a 0.9 km section through the Village of Aberfoyle. During the Update and Supplementary Investigations phase, 4-laning was introduced between Highway 401 and Aberfoyle. North of Aberfoyle and within Guelph, the older Highway 6 route is primarily two lanes with additional lanes through the central business district and in the north and south sections of the City.

There are capacity and operational difficulties on County Road 46, as the majority of traffic destined for Guelph (approximately 70%) from Highway 6 south currently uses this facility. Similarly, the majority of Highway 401 traffic destined for Guelph from the east uses County Road 46. One of the objectives of this study is to introduce improvements which will attract most of this traffic to the Hanlon Expressway.

Other Local Roads

The horizontal and vertical alignments of the township roads in particular have been controlled to a large extent by local topographic and groundwater conditions. Resultant problems include safety hazards created by steep vertical curves and hidden entrances.

Present Road Network Deficiencies

The deficiencies of the present Highway 6/County Road 46 route include poor level of service; high percentage of large commercial vehicles, and higher than normal maintenance costs. A more detailed appraisal of the road deficiencies is provided in Section 2.2 and Appendix L.

4.5.2 Public Transportation

Rail

Guelph is served daily by VIA Rail on the London to Toronto route. GO Commuter Rail service into Toronto originates in Georgetown 30 km east of Guelph. No rail service exists between the Guelph area and Hamilton.

The CP Rail Galt Subdivision crosses the study area and includes a small freight yard west of Highway 6 at Puslinch. Considerations with regard to any new rail crossings include ultimate track requirements, clearance envelopes and corridor access.

Intercity Buses

Guelph is served daily by inter-city bus to Hamilton. Daily bus service also connects Guelph with Toronto to the east and London to the west and Owen Sound to the north. GO Bus service

(7 trips daily) is provided between downtown Guelph and Yorkdale and York Mills rapid transit stations in Toronto via Brampton and a connection to the Georgetown GO Rail line terminus at Georgetown.

School Buses

The Project Team received information from three Boards of education serving the study area the Wellington County Board of Education, the Wellington County Separate School Board and the Wentworth County Board of Education. School buses operate extensively in the study area (refer to Figure 4.3). Only two elementary schools, Aberfoyle P.S. and Millgrove Unit School exist in the study area.

The majority of students in the study area are transported by school bus to schools outside the study area. The Wentworth County Board of Education buses running in the study serve eight elementary schools and four secondary schools. The Wellington County Separate School Board of Education runs buses in the study area to serve six of their schools and two private schools. Wellington County Board of Education buses serve two schools.

4.5.3 Utilities

The following utility companies were contacted and met with to ascertain the location of existing plant, any proposed expansion or improvements to existing facilities and significant relocation or plant modification requirements.

- Ontario Hydro
- TransCanada Pipeline
- Bell Canada (Hamilton, Kitchener)
- Union Gas Limited

Major utilities are shown in Figure 4.3. Generally, existing Hydro and Bell service lines parallel existing roadways and are normally overhead lines, often on common poles, although local underground cables do exist. Intersection and interchange illumination, for which MTO is responsible, exists on Highways 6 and 401 respectively.

Ontario Hydro has established a 115 kV corridor (easement) running in a northwesterly direction through the study area. This line diverges from the existing Highway 6 alignment north of Freelton, runs cross country and joins the Concession Road 7 alignment at Crieff Road. Hydro also has a major (500 kV) transmission line which enters the study area from the southwest, runs northeasterly and is located essentially parallel to Highway 401 from west of Brock Road. This is a bulk supply corridor between the Nanticoke GS and the Milton GS with 2-circuit capacity but only one circuit in operation. These lines are sensitive to new route or corridor expansion proposals in terms of possible tower relocation/redesign and vertical clearance requirements and cost implications. This is especially critical in the Highway 401 area due to the proximity of 500 kV towers, the width of the highway corridor and its effect on clearances. Tower maintenance is also a consideration with respect to access requirements by service vehicles.

There are no major municipal services, natural gas or petroleum product transmission lines crossing the study area. However, there are minor facilities, such as natural gas distribution lines running parallel to several roadway corridors (e.g. Union Gas along McLean Road and County Road 46).

4.6 SUMMARY OF IDENTIFIED ENVIRONMENTALLY SIGNIFICANT ISSUES

Table 4.6 provides a summary of study area concerns for the various factors investigated, as well as the agency or group which has vested interests or has expressed a specific concern.

TABLE 4.6

SUMMARY OF IDENTIFIED ENVIRONMENTALLY SIGNIFICANT ISSUES

FACTOR	SENSITIVITY	CONCERNED AGENCY/GROUP
	NATURAL ENVIRONMENT	
Geology/Geomorphology	Protection of mineral aggregate resource areas within the context of the Provincial Mineral Aggregate Resources Policy Statement.	MNR
	MTO is responsible for ensuring that reliable supplies of sand, gravel, crushed stone and earth borrow or fill are available for use in MTO highway construction and maintenance projects.	MTO
	5 major mineral aggregate extraction operations in the study area serve extensive Southern Ontario markets.	Pit Operators
	Galt Moraine and Freelton Esker are Earth Science ANSI's of provincial significance.	MNR
Soils	Areas of Class 1 and 2 agricultural capability are under pressure for conversion to non-agricultural uses.	OMAF Farm Operators Municipalities
	Moderate to high erosion potential on steep slopes accentuated in exposed cut sections (possible adverse impacts to surface water quality).	MNR MOEE Conservation Authorities
	Potential to encounter organic soils, which are extensive in study area.	MTO Geotechnical
Hydrogeology	Localized impacts to domestic wells (water quality, draw-down effects).	Residents MOEE
	Study area contains part of one of the best high quality aquifers in the Province, but ground water recharge areas susceptible to contamination.	MOEE MNR Municipalities
	Galt Moraine, including Crieff Old Field Complex, are important recharge areas.	MOEE
Hydrology	Potential alteration of hydrologic functions of provincially significant wetlands.	MNR Conservation Authorities
	Wetlands associated with West Bronte system are not provincially significant but serve important hydrologic function and enhance wildlife/fisheries habitat diversity.	HIRCA
	Specific concern over existing Galt/Mill Creek water quality.	MNR MOEE GRCA

[NR - Ministry of Natural Resources
[TO - Ministry of Transportation of Ontario
MAF - Ontario Ministry of Agriculture and Food
[OEE - Ministry of the Environment and Energy

GRCA - Grand River Conservation Authority
HIRCA - Halton Region Conservation Authority
HmRCA - Hamilton Region Conservation Authority
MCTR - Ministry of Culture, Tourism and Recreation

MMA - Ministry of Municipal Affairs
DFO - Department of Fisheries and Oceans
NTA - National Transportation Agency

TABLE 4.6 *(cont'd)*

SUMMARY OF IDENTIFIED ENVIRONMENTALLY SIGNIFICANT ISSUES

FACTOR	SENSITIVITY	CONCERNED AGENCY/GROUP
Hydrology (cont'd)	Number, location and type of new watercourse crossings and water quality in headwater areas of Galt/Mill, West Bronte, Spencer and Fletcher Creeks.	MNR MOEE Conservation Authorities
	Resolution existing drainage problems at Freelton.	Residents MTO, HIRCA
	Potential alteration of floodplain with modifications to County Road 34 profile.	GRCA
Fisheries	Concern over ongoing effects of Hanlon Expressway construction on Galt/Mill Creek habitat. Major capital investment program in effect to upgrade fisheries habitat.	DFO MNR GRCA Sportfishing groups
	Major brook/brown trout spawning areas identified by MNR on Galt/Mill, West Bronte Creek; headwater areas serve important function in controlling cold water stream quality for fisheries.	DFO MNR Conservation Authorities
	Potential impacts to fisheries resources require assessment within the context of the federal Fisheries Act and the MNR Fisheries Management Plan for Cambridge District.	DFO MNR
Forestry Resources	Class 1, 2 and 3 woodlots contain high productivity forestry resources, including firewood supplies, and wildlife habitat; larger specimens particularly valuable and difficult to replace. Scattered commercial plantations and the MNR Morriston Tract increase economic diversity and provide recreational opportunities.	MNR Residents
	Beverly Swamp represents boreal forest species at their southern limit in Canada.	MNR
	Potential for extensive forest management is low.	MNR
Environmentally Sensitive Areas/ Wildlife	Aberfoyle Woods, Crieff Old Field Complex, Galt Creek and Forest, Fletcher Creek Swamp Forest and Beverly Swamp are municipally designated ESA's; the latter three are provincially significant wetlands within the meaning of the Provincial Wetlands Policy Statement and the latter two are Life Science ANSI's.	MNR Hamilton-Wentworth Region Wellington County
	Aberfoyle Woods, Galt Creek and Forest, Fletcher Creek Swamp Forest, Beverly Swamp include extensive deer winter ranges and/or waterfowl areas.	MNR
	Potential impacts to habitat of West Virginia White Butterfly (rare/threatened species) (Lot 30 Concession 7 Puslinch)	MNR
Climate	Micro-climatic relief provided by woodlots, hedgerows, landforms for agricultural operations, residences. Winter maintenance implications (prevailing winds).	Residents MTO,OMAF

fNR - Ministry of Natural Resources
fTO - Ministry of Transportation of Ontario
)MAF - Ontario Ministry of Agriculture and Food
fOEE - Ministry of the Environment and Energy
GRCA - Grand River Conservation Authority
HIRCA - Halton Region Conservation Authority
HmRCA - Hamilton Region Conservation Authority
MCTR - Ministry of Culture, Tourism and Recreation
MMA - Ministry of Municipal Affairs
DFO - Department of Fisheries and Oceans
NTA - National Transportation Agency

TABLE 4.6 *(cont'd)*

SUMMARY OF IDENTIFIED ENVIRONMENTALLY SIGNIFICANT ISSUES

FACTOR	SENSITIVITY	CONCERNED AGENCY/GROUP
	SOCIAL ENVIRONMENT	
Communities	No major concerns in Freelton since it has previously experienced bypass effects.	
	Existing Highway 6 adversely affects Puslinch, Morriston, Aberfoyle in terms of integrity, safety; widening could exacerbate conditions.	Residents
	Village of Crieff and large seasonal recreational and institutional uses outside Hamlet areas (Mini-Lakes, Morriston Nursing Home, Crieff Hills Community) could experience adverse proximity effects with new route.	Residents Operators
	Potential alteration of farm community social linkages with modification of local road network, school bus routes.	Residents, Education Boards
	Displacement of rural, settlement area residences.	Residents, Municipalities
Noise	Existing and forecast Leq 24 noise levels in rural areas are typical (45 dBA) except in proximity to major transportation corridors.	Residents
	Existing and forecast Leq 24 noise levels in settlement areas on Highway 6 are higher than those typically experienced due to high traffic volumes and proportion of heavy commercial vehicles.	Residents
	Residential, recreational and institutional uses outside settlement areas will be particularly sensitive.	Residents Operators MOEE, MTO
Visual Aesthetics	Visual experiences in study area are not of particularly high quality except for Beverly Swamp ESA.	HmRCA, MNR, residents
	Individual residents and institutional/recreational uses in rural areas will be particularly sensitive to visual impacts.	Residents Operators MCTR
	Potential impacts to site screening, visual integrity of existing and proposed and gravel operations.	Pit Operators MNR

NR - Ministry of Natural Resources
TO - Ministry of Transportation of Ontario
MAF - Ontario Ministry of Agriculture and Food
OEE - Ministry of the Environment and Energy

GRCA - Grand River Conservation Authority
HIRCA - Halton Region Conservation Authority
HmRCA - Hamilton Region Conservation Authority
MCTR - Ministry of Culture, Tourism and Recreation

MMA - Ministry of Municipal Affairs
DFO - Department of Fisheries and Oceans
NTA - National Transportation Agency

TABLE 4.6 *(cont'd)*

SUMMARY OF IDENTIFIED ENVIRONMENTALLY SIGNIFICANT ISSUES

FACTOR	SENSITIVITY	CONCERNED AGENCY/GROUP
	ECONOMIC ENVIRONMENT	
Municipal	Expansion areas and industrial precincts external to settlement areas and potential assessment base effects; alteration of growth pattern resulting from community access modification.	MMA Municipalities
	Morriston, Aberfoyle expansion potential already limited due to servicing constraints.	Puslinch Township
	Protection of legally existing pits and quarries within the context of the Provincial Mineral Aggregate Resources Policy Statement.	MNR Pit Operators
Industrial/Commercial Operations	Maintenance of site and highway access, internal circulation is critical to mineral extraction operations; impacts to plant facilities (including Aberfoyle Fishery) and sterilization of economic resource (primary and after-use).	Pit Operators MNR
	Potential loss of business from passing traffic with new route, particularly in Morriston, for highway oriented establishments. Potential loss of business for institutional, recreational retreats due to proximity effects of any new route.	Operators
	Municipal tax loss resulting from displaced operations.	Municipalities
Agricultural Operations	Loss of Class 1 and 2 agricultural land irrespective of whether it is in production.	OMAF Farm Operators Municipalities OFA
	Encroachment on Specialty Crop/Livestock operations.	
	Severance of large farm blocks.	
	Amount of Class 3 and 4 land out of production; main equipment routes affected; main farm accesses affected, farm buildings/structures displaced; pressure for conversion of land to non-agricultural use.	
	Municipal tax loss resulting from displaced operations.	

MNR - Ministry of Natural Resources
MTO - Ministry of Transportation of Ontario
OMAF - Ontario Ministry of Agriculture and Food
MOEE - Ministry of the Environment and Energy
GRCA - Grand River Conservation Authority
HIRCA - Halton Region Conservation Authority
HmRCA - Hamilton Region Conservation Authority
MCTR - Ministry of Culture, Tourism and Recreation
MMA - Ministry of Municipal Affairs
DFO - Department of Fisheries and Oceans
NTA - National Transportation Agency

TABLE 4.6 *(cont'd)*

SUMMARY OF IDENTIFIED ENVIRONMENTALLY SIGNIFICANT ISSUES

FACTOR	SENSITIVITY	CONCERNED AGENCY/GROUP
	CULTURAL ENVIRONMENT	
Built Environment	No features designated under Ontario Heritage Act.	MCTR
Cultural Landscape	Communities and rural property delineation features.	MCTR Residents
Archaeological Resources	5 registered sites of undetermined location and significance are situated in study area; detailed assessment required during subsequent design phases for potentially affected sites.	MCTR MTO
	TRANSPORTATION FACILITIES & UTILITIES	
Road Network	Existing concerns include under-utilization of the Hanlon Expressway, and low levels of service on Brock Road and Highway 6 south of Highway 401, due primarily to turning movements.	MTO
	Other problems include higher than average accident rates in Morriston and on the Hanlon due to regional and local traffic conflicts.	MTO Commercial Carriers Commuters Residents
	Shoulder and side ditch maintenance.	MTO
	Local roads exhibit existing geometric deficiencies due to topographic and drainage constraints; network continuity is a concern in terms of potential road closures.	Municipalities MTO
Public Transportation	Alteration of school bus and intercity bus service.	Education Boards Operators Local Users
Rail	Crossings must respect ultimate track requirements, clearance envelopes, corridor access.	CP Rail NTA
Utilities	Existing Hydro and Bell service on existing Highway 6 and local roads may be affected by widening, new route (relocation, service disruption).	Hydro, Bell Users
	Impacts to Ontario Hydro 115kV and 500kV corridors (tower relocation, maintenance access; vertical clearance).	Hydro
	Impacts to gas distribution lines	Union Gas

NR - Ministry of Natural Resources
TO - Ministry of Transportation of Ontario
MAF - Ontario Ministry of Agriculture and Food
OEE - Ministry of the Environment and Energy

GRCA - Grand River Conservation Authority
HIRCA - Halton Region Conservation Authority
HmRCA - Hamilton Region Conservation Authority
MCTR - Ministry of Culture, Tourism and Recreation

MMA - Ministry of Municipal Affairs
DFO - Department of Fisheries and Oceans
NTA - National Transportation Agency

REFERENCES

1. Ontario Geological Survey, 1982. "Aggregate Resources Inventory of Puslinch Township", Aggregate Resources Inventory Paper 54.

2. Ontario Geological Survey, 1984. "Aggregate Resources Inventory of The Regional Municipality of Hamilton-Wentworth:, Aggregate Resources Inventory Paper 50.

3,4. Ministry of Natural Resources, Puslinch and Flamborough Fish and Wildlife Resources and Natural Areas, 1980. 1:50,000 scale resource inventory mapping, (1989 Revisions).

5. MTO Remote Sensing Section Memo - K. Ganesh to H. Vanderkooij, 85-06-17.

6. Chapman, L.J. and D.F. Putnam, 1966, The Physiography of Southern Ontario. Ontario Research Foundation, Toronto.

7. Karrow, P.F.P., 1963, The Pleistocine Geology of the Hamilton-Galt Area. Ontario Dept. of Mines, Geological Report No. 16.

8. Ministry of Natural Resources "Mineral Aggregate Resource Planning Policy", Toronto, Approved May 1986.

9. Hoffman, D.W. et al, 1963. "Soil Survey of Wellington County", Report No. 85 of the Ontario Soil Survey. Research Branch, Canada Dept. of Agriculture and the Ontario Agricultural College, Guelph.

10. Presant, E.W. et al, 1965. "The Soils of Wentworth County:, Report No. 32 of the Ontario Soil Survey. Research Branch, Canada Dept. of Agriculture and the Ontario Agricultural College, Guelph.

11. Research Branch, Canada Dept. of Agriculture and the Ontario Agricultural College. "Soils Capability for Agriculture", 1:50,000 National Topographic series, sheet 40 P/S East Half (Galt).

12. Ministry of Agriculture and Food "Foodland Preservation Policy Statement" (proposed), Toronto, February 1986.

13. Gartner Lee Associates Limited, 1986. "Groundwater Resources of the Township of Puslinch", Toronto.

14. Ministry of the Environment, 1979. "Water Well Records for Ontario: Brant, Hamilton-Wentworth, 1946 - 1976", Water Resources Bulletin 2-29 Ground Water Series, MOE Water Resources Branch, Toronto.

15. Ministry of the Environment, 1982. "Water Well Records for Ontario: Brant, Hamilton-Wentworth, 1946 - 1976", Water Resources Bulletin 2-29 Ground Water Series, MOE Water Resources Branch, Toronto.

16. Ministry of the Environment, Station Detail Report, Station 16-0184-059-02 (unpublished PLUARG data).

17. MacLaren Engineers, 1982. Floodline Mapping: Galt Creek and Irish Creek. Report to the Grand River Conservation Authority, London.

18. Gartner Lee Associates Limited, 1980. "University of Guelph Hydrogeological Study for a Proposed Sand and Gravel Pit". Report to the University of Guelph.

19. FaunAquatics Canada Ltd., 1981. "Galt Creek Study: University of Guelph Property, Puslinch Township". Report submitted to Planning Initiatives, Guelph.

20. Ministry of Natural Resources, 1983. "Cambridge District Land Use Guidelines".

21. Imnof, J.G. et al, 1987. "Long Term Impacts of Highway Construction on Mill Creek". Fisheries Branch, MNR, Toronto.

22. Portt, C. et al, "An Assessment of the Bronte Creek watershed with Recommendations for Salmoind Management". MNR Cambridge District.

23. Beak Consultants Ltd., 1980. "Rare Threatened and Endangered Fish Species of Southern Ontario: Status Reports".

24. Yerex, W.H., 1984. "Summary Report of Galt Creek Rehabilitation Programmes 1982 - 1984". Grand River Conservation Authority.

25. Holmes, J.A., 1984. Unpublished fisheries field inventory in the Hamilton Region Conservation Authority watershed.

26,27. Ministry of Natural Resources, 1980. Puslinch and Flamborough Fish & Wildlife Resources: Natural Areas (Scale 1:50,000) (1989, 1984 Revisions).

28. Rowe, J.W., 1972. Forest Regions of Canada. Canadian Forestry Service, Publication No. 1300.

29,30. Ministry of Natural Resources, 1980. Puslinch and Flamborough Forestry Resources. 1:50,000 resource inventory mapping.

31. ARDA. Canada Land Inventory (Capability for Forestry). 1:250,000 scale mapping.

32. Argus, G.W. and D.J. White, 1977. The Rare Vascular Plants of Ontario. Syllogeus No. 14, National Museum of Natural Sciences, Ottawa.

33. Campbell, C.A. and L.E. Lamb, 1984. A preliminary annotated list of the plants of Regional Municipality of Waterloo, Ontario.

34. Kershaw, J.L., 1976. "A Phytogeographical Survey of Rare, Endangered and Extinct Vascular Plants in the Canadian Flora. M.Sc. Thesis, University of Waterloo, Waterloo, Ontario.

35. Eagles, P., W. Elrick, D. Foster, S. Muirhead, M. Stewart, J. Van de Hulst, and C. Waterston, 1976. "South Wellington Environmentally Sensitive Areas Study". Centre for Resource Development. Publication No. 79.

36. (Note copy unclear).... Hamilton-Wentworth Region Environmentally Sensitive Areas Study".

37. Wormington, A., 1976. "Hamilton-Wentworth Region Environmentally Sensitive Areas Field Studies".

38. Paton, D.G. and M.J. Sharp, 1979. "A Biological Inventory of Halton Region Conservation Authority Properties". Halton Region Conservation Authority.

39. Halton Region Conservation Authority, 1980. "A Biological Inventory of Halton Region Conservation Authority Properties".

40. Halton Region Conservation Authority, 1981. "A Biological Inventory of the North Half of Lot 1 Conc. IX, Township of Flamborough".

41. Ontario Ministry of Natural Resources and Environment Canada, 1984. "An Evaluation System for Wetlands of Ontario South of the Precambrian Shield". Second Edition, January 1985.

42. Brown, D.M., G.A. McKay and L.J. Chapman, 1980. "The Climate of Southern Ontario". Climatological Studies Number 5. Environment Canada AES, Toronto.

43. Environment Canada, 1982. "Canadian Climate Norms, 1951 - 1980", Volumes 2 (Temperature), 3 (Precipitation) and 5 (Wind). Atmospheric Environment Service.

44. Official Plan of the Township of Puslinch (Draft July, 1986; Enacted September 1986).

45. Town of Flamborough Official Plant (Draft). 1986.

46. Wellington County Official Plan (Draft). March 1985.

47. The Regional Municipality of Hamilton-Wentworth Official Plan. September, 1982.

48. Ministry of Transportation of Ontario, Ministry of the Environment, 1986. "A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments.

49. Ministry of Transportation of Ontario, 1987. "Noise Policy and Acoustic Standards for Provincial Highways", Provincial Highways Directive A-1 (Effective 87-10-01).

50. Ontario Task Force on Provincial Rail Policy, 1981. "The Future Role of Rail", Toronto.

51. Ministry of Transportation of Ontario, 1987. "Hanlon Expressway Assessment Study". Southwestern Region Planning and Design, London.

52. Kobriger, N.P. et al, 1984. "Effects of Highway Runoff on Wetlands (Final Report)". Prepared under the National Highway Research Program for the Transportation Research Board of the U.S. National Research Council.

53. Mathers, J.S., 1978. "The Effects of Highway Construction on Galt Creek, Ontario". Ontario MNR and MTC, Toronto.

54. Ontario Ministry of Natural Resources, 1978. Forest Resources Inventory (FRI) Mapping.

55. Argus, G.W., Pryer, K.M., White, D.J. Keddy, C.J. 1982-87 Atlas of Rare Vascular Plants of Ontario, Botany Division, National Museum of Natural Sciences.

56. Riley, J.L. 1989. "Distribution and status of the vascular plants of Central Region". Ontario Ministry of Natural Resources. Parks and Recreational Areas Section, Central Region, Richmond Hill, Ontario.

57. Dodge, D.P., G.A. Goodchild, I. MacRitchie, J.C. Tilt and D.G. Waldriff, 1984. "Manual of Instructions - Aquatic Habitat Inventory Surveys". Official Procedural Manual Policy Fl. 2.03.01, Seventh Edition (Revised) - April 1985, Ontario Ministry of Natural Resources, Fisheries Branch, Toronto.

58. Ministry of Natural Resources, 1976. Unpublished Stream Survey records - Galt Creek.

59. Hamilton Region Conservation Authority, 1973. Unpublished Stream Survey records - Fletcher Creek.

60. Yerex, W.H. 1985. Brown trout spawning survey report for Galt Creek, 1984. Grand River Conservation Authority.

61. Dorfman, M.L., Planner Inc. "Township of Puslinch Economic Development Strategy". January, 1991.

62. "Wellington County Study: Future Land Needs City of Guelph". Wellington County Planning and Development Department, July 27, 1990.

63. Ontario Government, 1992. Policy Statement on Wetlands issued under the authority of Section 3 of the Planning Act 1983, approved by the Lieutenant Governor in Council Order No.1448/92, May 14, 1992.

64. Ontario Ministry of Natural Resources and Ministry of Municpal Affairs, 1992. Manual of Implementation Guideline for the Wetlands Policy Statement.

65. Fenco Engineers Inc., Environmental Technical Paper No.6, Supplementary Field Studies on Selected Alignment, Natural Environment, Toronto, Ontario.

66. Gore & Storrie Limited, 1990. A vegetative study and butterfly search along Highway 403 Ancaster to Brantford and Highway 6 Maddaugh Road to Highway 6 - County Road 34 Interchange. A report prepared for the Ministry of Transportation, Central Region, Ontario.

TABLE OF CONTENTS

Page

5.0 DEVELOPMENT & EVALUATION OF PROJECT ALTERNATIVES

5.1 Introduction 5-1

5.2 Evaluation Criteria 5-1
5.2.1 Identification of Analysis and Evaluation Factors 5-1
5.2.2 Analysis and Evaluation Procedure 5-3

5.3 Reasonable Alternatives to the Undertaking 5-3
5.3.1 Modal Alternatives 5-3
5.3.1.1 Do Nothing 5-3
5.3.1.2 Commuter Rail and Bus Service 5-4

5.4 Alternative Methods of Carrying Out the Undertaking 5-5
5.4.1 Upgrading of Existing Municipal Road Network 5-5
5.4.2 Corridor Concepts 5-7
5.4.2.1 Development of Corridor Concepts 5-7
5.4.2.2 Screening of Corridor Concepts 5-8
5.4.3 Route Location Alternatives 5-8
5.4.3.1 Preliminary Development of Route Location Alternatives 5-8
5.4.3.2 Refinement of Route Location Alternatives 5-11
5.4.3.3 Description of Alternatives Selected for Detailed Analysis and Evaluation 5-14
5.4.3.4 Rationale for the Selected Route Location Alternative 5-16
5.4.4 Alignment Alternatives (Initial Recommendations) 5-20
5.4.4.1 Preliminary Assessment of Alignment Alternatives 5-20
5.4.4.2 Refinement of Alignment Alternatives 5-23
5.4.4.3 Rationale for the Selected Alignment 5-24
5.4.5 Update and Supplementary Investigations - Alignment and Interchange Alternatives 5-28
5.4.5.1 County Road 34 Interchange Alternatives 5-28
5.4.5.2 Crieff Road to Highway 401 Alignment Alternatives 5-39

5.0 DEVELOPMENT & EVALUATION OF PROJECT ALTERNATIVES

TABLE OF CONTENTS *(cont'd)*

		Page
5.5	Special Studies	5-40
	5.5.1 Interchange Configurations at Hanlon Expressway/ County Road 34 (Initial Recommendation)	5-41
	5.5.2 Hanlon Expressway/County Road 34 Drainage Strategy (Initial Recommendation)	5-51
	5.5.3 Intersection Arrangement at Highway 6 and Campbellville Road/Gore Road	5-51
	5.5.4 Crieff Road/Highway 6 New Intersection Treatment	5-53
	5.5.5 Interchange Configurations at Calfass Road/ Connection Road/Highway 6 New	5-54
	5.5.6 Highway 6 Parallel to Highway 401	5-55
	5.5.7 Directional Ramp from Hanlon Expressway to Highway 401E	5-56
	5.5.8 Hydraulic Impact Study for Highway 6/401 N-E and W-N Ramps	5-56
	5.5.9 From Highway 6 South to Highway 401 East Ramp	5-57

5.0 DEVELOPMENT AND EVALUATION OF PROJECT ALTERNATIVES

5.1 INTRODUCTION

This Chapter provides a description of the reasonable alternatives to the project and alternative methods of carrying out the project which were investigated.

It also documents the related analysis (screening) and evaluation process in order to demonstrate that all associated positive and negative effects have been studied and that the net effect of implementing the selected alternative is more beneficial than non-implementation.

The following levels of study are documented, entailing the appropriate scope of alternative development, analysis and evaluation:

i) Modal
ii) Corridor
iii) Route Location
iv) Alignment

In addition, the bases for the analysis and evaluation of alternatives (evaluation criteria) are described, as is the evaluation process, including the weighting of factors and rating of route location alternatives.

The analysis and evaluation of alternatives are outlined in matrix form in Appendix E, providing a concise summary of the narrowing down of the range of alternatives and the size of the study area at each level of investigation.

5.2 EVALUATION CRITERIA

5.2.1 Identification of Analysis and Evaluation Factors

As alluded to in Section 2.3.2, the project objectives, as determined from identified transportation problems and perceived project benefits, formed the initial basis for conducting the analysis and evaluation of alternatives and served as the departure point for developing detailed evaluation criteria.

The detailed evaluation criteria emerged through consultation with, and concerns identified by, the key study participants, namely:

- Project Team
- Technical Committee/Municipal Staff
- Steering Committee
- External Team
- Internal Team
- Public and Interest Groups

Input was garnered through regularly scheduled meetings, as-required working sessions and formal presentations (refer to Section 3.2).

The concerns identified by study participants were assembled and consolidated within seven major factor groups as follows:

1. Service to the Public
2. Natural Environment
3. Social Environment
4. Economic Environment
5. Cultural Environment
6. Engineering
7. Cost

Within each group, analysis/evaluation factors and associated indicators of potential condition changes were outlined and cross-referenced with identified areas of concerns, and adopted as the Evaluation Criteria for both the route location and preliminary design facets of the study. Both direct short term and long term potential condition changes and resultant effects have been considered. A breakdown of the Evaluation Criteria is presented in Table 5.1.

The elements contained in the Evaluation Criteria have been derived from both established guidelines for impact analysis and evaluation (e.g. M.O.E. Guidelines for Construction of Highways and Bridges, March 1984 and M.T.C. Environmental Reference Book, February 1984) and concerns expressed by study participants on a project specific basis. Although the

TABLE 5.1

EVALUATION CRITERIA

Factor Group	Factor	Initial Weighting	Final Weighting	Indicator
Service to the Public	Traffic Service	14	14	• County Road 46 congestion • Hanlon Expressway utilization • Residual through traffic on Highway 6 south of Highway 401 • Highway 6 continuity
	Convenience	3	3	• Clarity of signage • Retention of individual property access • Local road access • New private accesses required
	Safety	6	17	• Private access configuration • Intersection configuration • Highway geometrics • Vehicular/pedestrian conflicts
	Sub Total	**23**	**34**	
Natural Environment	Geological Resources	2	1	• Selected Sand and Gravel Resource Areas Selected Bedrock Resource Areas • Earth Science Areas of Natural and Scientific Interest • (ANSI)
	Forestry Resources	4	3	• Class 1 and 2 woodlots • Woodlands Improvement Act areas
	Wildlife and Vegetation	10	7	• Deer habitat and migration corridors • Provincially significant wetlands • Life Science ANSI's
	Aquatic Resources	4	3	• Major fish nursery areas • Water quality (surface/ground water)
	Sub Total	**24**	**17**	
Social Environment	Communities	4	8	• Hamlet integrity/expansion • Community services • Inter-urban/rural-urban links • Residences displaced
	Noise	5	7	• Sensitive uses experiencing increases in 24 Leq levels • Sensitive uses experiencing reductions in 24 Leq levels
	Aesthetics	1	2	• View of the road • View from the road
	Sub Total	**10**	**17**	

TABLE 5.1

EVALUATION CRITERIA *(cont'd)*

Factor Group	Factor	Initial Weighting	Final Weighting	Indicator
Economic Environment	Agriculture	15	10	• Class 1 and 2 lands required • Class 3 and 4 lands out of production • Total farm property required • Total active land required • Number of operations affected • Capital intensive uses affected • Large blocks affected • Severances created • Main equipment routes/access affected • Farm buildings/structures displaced • Development pressure exerted
	Other Business Activities	5	4	• Number/type • Access circulation • Buildings/employees displaced
	Sub Total	**20**	**14**	
Cultural Environment	Built Environment and Cultural Landscape	3	3	• Exceptional/unique features directly/ indirectly affected Landscape features/patterns disrupted •
	Archaeological Resources	1	1	• Registered sites directly/indirectly affected
	Sub Total	**4**	**4**	
Engineering Environment	Construction Implications	4	4	• Road, rail traffic disruption • Staging requirements • Extraordinary construction requirements • Utilities relocation
	Sub Total	**4**	**4**	
Cost	Capital Cost	15	10	• Construction • Property • Utilities relocation
	Sub Total	**15**	**10**	
	TOTAL	**100**	**100**	

Evaluation Criteria were not modified significantly for use in the Update and Supplementary Investigations phase, their use in this latter part of the study did account for the recent policies and guidelines cited in Chapter 4 of this report.

Inherent in the consideration of potential adverse impacts associated with project implementation is the significance of such impacts and the extent to which they may be mitigated. Significance relates to both importance in a local, regional or provincial context and importance relative to other identified sensitive areas and issues. In the latter regard, external agencies were requested to establish a preliminary order of priorities for elements within their mandate (refer to correspondence in Appendix B).

5.2.2 Analysis and Evaluation Procedure

The route location and alignment selection process for this project entailed a comprehensive comparative analysis and iterative evaluation of all the alternatives which were developed.

Comparative Analysis

The analysis involved determination of a full range of potential condition changes associated with the implementation of the route location alternatives under consideration in accordance with the established evaluation criteria. Impacts and resultant effects were assessed on the basis of their magnitude, duration, significance and mitigation potential.

The level of detail involved conformed with the study juncture at which the analysis and evaluation were applied (i.e. coarse during the initial corridor/route alternatives screening to very intensive during preliminary design of the selected alternative).

Evaluation Procedure

The first phase of the route location evaluation procedure involved the weightings of the identified factors to establish their priority for the purpose of rating the alternatives. In preparation for the factor weighting session, Project Team members received a Briefing Package comprising a consolidated summary of the significance of the various factors in the route location exercise as detailed in Chapter 4 of this report. The Briefing Package was also forwarded to the Technical Committee and External Team members (upon request) for their comments.

Project Team members then proceeded to indicate individual weighting preferences for the 17 factors used in the route location analysis and evaluation exercise. Following further discussion and appropriate adjustments, the scores were averaged and adopted as the weightings for the route location evaluation. These were eventually either endorsed or modified as a result of discussions with other study participants. The route location factor weightings are presented in Table 5.1.

Because of the number of sub-alternatives involved, a staged evaluation procedure was employed to obtain a more manageable set of alternatives between Freelton and the Hanlon Expressway. A 22-link road network was analyzed and evaluated in 7 stages to the degree where four major route location alternatives were compared in the final stage of the exercise.

The alternatives under consideration in each stage were rated (scored) relative to 17 factors by each team member. The scoring of alternatives for each factor was based on a "10 point must" system whereby the alternative which best satisfied the project objectives received a score of 10 with the other(s) being indexed from 0 to 10. The established factor weightings were subsequently applied to the factor scores which were then totalled, again by each team member. The total weighted scores were tabled for observation and discussion and a consensus was reached as to the technically preferred alternative.

The briefing package, summary analysis and scoring summaries are on file with MTO Central Region. Additional details relative to the evaluation procedures are included in Appendix E.

The results of the comparative analysis and evaluation of modal, corridor, route location and route alignment alternatives, indicating the various associated levels of details, are presented in Section 5.3 and 5.4.

5.3 REASONABLE ALTERNATIVES TO THE UNDERTAKING

5.3.1 Modal Alternatives

5.3.1.1 Do Nothing

The Do Nothing alternative represents anticipated impacts and effects if none of the alternatives being considered is carried out. In this case it included normal ongoing maintenance of the

existing road network; regular local and inter-city bus service upgrading; and limited local road network improvements. The latter are consistent with the Do Nothing scenario included in the 1993 Guelph and Area Transportation Study and are essentially limited to urban arterial and collector road improvements within the built-up portion of the City of Guelph.

The Do Nothing scenario was considered undesirable for the following reasons:

i) Capacity deficiencies in the Highway 6-Brock Road Corridor will be accentuated. The high proportion of turning movements in the absence of turning lanes will continue to be the predominant concern, particularly on the 2-lane section of existing Highway 6 between Freelton and Highway 401 as traffic volumes increase (refer also to Appendix L for traffic analysis of Do Nothing alternative). This will result in higher costs for users, including travellers in the corridor using modes which are more conducive to creating environmentally sustainable conditions than private automobile use (e.g. carpooling, public transit) but are forced to operate in mixed traffic conditions.

ii) Under-utilization of Highway 6 north of Highway 401 (Hanlon Expressway) will be perpetuated, negating or deferring economic return on this important provincial capital investment.

iii) This option will not provide the degree of support needed to fully realize municipal sustainable economic development objectives as they relate to the City of Guelph's initiatives in the southwest quadrant of the City or to the Township of Puslinch's Economic Development Strategy.

iv) The conflicts between high speed inter-regional traffic and slower moving local traffic will be accentuated, resulting in increased potential for accidents and the associated loss of human lives and economic costs of property damage.

v) The Province will continue to incur higher than normal maintenance costs due to the continued use of roadway shoulders by motorists passing turning vehicles.

vi) The Do Nothing alternative exhibits the advantage of minimizing direct loss of natural environmental features associated with options such as road widenings and/or new roadway segments. However, anticipated roadway congestion associated with peak period operating conditions and increased accident potential may result in localized net degradation of water and air quality due to concentrated motor vehicle exhaust emissions. This conclusion is also based on the degree to which new roadway improvements exhibit the potential to actually enhance/restore some natural environmental elements (e.g. water quality, slope stability, vegetation species diversity) through the introduction of mitigation/preservation treatments that would not ordinarily be retrofit to a Do Nothing scenario.

Therefore, the Do Nothing option was NOT RECOMMENDED as a solution to meet project objectives.

5.3.1.2 Commuter Rail and Bus Service

After consideration of the full range of transportation modes which could be influenced by provincial government initiatives, and given the objective of optimizing cost and service efficiency components, the extension of commuter rail and bus service was deemed to be the only reasonable modal options for investigation in this study.[1] This included liaison with GO Transit regarding its mandate for providing inter-regional commuter services within the Greater Toronto Area under the Toronto Area Operating Authority Act.

Through its Strategic Policy Committee, the Ministry of Transportation has made a commitment to employing and promoting the most effective mode of transportation service or mix of modes to satisfy the needs of the six major urban areas (Toronto, Hamilton, Kitchener-Waterloo, Ottawa, London and Windsor) without compromising the viability of smaller urban centres. In this respect, the current GO Transit service area has been specifically delineated to include the Regional Municipalities of Hamilton-Wentworth, Halton, Peel, York, Durham and Metropolitan Toronto, none of which encompass this study area.

[1] Since the existing GO Bus link between Guelph and Toronto (York Mills rapid transit station) via Brampton along Highway 7 offers limited service and extends beyond the Authority's mandated area only under a special agreement, it has not been considered a part of the normal GO Commuter network.

GO Transit was contacted with regard to whether it has plans to expand its service area or whether it has ever examined the merits of such an expansion, and indicated that it has no plans to extend any bus or rail service into the Highway 6 study area, nor has such an extension every been the subject of a GO Transit study. It was also indicated that GO Transit does not anticipate extending its services anywhere beyond the currently defined service area in the foreseeable future (refer to GO Transit correspondence of August 21, 1985 in Appendix B).

With specific regard to rail commuter facilities, the recommendations contained in the Ontario Task Force on Provincial Rail Policy Report (51) may be cited for consideration in conjunction with the preceding GO Transit response. The Task Force recognized the geographic limits associated with fast, economically justifiable commuter rail service and recommended that the Toronto commutershed for rail purposes should be considered to be the territory within a line linking Burlington-Milton-Georgetown-Newmarket-Stouffville-Claremont-Brock Road-Pickering. VIA Rail's policy of not encouraging daily commuting within the Toronto-Windsor corridor was also taken into consideration.

Therefore, from a provincial transportation initiatives perspective, the extension or expansion of commuter bus and rail facilities to resolve identified transportation problems in the study area cannot be considered a viable alternative, at least in the foreseeable future, and was not recommended as a solution to meet project objectives.

5.4 ALTERNATIVE METHODS OF CARRYING OUT THE UNDERTAKING

5.4.1 Upgrading of Existing Municipal Road Network

In addition to investigating new routes, the 1982 Corridor Study examined the feasibility of improvements to the following major arterial roads in the Guelph area:

1) Brock Road (County Road 46)
2) Watson Road (County Road 41)
3) Victoria Road (County Road 38)

Brock Road

The Corridor Study concluded that widening Brock Road to 4 lanes between Highway 401 and College Avenue is physically feasible, with little additional property being required. However, difficulties would be encountered north of College Avenue in terms of topography (Speed River Valley) and the proximity of existing buildings. Impacts to property frontage, landscaping and natural vegetation would be difficult to mitigate at some locations, resulting in undesirable net effects to this portion of the corridor.

In addition, at the time this alternative was being considered it was the City of Guelph's policy that this route (Gordon Street) be restricted to two lanes between the City's south limit (Clair Road) and Wellington Street. Since that time Gordon Street has been widened to 4 lanes from Harts Lane to north of Stone Road. Based on the recommendations contained in the 1993 environmental assessment study for improvements in the Gordon Street corridor, the City's current intention is to retain a basic 2-lane cross-section north of Stone Road to the Speed River.

Furthermore, the terminal points would create excessive property requirements and would not complete the requisite road network to resolve traffic distribution problems in the City. In association with this concern, it was projected that 4-laning Brock Road would increase traffic pressure rather than relieve it, particularly south of the City in the vicinity of Aberfoyle, which is contrary to the project objectives.

This alternative was also considered costly ($10.3 Million) relative to anticipated service benefits.

Watson Road

The Watson Road option involved improving both the County and Township 2-lane sections north of Highway 401 and providing a new interchange with 401. The Corridor Study concluded that adverse impacts to the natural environment would outweigh the transportation benefits in this case. Specifically, the improvements would have a minimal effect on the distribution of North-South traffic to the extent that only a moderate reduction in the number of vehicles using Brock Road would be realized (1,870 vehicles daily). Additionally, there would continue to be a shared use of Highway 401 by Highway 6 traffic and a continued lack of continuity in the Highway 6 route.

As alluded to in Section 3.3.2 of this report, the current route location and preliminary design study investigated the Watson Road corridor north and south of Highway 401 with respect to long term municipal road requirements and possible interchange protection at 401. The review of this "Eastern Corridor" produced similar findings to those of the Corridor Study in terms of the traffic service function.

Similarly, the Eastern Corridor review confirmed the conclusion that potential adverse environmental condition changes would likely override potential service benefits. Specifically, the following sensitive areas would be affected :

- **Natural Environment**

  - provincially significant geological formation (Palaeozoic theme) at the Guelph Correctional Centre (quarry) south of Highway 7 (MNR designated Earth Science Area of Natural and Scientific Interest)

  - regionally significant geological formation and high potential sand and gravel resource area east of Freelton (Freelton Esker)

  - Eramosa River Valley (South Wellington ESA 17)

  - Aberfoyle Woods (South Wellington ESA 9) including 1.16 km^2 North Aberfoyle winter deer range and several Class 1 (high productivity hardwood) woodlots

  - Mountsberg Wildlife Area (South Wellington ESA 6; Hamilton-Wentworth ESA 41)

  - West Bronte Creek system (primary nursery area crossing plus proximity to headwater/recharge areas).

- **Socio-Economic Environment**

  - capital intensive (horse farm) agricultural operations in the north central portion of the corridor

  - 5 specialty agriculture operations (2 orchards, 2 nurseries, 1 market garden)

  - 58 potential heritage buildings, including 25 in the hamlet of Arkell where a by-pass could be required for a 4-lane facility

  - institutional, recreational and other major land uses (Camp Corwin north of Wellington County Road 34, Guelph Handgun Association south of Puslinch Road 15, Barber Memorial Scout camp north of Arkell, Guelph Correctional Centre, Guelph Air Park at Highway 7)

  - noise and visual intrusion to numerous rural estate residences with minimum setbacks from the existing road right-of-way.

The extensiveness and relatively low degree of mitigation potential associated with these impacts (i.e. significant net effects due to non-renewable nature of affected resources) make this alternative particularly undesirable.

Victoria Road

This alternative entailed connecting Victoria Road to existing Highway 6 north of Freelton, upgrading the full length of the 2-lane road, providing an interchange with Highway 401 and linking with existing Highway 6 north of the City of Guelph. The advantages of this scheme included comparatively lower construction costs (per kilometre) and the fact that North-South to East-West connections in Guelph would be facilitated, thus providing direct time-saving access.

However, the disadvantages also outweighed the benefits in this case. It was anticipated that the improvements would induce crosstown truck traffic and industrial development pressures on the east side of Guelph and other areas not designated for such growth. The associated problem of increased traffic exposure in school zones on Victoria Road was also identified, as was the excessive number of residential, commercial and institutional entrances which would create an undesirably high potential for accidents. These are potential impacts which could not be readily mitigated without negating the initial advantages achieved (i.e. operational restrictions would have to the imposed for safety purposes).

Based on the concurrence by the Project Team with the results of these earlier investigations, the supplementary Eastern Corridor investigations, and the fact that no other such feasible options were identified in the course of alternatives development, **major upgrading of the municipal road network was not recommended as a solution to meet project objectives and was discarded as a viable scenario.**

5.4.2 Corridor Concepts

5.4.2.1 Development of Corridor Concepts

Based on the rejection of reasonable modal and municipal network improvement alternatives to the undertaking, the need to introduce a new provincial highway route or upgrade existing Highway 6 in the study area as the only means of resolving the identified transportation problems was established. Subsequently, the following five basic highway corridor concepts were developed during January and February 1985 to initiate the investigation of alternative methods of carrying out the undertaking (refer to Figure 5.1).

East Concept (A Series)

- Follow existing Highway 6 from the four-lane section at Freelton;
- Major options involve bypassing Puslinch and/or Morriston to the east or west;
- North of 401 continue northwesterly from south of Aberfoyle to connect to the Hanlon Expressway in the vicinity of Puslinch Road 15;
- Optimize use of existing Highway 6 corridor.

Highway 401 Concept (B Series)

- Utilize the East Concept to Highway 401 and continue westerly to the existing Hanlon/401 interchange or Central Concept using 401 corridor;
- Incorporate separate parallel (service) road north or south of Highway 401, or a short core-collector system;
- Optimize use of Highway 401 corridor.

Central Concept (C Series)

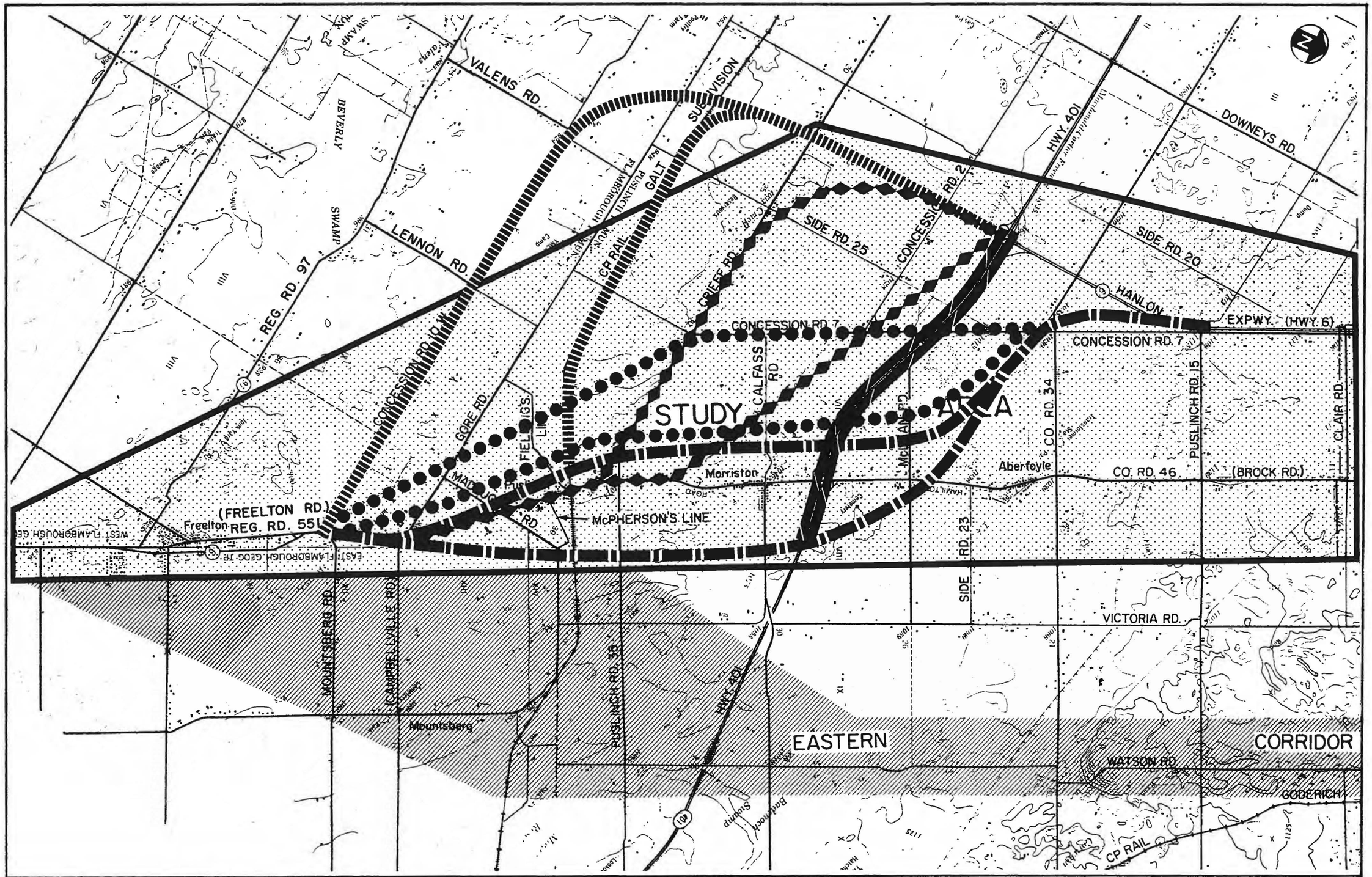
- Follow 115 kV Hydro corridor (easement) from Freelton to Puslinch Concession Road 7;
- Utilize Concession Road 7 to Highway 401 Concept or continue northerly to convergence point of Concession Road 7 and the Hanlon;
- Major options involve extension south from the hydro easement/Concession Road 7 intersection at Crieff Road to connect with Extreme West Concept at Gore Road as well as integration with the West Concept.

West Concept (D Series)

- Utilize East Concept (existing Highway 6 or west bypass) to north of CP Rail Galt Subdivision and head westerly using Crieff Road or new alignment from south of Morriston;
- Routes are directed north to existing Hanlon/401 interchange at Concession Road 7 or west of Side Road 25;
- Optimize use of Concession Road 7 corridor; introduces southerly extension of Hanlon Expressway.

Extreme West Concept (E Series)

- Utilize 115 kV hydro corridor/East Concept (west bypass) and continue westerly in Concession Road 10, Gore Road or CP Rail corridor;
- Routes are directed north at intersection with tangential southerly extension of the Hanlon Expressway;



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

- EAST CONCEPT (SERIES A)
- HIGHWAY 401 CONCEPT (SERIES B)
- CENTRAL CONCEPT (SERIES C)
- WEST CONCEPT (SERIES D)
- EXTREME WEST CONCEPT (SERIES E)

Figure 5.1
ALTERNATIVE CORRIDOR CONCEPTS

- Maximize use of existing corridors to minimize adverse impacts to environmentally sensitive areas; fill out range of physically feasible alternatives.

5.4.2.2 Screening of Corridor Concepts

The corridors were subjected to a coarse assessment based on their potential impact on identified major sensitive areas and their ability to satisfy project objectives. This assessment is summarized in Table 5.2. None of the corridors were eliminated on the basis of this assessment since a full traffic analysis was not included.

Further screening and evaluation of the corridor concepts is described in parallel with the development and evaluation of route location alternatives in Section 5.4.3.

TABLE 5.2

ADVANTAGES & DISADVANTAGES ASSOCIATED WITH CORRIDOR CONCEPTS

Corridor Concept	Potential Impacts
EAST	• Encroachment on major mineral extraction operations • Encroachment on Brock Road industrial areas • Impacts to Fletcher Creek, Galt/Mill Creek, Bronte Creek headwater areas • Property severances • High level of desired traffic service • Loss of prime agricultural land
HIGHWAY 401	• Impacts to abutting mineral extraction and agricultural operations • Impacts to Galt/Mill Creek system • Maximizes use of existing infrastructure
CENTRAL	• Property severances • Encroachment on mineral aggregate operations/ reserves south of Highway 401 • Impacts to intersecting local roads • Impacts to Galt/Mill Creek system
EXTREME WEST	• Good use of existing road/rail corridors • Impacts to Beverly Swamp, Fletcher Creek Swamp Forest, Galt/Mill Creek wetlands • Travel time benefits minimal • Loss of prime agricultural land

5.4.3 Route Location Alternatives

5.4.3.1 Preliminary Development of Route Location Alternatives

Route alternatives were developed on a preliminary basis with a view towards minimizing identified impacts and maximizing perceived benefits associated with the corridors. The most significant function of these, as yet, largely undefined routes at this point was to demonstrate possible corridor connections or combinations.

A major premise in the development of the routes involved the adoption of ultimate full control of access for the portion of the route north of Highway 401 and limited (or special) control of access south of Highway 401 as part of broader strategy to protect for the traffic service function of the facility.

The corridor concepts were reviewed by the Technical Committee in April 1985. The initial concern by the municipal technical representatives from a traffic service perspective was related to the retention of the existing Highway 401/Hanlon Expressway interchange as a connection point for any new routes south of Highway 401 (i.e. it would not attract new users to the Hanlon which is presently under utilized). The Project Team suggested that abandoning such a connection could introduce a west-only orientation to the interchange or even total elimination of the Hanlon "dog leg" link to Highway 401. This would create an undesirable position for the Province in terms of economic costs and lack of a return on capital investment. It was subsequently agreed that the concept of utilizing the existing Highway 401/Hanlon interchange be retained.

Based on potential major cost and operational disruption considerations, the project Team had not included any preliminary routes which encroached on the mineral aggregate extraction operations immediately north of Highway 401. Following a discussion to this effect, the Project Team agreed to adopt the Technical Committee position that these operations should be considered no more prominent than any other land use in terms of sensitivities, and that physically feasible route alternatives, including one approximating the recommended corridor from the 1982 Corridor Study, be developed north of Highway 401.

It was also agreed that, given the terms of reference related to the Eastern Corridor (an investigation to serve only as background for future municipal initiatives in upgrading the Watson Road Corridor), no connections between the East Concept and the Eastern Corridor would be considered.

Later in April 1985, the routes were identified by alpha-numeric designations associated with the respective corridors. A total of 24 alternatives, including the "Do Nothing" option, were reviewed by the Project Team. At this time, the Project Team developed two additional alternatives - first, a short bypass of the Hamlet of Puslinch to address Puslinch Township concerns (Alternative A-7), which could be considered as part of an option to widen existing Highway 6 and bypass the Village of Morriston; and second, a route which most accurately represents the 1982 Corridor Study recommendation (Alternative C-6). The 26 route alternatives are illustrated in Figures 5.2, 5.3, 5.4 and 5.5. These exhibits also illustrate the minor modifications made to the alternatives between July 1985 and January 1986, as described in the following text, and should be referred to accordingly.

In parallel with the development of route alternatives, the basis for analyzing and evaluating the alternatives was being developed in the form of Evaluation Criteria. Using these criteria, the corridor and attendant route alternative were subjected to a preliminary assessment which identified significant potential impacts under the seven factor group headings. The Preliminary Route Alternatives Assessment is summarized in tabular form in Appendix E.

To this point in the study, traffic volumes were still in the process of being refined and it was deemed most appropriate to conduct the traffic service analysis on a corridor basis only. In the preliminary assessment exercise, recommendations were therefore tailored to retaining at least one route alternative from each corridor for further consideration in the context of meeting project traffic objectives. Consequently, no corridor or route was deemed to be absolutely eliminated from further consideration, thereby maintaining maximum flexibility to reinstate any alternative based on the results of a later, more precise traffic service analysis.

The alternative routes recommended for further consideration at this juncture included:

A-1	C-5
A-3/4	D-6
A-7	E-2
B-3	

Arrangements were then made to meet with and advise all study participants of the results of the preliminary route alternatives assessment and receive input prior to a public presentation in June 1985. Table 5.3 presents a summary of the points emerging from those meetings.

The last major participant from which input was required during the preliminary development of alternatives was the public and interest group faction. This was accomplished by holding a public information centre in June 1985. Apart from a study initiation information brochure distributed in February 1985, this was the first formal public exposure to the study.

Therefore, besides the results of the preliminary route alternatives assessment and proposed evaluation criteria, information related to study background, rationale, objectives and organization was also provided.

The conduct and results of this information centre are formally detailed in Environmental Technical paper No. 1 "Results of Public Information Centre No. 1, June 20, 1985" (refer also to Table 3.1A). The following is a summary of comments received at and following the information centre:

1) Submission by R.O.A.D.S. Committee

- recommends that Alternative A-5 be re-aligned further west in line with rear lot lines in Concession 7. South of Crieff Road (1st Concession), angle southeasterly towards Freelton. At Highway 401 a grade separation in the form of a flyover be constructed to enable traffic to proceed westerly to the present Hanlon interchange. This position was supported by the Township of Puslinch Council.

- high costs associated with routes requiring filling gravel pits and with possible grade separations of Concession Road 7 and County Road 34.

- safety hazard associated with farm vehicles crossing the Hanlon plus an additional 4-lane highway within 1 km.

TABLE 5.3

SUMMARY OF MEETINGS TO PRESENT RESULTS OF PRELIMINARY ROUTE ALTERNATIVES ASSESSMENT

	PARTICIPANTS			
	Technical Committee	**External Team**	**MTO Management/ Internal Team**	**Steering Committee**
Mtg. Date	**May 7, 1985**	**May 22, 1985**	**May 29, 1985**	**June 4, 1985**
Comments	• Agreement that a route east of Alternative A-1 using County Road 38 and County Road 34 is inappropriate based on lack of traffic service potential (refer to Section 5.2.2 for basis of discussion). • Agreement on the 60 km/h speed constraint on Brock Road (401 to County Road 34) for traffic assignments • Resolved to accept Project Team recommendations on routes to be retained contingent on refining traffic assignments.	• Guelph University expressed preference for Alternative E-2 based on potential for developing mineral aggregates on their 401/Hanlon property. In subsequent correspondence: • Halton Region Conservation Authority expressed concern over East Concept impacts to the West Bronte Creek and associated wetlands • Ministry of Agriculture and Food recommends Alternative C-2 be retained due to apparently lower impact on agricultural resources. • Ministry of Natural Resources indicated limited concern over East and Highway 401 Concepts due to acceptable mitigation potential but expressed major concerns with respect to impacts to wetlands, fisheries, wildlife habitat, forestry resources and aggregate resources by the West, Extreme West and southern Central Concept routes (C-1, C-2, C-3). Recommended combining eastern portions of D-1 and D-3 with northern portion of C-1 to reduce impacts. • Ministry of Municipal Affairs reinforce the need to address impacts by the East Concept on local municipal growth strategies in Aberfoyle and Morriston.	• MTO management indicated a desire to optimize the use of existing highway facilities to produce a cost-effective solution.	• Puslinch Township expressed a preference for the A-5/B-1 route and disfavour over A-1 and C-5 due to potential impacts to existing mineral aggregate operations and associated future estate residential uses, as well as the influence on the Aberfoyle growth area. Alternative A-5 should be shifted to the west to reduce property severances. • In an earlier meeting with County representatives from the Technical Committee, Puslinch Township also expressed a desire to have no new interchange with Highway 401 located between the existing Brock Road and Hanlon Expressway interchanges. • The Steering Committee accepted the Technical Committee's recommendation on the route alternatives for further consideration.

Note : Refer to Table 3.1A for results of public response to Preliminary Route Alternatives Assessment.

- economic implications of modifying Concession Road 7 relative to movement of farm equipment and produce; property value depreciation.

- potential environmental impacts relative to surface watercourses, groundwater recharge and noise pollution.

2) Hanlon Expressway

- a direct connection to the existing Highway 401/Hanlon Expressway interchange would not be appropriate since the Hanlon is oriented in the wrong direction (west).

- the Hanlon has too many controlled intersections and no emergency or convenience services.

- the Hanlon, with the number and location of controlled intersections (i.e. at bases of grades), is a poor truck route.

- the existing route to the Hanlon is adequate, but the Hanlon itself is not attractive enough to dissuade drivers from carrying on along Brock Road to their destination.

- the present Hanlon/County Road 34 intersection is considered a safety hazard by school bus operators and local residents, especially to farm vehicle operators having to cross the Hanlon.

- there is a perception that the Hanlon traffic signals are not synchronized.

- a connection from free-flow Highway 6 south of Highway 401 to the restricted-flow Hanlon will create a bottleneck on the Hanlon and further discourage its use.

- Highway 6 is perceived as being used only as a connecting link between Highways 401 and 403 as opposed to being part of a wider inter-regional network which includes the Hanlon.

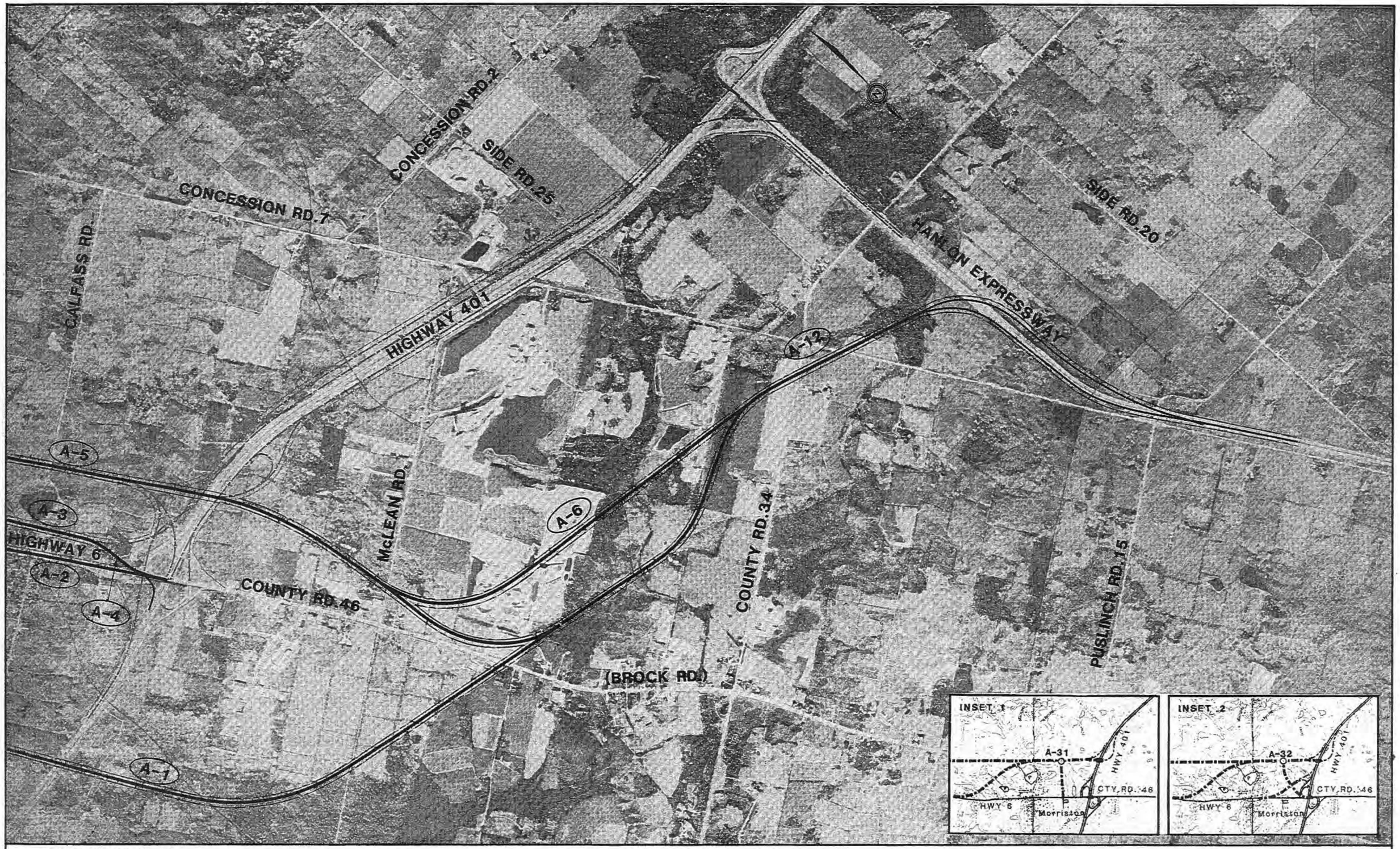


HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 500 1000m

Figure 5.2a
SERIES A
ROUTE LOCATION ALTERNATIVES



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE:
0 500 1000m

Figure 5.2b
SERIES A
ROUTE LOCATION ALTERNATIVES



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE:
0 500 1000m

Figure 5.3a
SERIES B
ROUTE LOCATION ALTERNATIVES



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 500 1000 m

Figure 5.3b

SERIES B
ROUTE LOCATION ALTERNATIVES

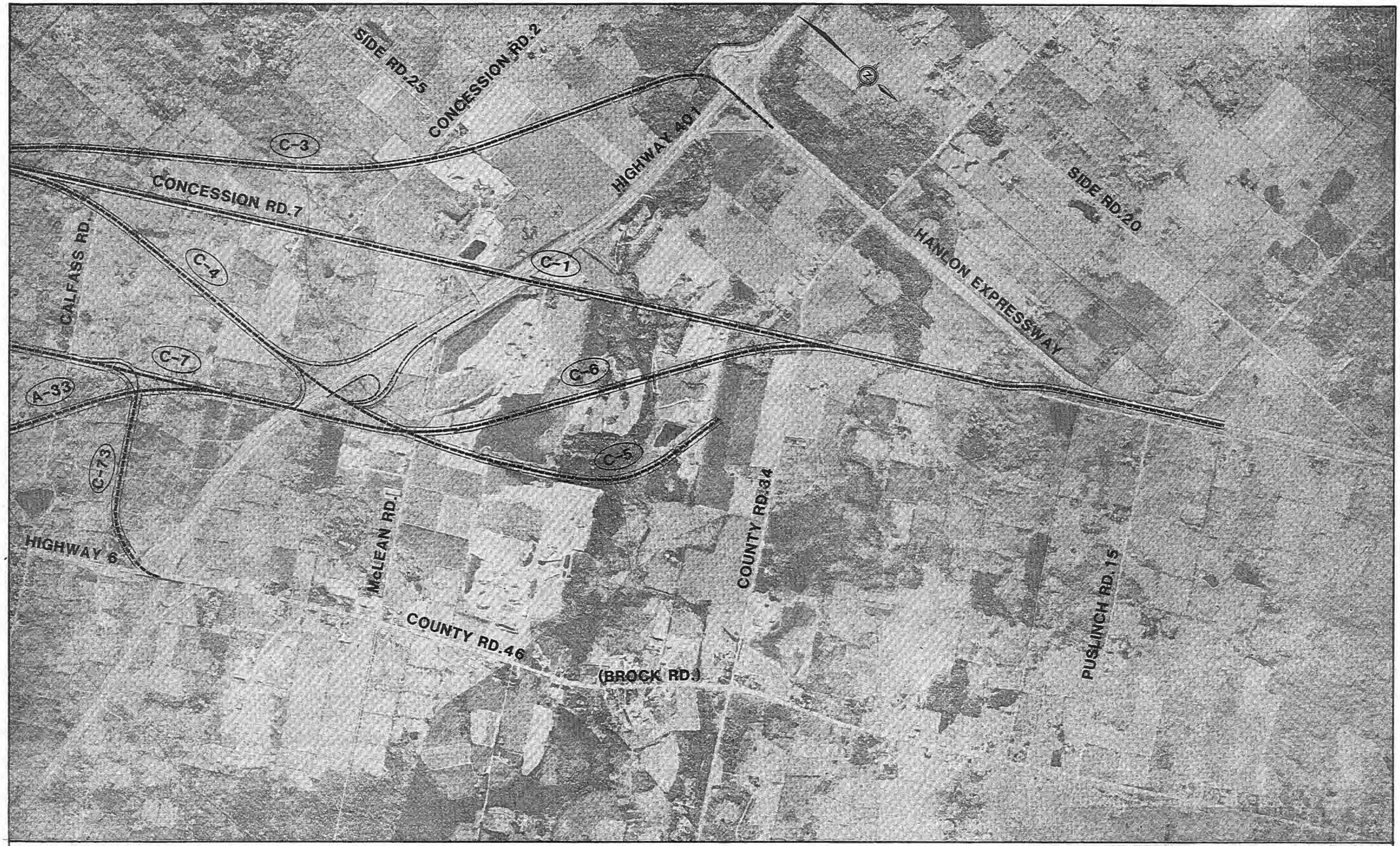


HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 500 1000 m

Figure 5.4a
SERIES C
ROUTE LOCATION ALTERNATIVES
(INCLUDING ALTERNATIVE A-33)

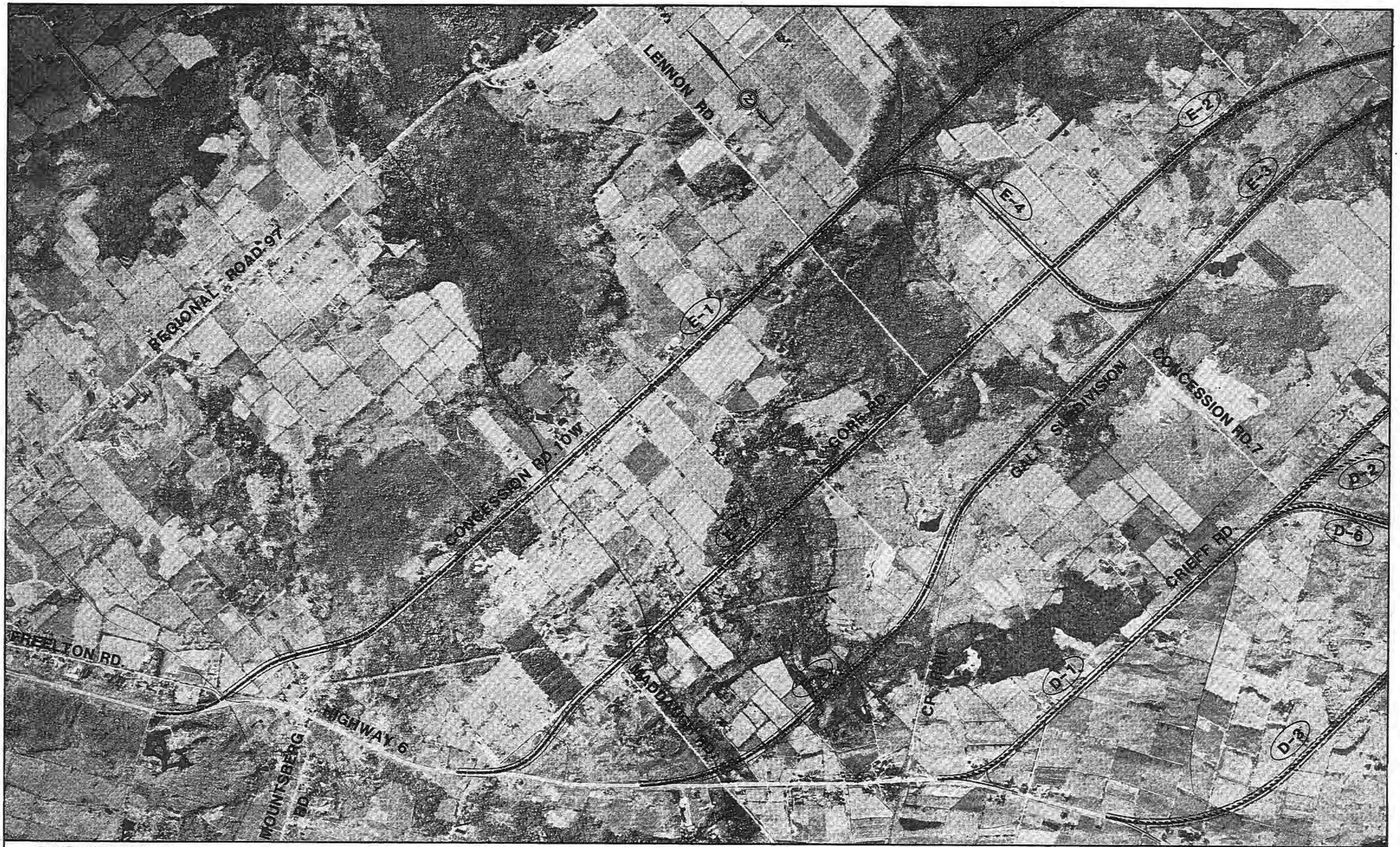


HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE:
0 500 1000 m

Figure 5.4b
SERIES C
ROUTE LOCATION ALTERNATIVES
(INCLUDING ALTERNATIVE A-33)



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 500 1000m

Figure 5.5a

SERIES D AND E
ROUTE LOCATION ALTERNATIVES



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE:
0 500 1000

Figure 5.5b
SERIES D AND E
ROUTE LOCATION ALTERNATIVES

3) A number of route alternatives would use good agricultural land, especially A-1 and the Series E options, the retention of which is considered essential for the livelihood of many farming families.

4) Existing rights-of-way should be used as much as possible.

5) There is a need for improved safety levels on existing Highway 6 south of Highway 401, especially in the vicinity of the CP Rail overpass. Turning lanes and improved geometrics were cited as requirements. Owners at the cited locale expressed a desire to be kept well informed on developments in the area.

6) Victoria Road could have been considered as an eastern bypass.

7) Severance of the Village of Morriston from the Morriston Pond to the west should be avoided.

8) Loss of highway oriented business in Morriston.

9) Impacts to mineral aggregate reserves, plant and internal pit-to-pit access.

10) There will be increased pressure on farmlands for re-zoning and development.

11) Trucks should be directed to the Hanlon and restricted from using the Brock Road route into Guelph.

12) Alternative A-1 is the best for attracting traffic away from Morriston.

13) The Series E routes are too long, will induce the use of local side roads and have negative impacts on recreational and open space areas in the form of noise and unsafe access.

14) The Crieff Hills Community Religious Retreat is a major institutional/recreational use area which may experience noise impacts and other disruption of activities with the Series D and E alternatives.

15) Alternative A-1 could create negative impacts on wetlands associated with the Bronte Creek headwater area east of Highway 6.

16) Some of the ponds which may be affected serve as reserve water sources for fire protection services.

17) Any route which remains near existing Highway 6 will not relieve demands on Brock Road, decrease traffic flow through Puslinch and Morriston, or increase use of the Hanlon Expressway.

18) If the route incorporates a close bypass of Puslinch and Morriston, designated growth areas will be lost, visual aesthetics will be disrupted, noise will be increased and the safety of local residents jeopardized.

19) Numerous individual property-related concerns with respect to potential right-of-way acquisition.

5.4.3.2 Refinement of Route Location Alternatives

In July 1985, based on input received in May and June, and additional investigations related to the capability of the alternatives to provide the desired level of traffic service, the Project Team made the following revisions to the alternatives being recommended for future consideration.

1. Modify Alternative A-3 to pass west of the Morriston Pond, including two options (Links A-31 and A-32) for connecting new Highway 6 to Highway 401 and existing Highway 6 north of Morriston (refer to Figure 5.2).

2. Add Alternative C-7, including Link C-11, to reduce potential severances south of Highway 401 (refer to Figure 5.4).

3. Delete Alternative A-7 for geometric reasons and reinstate Alternative A-5 to retain a close bypass of the Hamlet of Puslinch (refer to Figure 5.2).

4. Delete Alternative E-2 due to lack of traffic service capability and potential adverse environmental impacts (refer to Figure 5.5).

5. Delete Alternative A-4 due to general duplication by Alternative A-3.

At this time, the Project Team resolved to recommend that the Technical Committee adopt the following route alternatives for detailed investigation:

A-3	C-7
A-5	D-6
C-5	

Note: Alternative B-3 (parallel one-way roads or mini core-collector system as the ultimate scheme; use existing Highway 401 in initial stage) was now considered to be an integral component of Alternatives A-3, A-5 and C-7 (refer to Figure 5.3).

The public information centre results and subsequent modifications to the route alternatives were presented to the Technical Committee for preliminary review in August 1985. The most significant outcome of this meeting was that, notwithstanding the environmental, economic and cost considerations which initially provided the rationale for eliminating Alternative A-1, the Project Team agreed to retain A-1 based on the Technical Committee's position that traffic service benefits alone warranted such a decision.

Prior to going back to the Technical and Steering Committees in the fall of 1985, the Project Team refined the short listed alternatives further in an effort to produce more local efficiencies. The following revisions were implemented:

1) There was some concern at the Project Team level that use of the A-31 and A-32 connections between new and existing Highway 6 by East-South traffic could be limited. As a result, a new sub-alternative linking A-3 to the C-7/Highway 401 interchange area was added (Sub-alternative A-33), whereby the aforementioned connection would not be required (refer to Figure 5.4).

2) Alternative A-3 was modified to reduce direct impacts to properties immediately south of Morriston.

3) At the south end of Alternatives C-5 and C-7, Gore Road was realigned to provide a connection between Gore Road and the unopened road allowance between Lot 1 Concession 10 and Lot 36 Gore to serve Lot 1 on the west side of new Highway 6. Gore Road was realigned from the east to swing into the new connection at a 'T' intersection.

4) Immediately north of Crieff Road, Alternative C-7 includes an option to shift easterly to reduce direct impacts to the pond, woodlot and buildings on Lot 34 Front Concession 7.

5) On Alternative D-6, widening of Concession Road 7 would be undertaken exclusively to the east to avoid the cost of relocating the 115 kV Hydro tower line immediately to the west. In addition, an optional divergence point from existing Highway 6 (approximately 100 m north) was adopted to reduce property impacts.

Early in September 1985, the Project Team presented the route alternatives recommended for detailed investigation to both the Technical and Steering Committees for confirmation before proceeding with the analysis and evaluation phase of the work. At the same time, the refined traffic assignments were submitted to the Technical Committee.

The Technical Committee confirmed that the route alternatives presented by the Project Team were those which should be recommended to the Steering Committee and reinforced its position of retaining the options which best meet the study traffic service objectives (i.e. including Alternatives A-1 and C-5).

Therefore, along with the results of the June public information centre and resultant route modifications, the following alternatives were presented to the Steering Committee and recommended for detailed analysis and evaluation:

A-1	C-5
A-3	C-7
A-5	D-6

At that meeting, the Township of Puslinch requested that the Project Team provide the details of all Highway 401 interchange configurations for the alternative routes for review by Council prior to any decision making by the Steering Committee. Subsequently, it was agreed that a joint presentation of all the routes recommended for detailed investigation would be made to the Councils of participating municipalities. Hence, the confirmation sought by the project Team was deferred to a point following the presentation which occurred on September 20, 1985.

Immediately following the joint presentation to Councils, the Steering Committee met in an effort to confirm the recommended alternatives. The following major points were raised at this meeting:

1) County of Wellington representatives inquired as to whether Alternative A-1 could include an option wherein it diverges from existing Highway 6 at a point further north (i.e. at the Flamborough/Puslinch Town Line).

2) The Town of Flamborough Council had, by resolution, adopted a motion that recommends that the existing Highway 6 route be retained to the greatest extent possible within the Town's boundaries (refer to Appendix B). This comment was complemented by the Town of Puslinch's desire to bring Alternative C-7 into the southern end of Alternative A-5 for a connection to existing Highway 6.

The Steering Committee agreed to confirm the recommended alternatives as presented with the proviso that the strongest consideration be given to the motion adopted by the Town of Flamborough Council and the comments expressed by the County of Wellington.

In October 1985, as a result of the concerns registered by Wellington County and the Town of Flamborough, the Project Team developed:

1) Link A-11 using the Town Line (Maddaugh Road) on the east side of Highway 6 to proceed from an improved existing Highway 6 to Alternative A-1 (refer to Figure 5.2).

2) Link C-71 using the mid-concession between Puslinch Road 35 (Crieff Road) and Gore Road to proceed from an improved existing Highway 6 to Alternative C-7 (refer to Figure 5.4).

Subsequently, it was agreed that all route alternatives north of Highway 401 would be subjected to analysis for the ultimate stage only (full control of access) based upon the anticipated imminent protection of the Hanlon Expressway for full control of access by MTO Southwestern Region.

The exceptions to the staging considerations were the Highway 401 improvements. Beyond the preliminary assessment phase, the ultimate widening of Highway 401 to include parallel service roads or a mini core-collector system was developed only to the extent that it could be incorporated in the analysis and evaluation of cost implications, to be used only if two alternatives were rated comparatively equal. This philosophy was adopted based on the capability of existing Highway 401 to accommodate forecast traffic volumes beyond the plan period (Year 2004). **(Note: All decisions at this point related to staging of improvements on Highway 401 pre-dated MTO's decision that widening Highway 401 through the study area would precede Highway 6 improvements).**

Also in October 1985, it was deemed necessary to provide the public with the opportunity to review the route alternative modifications introduced since June. These were displayed at the Township of Puslinch Municipal Offices during regular business hours between November 18 and November 29, 1985. In addition, Project Team representatives made themselves available to discuss the changes and receive comments during the evening of November 21. This session was intended to accommodate directly affected property owners, but since it received the same notification distribution as previous public forums, a full range of concerns were expressed by attendees (refer to Environmental Technical Paper No.2 "Open House, November 21, 1985 and Public Information Centre No. 3, January 22, 1986), as well as Table 3.1B herein. The comments received were similar to those from the June 1985 information centre.

As a result of the number and nature of comments received at the open house, the following action was implemented:

1) Link C-72 was introduced. This represents an alternative to Link C-71 and reduced (locally) direct impacts to major agricultural operations and to the Fletcher Creek Swamp Forest wetlands (refer to Figure 5.4).

2) A full public information centre to cover off the development of alternatives and the basis for their analysis and evaluation was arranged for late January 1986.

The Public Information Centre to present and explain the modifications and additions to the development of alternatives introduced since June of 1985, was held on January 26, 1986.

No new major issues emerged from the Information Centre and the input received was incorporated in the study process by mid-February 1986. This completed the formal portion of the development of route location alternatives.

5.4.3.3 Description of Alternatives Selected for Detailed Analysis and Evaluation

Based on the input received from study area residents and other interested members of the public, local municipalities, participating Ontario Government Ministries and other agencies between June 1985 and February 1986, the following route location alternatives, as presented at the January 22, 1986 Public Information Centre, were selected for detailed analysis and evaluation (refer to Figures 5.2, 5.3, 5.4 and 5.5).

Route Alternative A-1 (with Sub-alternative A-22/A-11 and A-13)
Route Alternative A-3 (with Sub-alternative A-31, A-32 and A-33)
Route Alternative A-5 (with Sub-alternative A-31 and A-32)
Route Alternative C-5

Route Alternative C-7 (with Sub-alternative C-11, C-71, C-72 and C-73)
Route Alternative D-6

These route location alternatives are described below. The features common to all alternatives were as follows:

- Widen existing Highway 6 from 2 to 4 lanes from north limit of 4-lane section at Freelton to Hamilton - Wentworth Regional Road 551 (Freelton road).

- 4-lane 15 m pavement within 45 m right-of-way on new routes south of Highway 401; 4-lane 15 m pavement within 80 m right-of-way on new routes north of Highway 401.

- Class III (Special Controlled Access) south of Highway 401; Class I (Expressways and Freeways) for the purpose of land access control north of Highway 401.

- Alternatives which do not involve new routing north of Highway 401 included an interchange between Wellington County Road 34 and the Hanlon Expressway.

- All alternatives which utilize Highway 401 to connect with the Hanlon Expressway involved widening Highway 401 by one lane in each direction between the point of interchange and the Hanlon.

SERIES A ALTERNATIVES

Alternative A-1 (Figure 5.2)

Alternative A-1 involves 4-laning existing Highway 6 north from the common section and bypassing both Puslinch and Morriston to the east with two optional divergence points from existing Highway 6.

The first sub-alternative (A-13) diverges from existing Highway 6 380 m south of the Campbellville Road, heading northeast and then north through Lot 12 in Flamborough Concessions XII, XIII and XIV to generally follow Puslinch Concession VIII rear lot lines. This link crosses Campbellville Road, Concession Road XIV and Maddaugh Road at grade with local road realignments and closures as necessary to improve highway geometrics while retaining all local road network links. The new highway link is grade separated (over) at the CP Rail Galt subdivision line.

The second option entails widening existing Highway 6 to the Flamborough/Puslinch Town Line (Maddaugh Road) and following Maddaugh Road northeasterly (Link A-22/A-11) to the common route along the rear property lines in Puslinch Concession VIII. This includes grade separation (over) at the CP Rail line and local realignment of McPherson Lane to improve the angle of intersection with the new route.

Both options include design measures to reduce the attractiveness of the bypassed section of existing Highway 6 to through traffic.

From north of the CP Rail line the route continues north, just east of the mid-concession line to avoid two homes fronting on Wellington County Road 36, to a Parclo B interchange with Highway 401 1.2 km east of the existing Brock Road/Highway 401 interchange. The intersections with Puslinch Road 35 and County Road 36 are at grade with the possibility of grade separation for the latter depending on crossing traffic volume warrants.

North of Highway 401, the route swings northwest to the east of the Nicholas Beaver Industrial Park and is grade separated over Brock Road south of Aberfoyle. It continues northwest to the half-diamond interchange (to and from the south only) with Wellington County Road 34, 150 m east of Puslinch Concession Road 7 which is discontinued for 350 m north of County Road 34

(north-south moves on Concession Road 7 are retained via a connection road in the northeast quadrant).

After crossing over County Road 34 and Concession Road 7, the route continues northwest to the directional interchange (to and from the north only) with the Hanlon Expressway which may include restrictions on existing movements between the Hanlon and Puslinch Road 15 (East).

Alternative A-3 (Figures 5.2, 5.3 and 5.4)

Alternative A-3 makes use of the existing Highway 6 right-of-way to a point 1 km north of Puslinch Road 35. It then proceeds northwesterly one-quarter of a concession to bypass Morriston, including the Morriston Pond, to the west. The new route has a directional interchange with Highway 401 for traffic to and from the west only with three sub-alternatives to accommodate additional traffic movements.

Sub-alternatives A-31 and A-32 involve introducing a connecting link (Connection Road) between new and existing Highway 6 north of Morriston to provide service for north-south and east-south traffic. The major difference between the two options relates to the intersection point of the connecting link and existing Highway 6. Sub-alternative A-31 employs a T-intersection adjacent to the existing MTO commuter parking lot entrance, thereby creating the potential for a 4-leg junction. Sub-alternative A-32 uses essentially the same alignment but hooks directly into the existing Highway 6/Highway 401 interchange with an extension of the west-south ramp through the Connection Road at-grade to merge with existing Highway 6. This is a modification of the existing single lane throat, T-intersection configuration.

Sub-alternative A-33 employs a different concept in that it involves a northwesterly extension of Alternative A-3 as it diverges from existing Highway 6 to the mid-concession line in Concession VII and proceeds to a trumpet interchange with Highway 401. All moves are provided at the interchange and no connecting link to existing Highway 6 north of Morriston is required (refer to Figure 5.4).

All three sub-alternatives would cross Calfass Road at grade with a local realignment of the township road with A-33 to create acceptable intersection geometric characteristics. Alternative A-3 then utilizes Highway 401 to connect with the Hanlon Expressway at the existing Highway 401/Hanlon interchange (refer to Figure 5.3).

Alternative A-5 (Figures 5.2 and 5.3)

Alternative A-5 provides a close bypass of both the Hamlet of Puslinch and Village of Morriston to the west. This route uses existing Highway 6 to a point 400 m south of Maddaugh Road where it diverges northwesterly to an alignment approximately 200 m west of and parallel to existing Highway 6. Grade separations (overpasses) are introduced at Fielding Lane, the CP Rail Galt Subdivision and the farm lane on Lot 37 Rear Gore.

The new route intersects Puslinch Concession Road 1 (Crieff Road) at grade and proceeds north along the quarter concession line and crosses Calfass Road at grade to interchange with Highway 401 in a manner similar to Alternative A-3. Sub-alternatives A-31 and A-32 are considered in association with Alternative A-5.

SERIES C ALTERNATIVES

The two Series C Alternatives (Central Corridor) make use of property lines and existing road and utilities easements and rights-of-way to bypass Puslinch and Morriston to the west and connect to Highway 401 and the Hanlon Expressway.

Alternative C-5 (Figure 5.4)

From the common divergence point at Freelton Road, Alternative C-5 proceeds northwest on the south side of and parallel to the 115 kV Ontario Hydro easement. The route crosses Concession Road 10 West, Gore Road and Crieff Road at grade with local modifications at the intersection points to maintain property access and ensure acceptable geometric characteristics. The route employs an overpass of the CP Rail Galt Subdivision.

At the intersection of Crieff Road and Puslinch Concession Road 7, the route swings northeast and runs west of and parallel to the 500 kV Ontario Hydro right-of-way to a Parclo B interchange with Highway 401 approximately 1.4 km west of the existing Brock Road/Highway 401 interchange.

The route continues north of Highway 401 and swings northwest towards the Hanlon Expressway, to link with the route section common with Alternative A-1 at a point approximately 300 m south of County Road 34.

Alternative C-7 (Figures 5.3 and 5.4)

As in Alternative A-1, Alternative C-7 includes two optional points of divergence from existing Highway 6.

The first option involves using the Alternative C-5 routing adjacent to the 115 kV hydro easement to a point approximately 300 m south of the CP Rail line and swings north to pass over the railway corridor to a mid-concession (Puslinch Concession VII) alignment north of Crieff Road.

The second option employs the same divergence point as Alternative A-5 and proceeds either west along Concession Gore rear lot lines and then swings north (Sub-alternative C-71), or northwest across Crieff Road into the mid-concession VII alignment (Sub-alternative C-72). Both sub-alternatives cross Crieff Road at grade; C-72 includes an overpass of Fielding Lane and local realignment of Crieff Road to obtain acceptable geometric characteristics.

North of Crieff Road, Alternative C-7 follows the mid-concession routing to either a trumpet interchange with Highway 401 or a simpler west-oriented directional configuration and a new Connection Road to the existing Brock Road/Highway 6 interchange to accommodate north and east traffic movements (Sub-alternative C-73). Major variations in the profile of the route are related to whether the new highway is grade separated from Calfass Road.

From its new interchange point, the route utilizes a widened Highway 401 to connect with the Hanlon Expressway at the existing interchange (refer to Figure 5.3).

SERIES D ALTERNATIVE

The Series D Alternative (West Corridor) makes maximum use of the existing Highway 6 corridor and local road rights-of-way to bypass Morriston to the west and connect directly to the Hanlon Expressway at the existing Highway 401 interchange.

Alternative D-6 (Figure 5.5)

Alternative D-6 uses the existing Highway 6 corridor to Crieff Road. The Crieff Road corridor is used with local road realignment in the vicinity of the divergence point from existing Highway 6 to maintain road network links and minimize property impacts.

The route proceeds north in the Puslinch Concession Road 7 corridor with widening on the east side to avoid costly relocation of the 115 kV Ontario Hydro tower line to the west. Reconfiguration of the Crieff Road/Concession Road 7 intersection is introduced to provide acceptable geometric and operational characteristics.

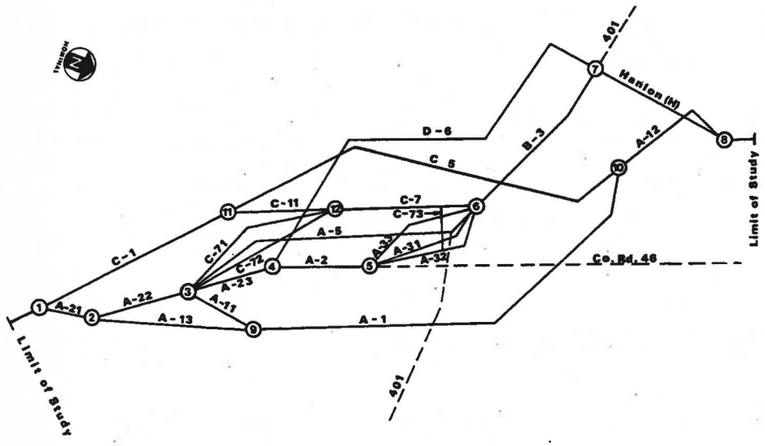
After proceeding west in the Puslinch Concession Road 2 corridor, the route swings north to connect with the Hanlon Expressway at the existing Highway 401/Hanlon interchange. Local modifications and closure are introduced on Concession Road 2 to retain the appropriate road network links.

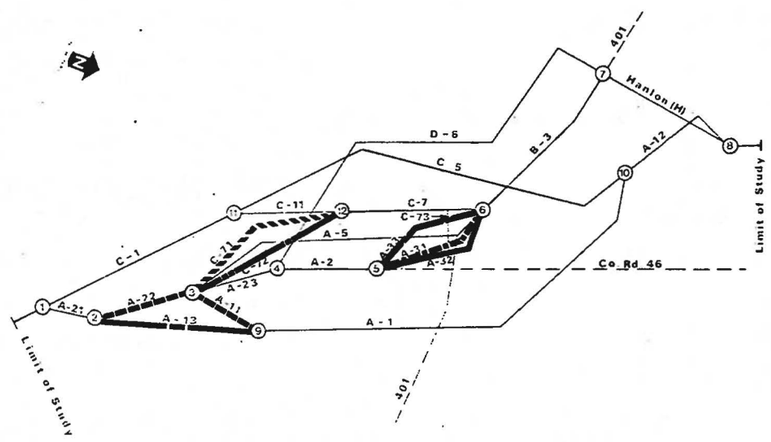
5.4.3.4 Rationale for the Selected Route Location Alternative

A comparative analysis and evaluation of the route location alternatives described in Section 5.4.3.3 was conducted using the evaluation criteria and methodology outlined in Section 5.2.

The following text summarizes the results of the 7-stage link elimination process. The first five stages were oriented primarily to eliminating localized link alternatives and selecting the option most suitable for incorporation in the broader route alternatives. Emphasis is placed on describing the most determinant factors in these stages. All of the factors are summarized for the last two stages. The more detailed Staged Route Alternatives Assessment is included in Appendix E. A schematic representation of the links considered in each stage is presented in Figure 5.6. Reference should also be made to Figures 4.1, 4.2 and 4.3 for specific impacts.

This exercise was conducted in co-operation with other study participant groups. The route evaluation procedure itself involved assessments at the Project Team Level and refinement at the Technical Committee level. At the Technical Committee session (February 5, 1986) alterations to the initial factor weighting were introduced to the effect that the Safety, Communities and Noise factors received increased weighting while others (cost in particular) were downgraded in importance (refer to Table 5.1). This resulted in the selection of a different alternative as the technically preferred option (Alternative C-7) than during the initial (Project Team) evaluation (Alternative A-3). The emphasis on the Safety factor was particularly instrumental in producing the final result since Alternative C-7 included a significantly larger proportion of new route than Alternative A-3, thereby avoiding numerous existing traffic conflict points (entrances) and creating a safer driving environment.

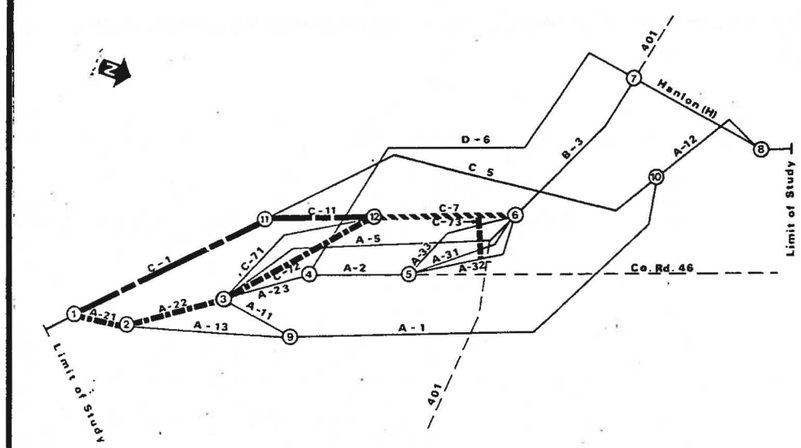




STAGE 1 : A-22/A-11 VS A-13 (A-13)

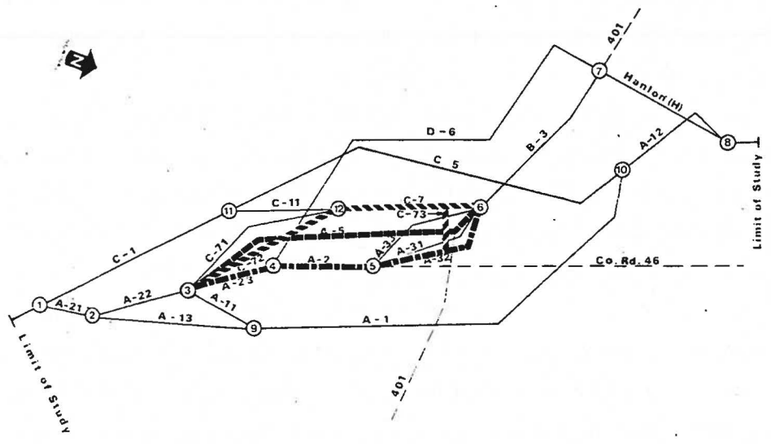
STAGE 2 : A-31 VS A-32 VS A-33 (A-32)

STAGE 3 : C-71 VS C-72 (C-72)

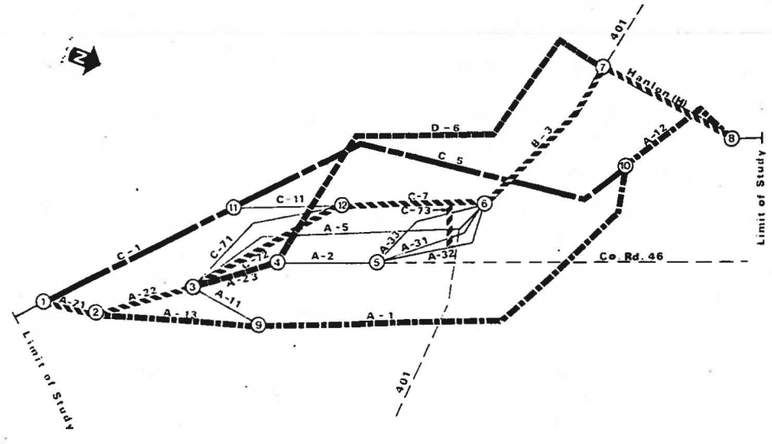


STAGE 4 : A-21/A-22/C-72 VS C-1/C-11 (C-72)

STAGE 5 : C-7 VS C-73 (C-73)



STAGE 6 : A-5 VS C-72/C-73 VS A-23/A-2/A-32



A-1 : A-21/A-13/A-1/A-12 VS C-5 : C-1/C-5/A-12 VS

STAGE 7 : D-6 : A-21/A-22/A-23/D-6/H

FINAL : C-7 : A-21/A-22/C-72/CC-7/C-73/B-3/H

HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

Figure 5.6

ROUTE LOCATION EVALUATION LINKS

Stage 1 Summary - Link A-13 vs Link A-22/A-11

The major differences are related to safety and the natural environment.

Link A-13 would create negative impacts to aquatic resources, wetlands and forestry management areas on and adjacent to the West Bronte Creek.

Link A-22/A-11 received a lower rating for safety since it would create 2 T-intersections within an undesirable distance (100 m). It would also create more conflict points, since it retains 23 entrances over a distance of 1,900 m.

Link A-13 would also result in noise increases for fewer homes.

The costs for A-13 would be approximately $1 Million higher than those for A-22/A-11.

Link A-13 most effectively satisfies the project objectives and was unanimously selected, but only by a margin of 2.4%, to become part of the Alternative A-1 for further stages in the evaluation.

Stage 2 Summary - Link A-31 vs Link A-32 vs Link A-33

Links A-31 and A-32 are similar with respect to their effects on the natural environment. Both would require a small portion of the Ministry of Natural Resources' forestry management area north of Morriston and would likely displace a small Class 7 wetland adjacent to existing Highway 6.

The main advantage of A-32 is its capability to provide the highest degree of flow for North-South and return traffic, thereby reducing impacts to Morriston.

Link A-33 would require the largest portion of the Ministry of Natural Resources' forestry tract as well as displacing part of a high productivity hardwood stand to the west of this area. This link would also result in 3,500 more vehicles travelling on Highway 6 through Morriston on a daily basis than would the other two options.

Five of seven Project Team members selected Link A-31 as the most desirable alternative. The other two selected Links A-32 and A-33, primarily on the basis of perceived superior traffic service characteristics. On average, Link A-31 was rated 7.5% and 6.9% higher than Links A-33 and A-32 respectively.

Therefore, Link A-31 was considered to most effectively satisfy the project objectives and was selected to become part of Alternatives A-3 and A-5 for further stages in the evaluation.

Stage 3 Summary - Link C-71 vs Link C-72

Both of these sub-alternatives would affect the Fletcher Creek Swamp Forest, which is a wetland resource of provincial significance, particularly with respect to deer activity and waterfowl areas, as well as surface water and groundwater recharge potential. However, the effects of C-72 are limited to minor encroachment on the northeast fringe of the wetland while C-71 would result in severance of the sensitive areas.

Link C-72 would also create less significant impacts to agricultural operations than Link C-71.

Link C-72 most effectively satisfies the project objectives and was unanimously selected, by a margin of 9.2%, to become part of Alternative C-7 for further stages in the evaluation.

Stage 4 Summary - Link A-21/A-22/C-72 vs Link C-1/C-11

The major points favouring Link A-21/A-22/C-72 are the comparatively fewer impacts to the natural environment and less significant potential noise impacts.

Impacts to Fletcher Creek associated with Link A-21/A-22/C-72 would be minor in comparison with Link C-1/C-11 which encroaches on the Beverly Swamp and severs the Fletcher Creek Swamp Forest, both of which are provincially significant wetlands. In particular, deer lanes and habitat would be severed in the Fletcher Creek Swamp Forest.

Link A-21/A-22/C-72 would increase noise levels for 5 homes, including a doubling of existing noise levels for 2 homes. Link C-1/C-11 has the potential to create noise increases for 14 homes, including a doubling of existing noise levels for 8 of those. This link would also displace 3 homes.

Link C-1/C-11 is considered the safer of the two alternatives since it would retain fewer conflict points. In this regard, Link A-21/A-22/C-72 would retain 33 entrances over 2,800 m and involve 2 T-intersections within an undesirable distance (100 m).

Link A-21/A-22/C-72 would be $1.5 Million less costly.

Six of seven Project Team members rated link A-2/A-22/C-72 higher by an aggregate margin of 6.1%.

Therefore, Link A-21/A-22/C-72 was judged to most effectively meet the project objectives and was selected to become part of Alternative C-7 for further stages in the evaluation.

Stage 5 Summary - Link C-7 vs Link C-73

Sub-alternative C-73 was developed as an option to the interchange configuration of Alternative C-7 at Highway 401 in an attempt to improve local road access and reduce costs. It involves providing a connecting link between new Highway 6 and the existing Brock Road/Highway 401 interchange north of Morriston and reducing construction and property requirements at the new interchange with Highway 401 to the west.

The connecting link (C-73) and simplified new interchange are favoured over the more complex interchange at Highway 401 for the foregoing reasons. The lower degree of continuity for East-South and reverse traffic is not considered a major detracting feature since these are minor moves.

Five of seven Project Team members favoured Link C-73 which was rated higher by an aggregate margin of 3.9%.

Link C-73 most effectively satisfies the project objectives and was selected to form part of Alternative C-7 for further stages in the evaluation.

(Note: Although the original interchange configuration for C-7 was now eliminated, the general concept associated with it remained. Thus, the reference to the C-7 designation in further stages.)

Stage 6 Summary - Link A-3 vs Link A-5 vs Link C-7

The sixth stage of the evaluation addressed the most appropriate highway routing in the Puslinch and Morriston areas. The following is a consolidated comparative analysis for the most significant determining factors.

TRAFFIC	All three are equal in traffic service but A-3 retains the most traffic through Puslinch/Morriston (negative).
CONVENIENCE	C-7 is marginally better than A-5 due to access requirements at severed farm properties on A-5; A-3 retains many existing entrances (negative).
SAFETY	As per "Convenience", plus A-3 has substandard design at the CP Rail overpass.
FORESTRY	A-3 and A-5 create similar impacts; C-7 displaces the most Class 1 and 2 resources.
VEGETATION AND WILDLIFE	A-3 creates marginally fewer negative impacts than A-5; C-7 creates the most impacts to wetland areas (Fletcher Creek Swamp Forest) and wildlife habitat (Crieff Old Field Complex/Fletcher Creek/farm woodlots)
COMMUNITIES	C-7 is marginally better than A-5; A-3 reduces the integrity of Puslinch/ Morriston and displaces 3 residences in Puslinch.
NOISE	C-7 creates the most severe impacts (9 units experience increase; doubling of noise for 3 including the Morriston Park Nursing Home); A-3 and A-5 have a similar number of units experiencing an increase (4 and 5 respectively) but impacts are greater for A-5 (doubling of noise for 4 homes)

AGRICULTURE C-7 marginally effects the most active and best lands but A-5 effects the most large blocks (7), creates the most severances and requires the most new field accesses (3); A-3 creates the least impacts.

COST C-7 would cost $3.5 Million more than A-5; A-3 would be the least expensive option.

In terms of satisfying the project objectives, Links C-7 and A-5 were scored virtually equal by the Project Team, with Link A-3 rated approximately 11% lower, primarily due to its effects on existing communities.

However, Link C-7 was selected as the option to be carried forward to the last stage in the evaluation for the following reasons:

1) The lower degree of safety and higher cost associated with providing field accesses north of Crieff Road on A-5;

2) The potential adverse impacts on existing and future development in Morriston associated with A-5;

3) The increased flexibility for profile options and treatments of Calfass Road with C-7; and

4) Five of the seven Project Team members scored C-7 the highest of the three options.

Stage 7 Summary - Alternative A-1 vs Alternative D-6 vs Alternative C-5 vs Alternative C-7

In the final stage of the evaluation, four routes connecting Freelton to the Hanlon Expressway were assessed (refer to Figure 5.6). From the technical comparison, it was determined that Alternative C-7 produces the most potential benefits and least potential adverse impacts overall.

The following is a consolidated comparative analysis of the four routes for all factors used in the evaluation:

TRAFFIC A-1 provides the best utilization of the Hanlon and relief of Brock Road; C-5 and C-7 also provide long term relief of congestion; D-6 does not provide long term relief and retains the most traffic through Puslinch.

CONVENIENCE There are some signage problems with A-1 and C-7 related to network linkages; minimal access modifications with C-5; D-6 retains the most entrances and requires the most significant modifications.

SAFETY C-5 provides the highest safety levels due to the least conflict points; A-1 and C-7 are similar; D-6 has the most accident prone areas due to entrances/geometrics.

GEOLOGY All except C-7 affect areas of large licensed and unlicensed selected sand and gravel reserves; impacts are not significant in terms of total reserves available.

FORESTRY A-1 affects the largest area of high quality hardwood stands (north of 401); C-7 affects the largest number of high quality stands; D-6 has minimal impacts.

VEGETATION AND WILDLIFE C-7 creates the least significant impacts; C-5 creates the greatest impacts to the most sensitive areas (Beverly Swamp/Fletcher Creek/Galt Creek wetlands); A-1 and D-6 impacts are also significant (Galt Creek wetland, municipal ESA's).

AQUATIC A-1 affects a significant West Bronte Creek spawning area and Aberfoyle Creek rehabilitation areas; C-5 and D-6 impacts are related to major wetland water resources; C-7 creates the least impacts.

WATER QUALITY	A-1 is of concern due to its proximity to the West Bronte Creek system (surface and ground water) and potable supply (21 wells); C-5 creates problems related to wetlands and ground water recharge; D-6 creates the most impacts to potable supply and Galt Creek; C-7 creates the least impacts.
COMMUNITIES	C-7 and C-5 create a remote bypass of Puslinch and Morriston; A-1 creates potential intrusion at Morriston/Aberfoyle; D-6 passes through Puslinch and displaces 8 residences in total.
VISUAL AESTHETICS	C-7 affords the most desirable views and has the highest mitigation potential when adverse impacts occur; A-1 creates intrusion at Aberfoyle and has low mitigation potential; C-5 creates the least appealing view of/from the road; D-6 creates the most negative effects with respect to view of the facility.
NOISE	D-6 creates the most effects with respect to serious impacts (doubling of noise for 20 homes); C-5 and A-1 have similar impacts; C-7 affects the fewest homes but includes the Morriston Park Nursing Home (mitigation potential is high).
AGRICULTURE	A-1 affects the largest amount of active and best lands and creates many severances; C-5 affects the largest number of large blocks, creates the highest number of severances (21) and results in the highest number of non-viable severances (13); D-6 displaces many farm buildings (17); C-7 creates the least significant overall impacts although it effects capital intensive operations in Concession VII Puslinch.
OTHER BUSINESS	A-1 and C-5 remove the most traffic from existing routes with highway oriented business; D-6 retains the most traffic and provides direct access for aggregate reserves south of 401; C-7 improves the potential for access to aggregate operations and reserves south of 401 but reduces passing traffic on existing routes.
BUILT ENVIRONMENT/ CULTURAL LANDSCAPE	All are similar except D-6 which displaces buildings adjacent to the existing right-of-way.
ARCHAEOLOGICAL RESOURCES	A-1 may affect 2 registered sites; no potential impacts have been identified for the other alternatives.
CONSTRUCTION	Similar except D-6 which results in more disruption of traffic on existing roads.
COST	A-1 is the most costly alternative while D-6 would be the least expensive.

Alternative C-7 was unanimously scored higher than Alternatives A-1, D-6 and C-5 by aggregate margins of 28.1%, 36.7% and 21.0% respectively.

Therefore, on the basis of the preceding 7-stage evaluation procedure, Alternative C-7 was selected as the route location alternative which most effectively satisfies the project objectives.

5.4.4 Alignment Alternatives (Initial Recommendations)

5.4.4.1 Preliminary Assessment of Alignment Alternatives

During the spring and summer of 1986, the Project Team secured agreement from all external participants with respect to the results of the Route Location phase of the study in that Alternative C-7 was endorsed as the Highway 6 route to be carried forward to the Preliminary Design phase (refer to Appendix B Correspondence). On November 6, 1986, the Minister of Transportation announced his approval of Alternative C-7 as the selected route.

For the new portion of Highway 6 (Maddaugh Road to Highway 401), the selected "route" was defined by a relatively wide (100+ m) band within which specific horizontal and vertical alignments would be developed, analyzed and evaluated based on their ability to satisfy the agreed upon project objectives and related evaluation criteria.

During the July-September 1986 period, the Project Team developed, analyzed and evaluated the alignments illustrated in Figure 5.7.

The alignments were developed to the point where right-of-way requirements could be defined, recognizing the following major controls and sensitivities for the new route section:

i) Connection with existing Highway 6 will be at Maddaugh Road;

ii) Property size, type and configuration south of the CP Rail line relative to minimizing property impacts;

iii) Minimizing encroachment on Fletcher Creek Swamp Forest Environmentally Sensitive Area (Class 1 wetland);

iv) Angle and location (relative to freight yard) of CP Rail crossing with respect to optimum structural configuration;

v) Angle and type of crossing at Crieff Road including realignment of the local road relative to desirable geometrics and traffic access requirements;

vi) Minimizing impacts to residential properties in the Crieff Road area;

vii) Balancing effects on agricultural operations in the Crieff Road area;

viii) Minimizing impacts to residential and institutional uses in the Calfass Road area;

ix) Minimizing impacts to Class 1 woodlots and forest management areas;

x) Vertical profile and structural requirements at Calfass Road vis-a-vis the new Connection Road to existing Highway 6 north of Morriston;

xi) Integration with the Highway 401 corridor; and

xii) Highway geometrics in terms of safety and comfort.

The various alignments illustrated in Figure 5.7 were initially included for the following reasons:

Alignment C-701: follows existing mid-concession lot line and minimizes property impacts south of CP Rail line.

Alignment C-702: approximates route segment C-72 which formed part of selected Alternative C-7;

Alignment C-703: minimizes impacts to Fletcher Creek Swamp Forest ESA south of CP Rail;

Alignment C-704: approximates Alternative C-7 (Note: This alignment lies on the west side of the mid-Concession VII lot line);

Alignment C-705: minimizes impacts to residential and institutional uses at Calfass Road;

Alignment C-706: variation of C-702 which eliminates significant impacts to one residential property and reduces impacts to others.

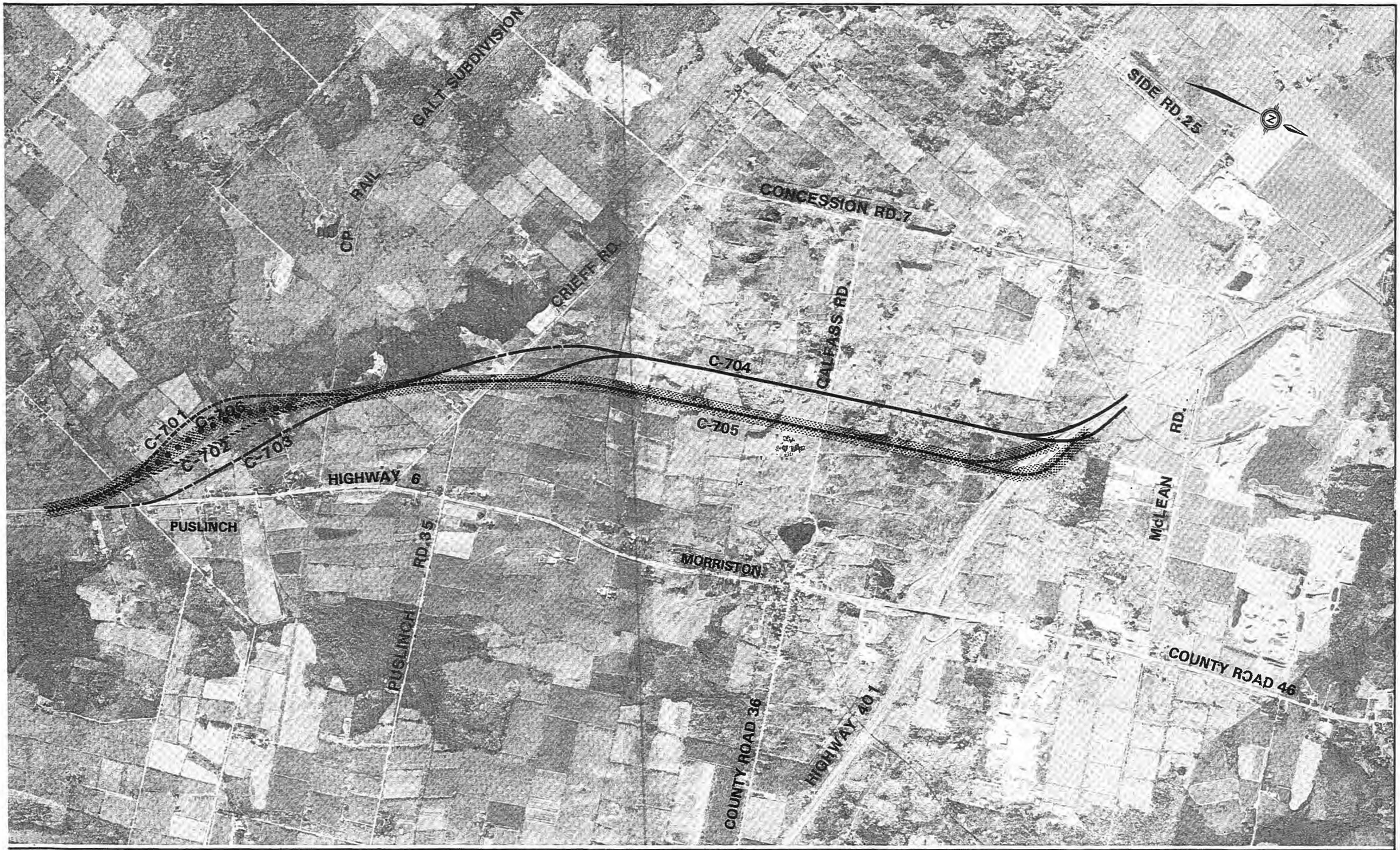
Alignment C-701 was eliminated after a cursory analysis when it became apparent that its only significant advantage (minimize property impacts) could be achieved to a large degree with Alternative C-706 while its impacts to the Fletcher Creek Swamp Forest ESA were the most severe of all the alternatives.

The Assessment of Initial Alignment Alternatives in Appendix E provides a summary analysis and evaluation of the alignments in question. The evaluation remarks are presented below.

To facilitate the exercise, and provide the flexibility for further combination of alignments, a link-by-link procedure was adopted using the following control points:

1. Maddaugh Road to CP Rail

   C-703 exhibits marginal advantages with respect to natural environment and agricultural operations but is undesirable in terms of safety and property impacts. **C-706 is preferred** because safety and social advantages outweigh impacts to the natural environment and agricultural operations.



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 500 1000m

TECHNICALLY PREFERRED ALIGNMENT

Figure 5.7
PRELIMINARY ALIGNMENT ALTERNATIVES C-701 TO C-706
(NOVEMBER 1986)

2. CP Rail to Crieff Road

C-702 is preferred because natural and economic advantages outweigh the marginal social advantage exhibited by C-703.

3. Crieff Road to Calfass Road

C-705 is preferred because it creates fewer impacts to the natural environment (particularly ground water) and the social environment. These outweigh its marginally greater economic impacts.

4. Calfass Road to Highway 401

C-705 is preferred because it creates fewer adverse impacts to the natural and social environments and is less costly.

All alignments at Crieff Road initially included a signalized intersection at Highway 6 and Crieff Road, with local realignment of Crieff Road to provide a desirable intersection angle.

The results of the initial alignment selection exercise, including the preferred alignment shown in Figure 5.7, were presented to the Technical Committee in November 1986 as part of the preliminary design proposals for the entire highway improvement package for the study area.

The Committee's approval in principle to the alignment was secured pending discussions with the Town of Flamborough and the Region of Hamilton-Wentworth regarding local reconfiguration of Gore Road and Campbellville Road.

In December 1986, the Project Team conducted meetings with individual owners from whom property would be required as a result of implementing the proposed alignment. The details and results of these sessions were reported to the Technical Committee at its January 18, 1987 meeting (refer to Appendix C).

Following the December 1986 property owners' meetings, the Project Team was generally satisfied that most of the concerns expressed could readily be addressed. However, in the vicinity of Crieff Road, it was apparent that potential impacts, particularly those to agricultural operations, were of major concern. The four properties in question and the concerns expressed are as follows:

i) D. Stewart (Part Lot 35 Gore) - expressed great concern over severance of his lot which is currently used for storage of salvage materials and as a garden plot.

ii) F. Hollenbach (Lot 34 Gore) - concern over impacts to his winter feedlot and grain handling area and the associated effects on the integrity of his cow/calf operation as a result of the realignment of Crieff Road.

iii) G. Sutton (Lot 35 Concession VII) - concern over the location and nature of the farm severance created and its effect on his dairy operation. Also concerned about potential salt spray effects, highway runoff onto his fields and access to the severed parcel via Crieff Road with heavy equipment.

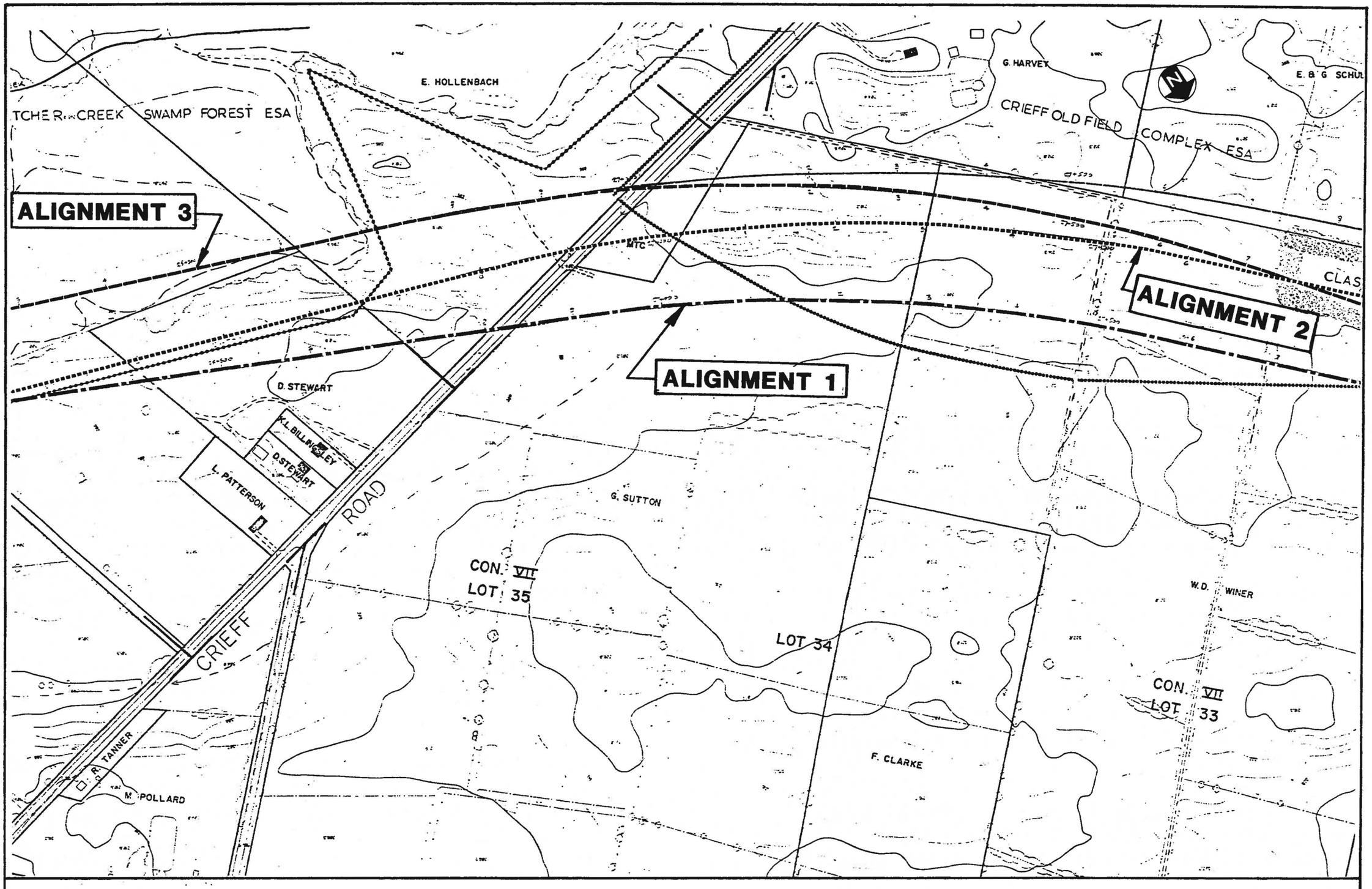
iv) W. Winer (Part Lot 34 Concession VII) - concern over amount of land landlocked due to farm severance, plus loss of woodlot on severed parcel.

With respect to the Stewart and Hollenbach properties, the Project Team was of the opinion that impacts to the former are largely unavoidable with any viable alternative in the vicinity and that the impacts to the latter are minimized with the preferred alignment.

In January 1987, based on the concerns registered by Messrs. Sutton and Winer, two additional (more westerly) alignments were developed and an assessment made of the inherent tradeoffs with respect to agricultural impacts (i.e. additional impacts to the Hollenbach operation).

As illustrated in Figure 5.8, all three alignments featured a grade separation with no interchange facility at Crieff Road. The decision to introduce this design feature was made after the property owners' meetings and is discussed further in section 5.4.3.4 Special Studies.

The analysis of only agricultural impacts of the three alignments to the Sutton, Winer and Hollenbach operations suggested that the alignment preferred by the Project Team (Alignment 1 in Figure 5.8) requires the least amount of property for the right-of-way, the least amount of active agricultural land for the right-of-way, creates the most viable severances and the least



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment & Preliminary Design Report

Figure 5.8
ADDITIONAL ALIGNMENT ALTERNATIVES 1-3
(January 1987)

amount of pressure for development for other uses (i.e. residential) and results in the least amount of active agricultural land being taken out of production.

Representatives of the Ontario Ministry of Agriculture and Food (OMAF) and the Ontario Federation of Agriculture (OFA) were consulted, concurred with the Project Team's findings (see Appendix C January 27, 1987) and confirmed their opinions by subsequently visiting the operations affected for the purposes of reconnaissance and first hand observation and discussion.

The results of this analysis of alignment alternatives were presented to the Technical Committee late in January 1987. The Committee's main concerns regarding the impacts to agricultural impacts again related to the G. Sutton and W.Winer operations and were raised by the representatives from the Township of Puslinch who enumerated their opinions as follows:

i) The preferred alternative has the most significant impact on the best soils on the Sutton Farm.

ii) An alignment utilizing the mid-concession lot line should be adhered to in order to minimize the impacts to the Sutton and Winer properties.

iii) Given that the unique characteristics of the Hollenbach winter feedlot would be lost and cannot practically be relocated elsewhere on his lot, an investigation of relocation possibilities on the adjacent (Lillycrop) property, if it were to be purchased by Mr. Hollenbach, should be conducted.

At the Technical Committee's direction, the Project Team subsequently retained Ministry of Agriculture and Food technical resources to conduct the investigation referred to in item (iii) above. The Ministry's response is included in Appendix B (see February 13, 1987 correspondence) and relates to both the initial assessment of the alignment alternatives' agricultural impacts as well as the feedlot relocation investigation.

The Ministry of Agriculture and Food expressed the opinion that the most easterly alignment (the alignment preferred by the Project Team) would have the least impact on agricultural resources. The reasons for this position are summarily stated by them as follows:

i) Mr. Hollenbach's winter feeding/shelter area is crucial to his purebred cow/calf operation. No other similar acceptable feeding area was found on his land or on Mr. Lillycrop's land. If this natural feeding/shelter area were disturbed or removed, the entire cow/calf operation would be in jeopardy.

ii) The easterly route would create field areas to the west of the proposed highway of a size useful for cultivation. The two westerly alignments would create smaller fragmented fields.

iii) Mr. Sutton would lose productive agricultural land no matter which route was selected. The drainage and salt spray impact would occur with either of the two easterly routes. This impact would need to be mitigated no matter which route were selected.

In supporting this position, the Ministry of Agriculture and Food recognized the respective concerns of Messrs. Sutton and Winer related to potential drainage/salt spray and access restrictions. Accordingly, they qualified their conclusions by stating that mitigation measures to reduce these potential adverse impacts must be undertaken.

5.4.4.2 Refinement of Alignment Alternatives

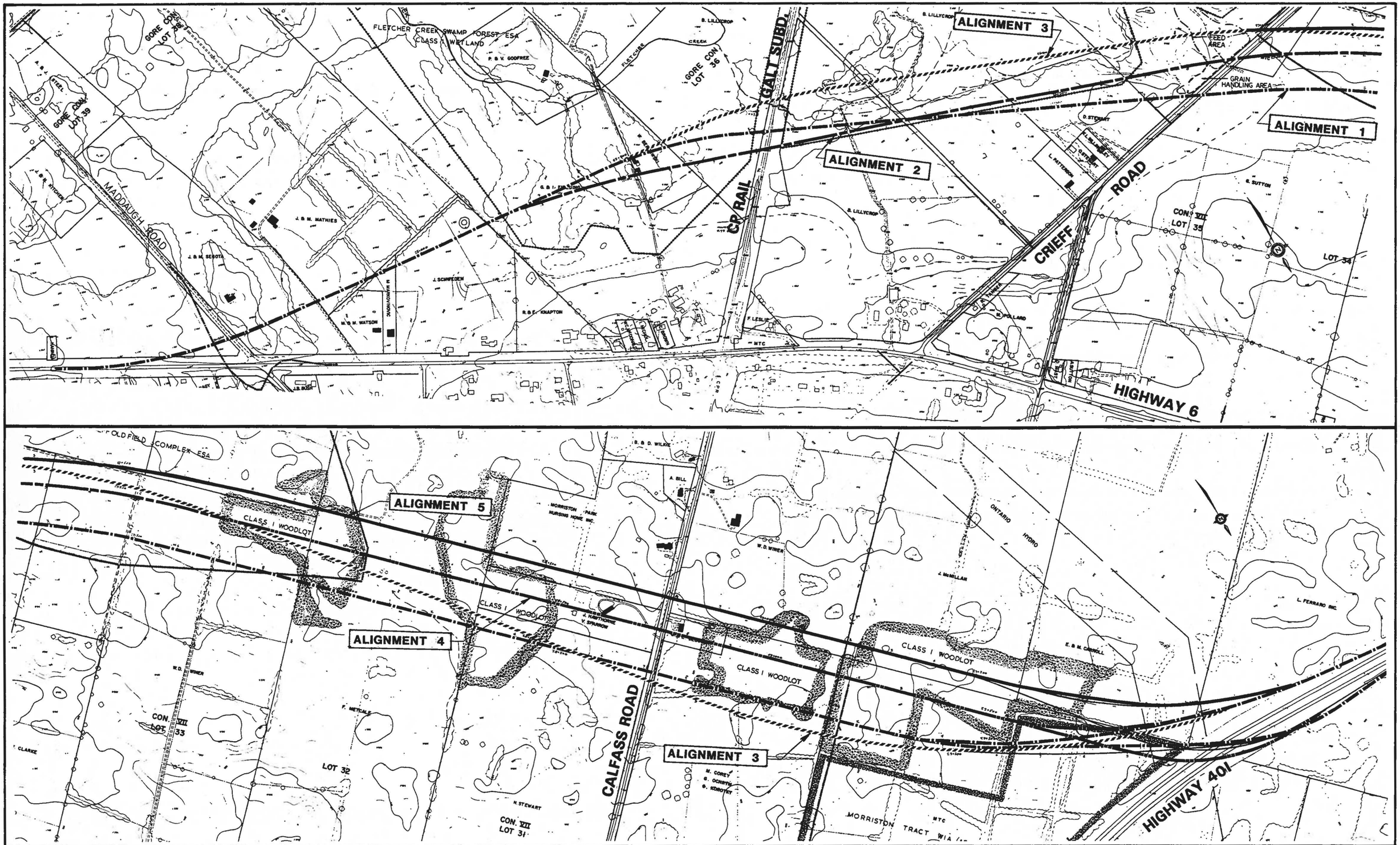
In response to external input received between December 1986 and February 1987, the set of initial alignment alternative was refined as follows and subjected to a detailed analysis for the purposes of making a final determination of the technically preferred alternative (refer to Figure 5.9 and the Refined Alignment Alternatives Assessment in Appendix E).

Alignment 1: modified to reflect property owner and OMAF/OFA concerns.

Alignment 2: located west of Alignment 1 from Lillycrop farm to Winer farm where it becomes common with Alignment 3 to Highway 401.

Alignment 3: located west of Alignments 1 and 2 between CP Rail and Winer property where it becomes common with Alignment 2 and runs northeast to cross to the east of Alignment 2 at the N. Stewart farm.

Alignment 4: common with Alignment 2 to the Winer property where it diverges to run parallel with and east of the mid-concession lot line to Highway 401.



HIGHWAY 6
FREELTON TO GUELPH

Environmental Assessment
& Preliminary Design Report

SCALE: 0 200 400 m

LEGEND
- BOUNDARY OF FLETCHER CREEK FOREST SWAMP
- BOUNDARY OF CRIEFF OLD FIELD COMPLEX
- ALIGNMENT 1
- ALIGNMENT 2
- ALIGNMENT 3
- ALIGNMENT 4
- ALIGNMENT 5

Figure 5.9
ALIGNMENT ALTERNATIVES SUBJECTED TO DETAILED INVESTIGATION

Alignment 5: common with Alignment 3 to the Sutton property where it diverges to run parallel with the mid-concession lot line on the west side to Highway 401.

Alignment 2 is an adaptation of a previous alignment with modifications south of Crieff Road to reduce adverse impacts to the Fletcher Creek Swamp Forest wetland in the vicinity of the CP Rail line.

Alignment 3 was also developed previously as part of the exercise to examine agricultural impact tradeoffs in the Crieff Road area.

Alignment 4 was introduced at the request of Technical Committee members from the Township of Puslinch to investigate alternatives as close to the mid-concession lot line as possible. Alignment 5 had been developed earlier in this regard (Alignment C-704).

5.4.4.3 Rationale for the Selected Alignment

Appendix E provides a detailed assessment of the refined alignment alternatives. This section presents a summary of the analysis and evaluation.

The limits of the assessment include the CP Rail line to the south and Highway 401 to the north (including the new Connection Road). South of the CP Rail line the alignment impacts are considered common due to the proximity of the options. Between the CP Rail line and Crieff Road, references to Alignments 2 and 3 include impacts for Alignment 4 and 5 respectively since they are common.

From the analysis of the five candidate alignment alternatives, the Project Team reached the following conclusions:

Alignment 1

Alignment 1 would create the least overall impacts to the natural environment since it is generally located on the periphery of sensitive areas. It is also the most desirable in terms of minimizing social (noise increases, visual intrusion) and economic (integrity of agricultural operations) impacts. **It was recommended that this alternative be retained for further consideration.**

Alignment 2

Without fully accounting for the mitigating effects of the depressed profile of Alignment 1, Alignment 2 is marginally preferable in terms of social impacts. Alignment 2 is marginally less desirable than Alignment 1 in terms of impacts to the natural environment. It is also less desirable in terms of the significance of impacts created to agricultural operations. **Due to the marginal nature of differences between Alignment 1 and Alignment 2, it was recommended that this alternative be developed further and considered in comparison with Alignment 1.**

Alignment 3

Alignment 3 is less desirable than either of Alignments 1 and 2 due to its potential to create more significant impacts to the natural environment and to agricultural operations (most specifically the creation of non-viable severances and impacts to the integrity of operations in the vicinity of Crieff Road). **This alternative was eliminated from further consideration.**

Alignment 4

Alignment 4 has the potential to create impacts similar to those of Alignment 2 south of Crieff Road. However, north of Crieff Road it is less desirable due to its additional adverse impacts to the natural environment (Class 1 woodlots) and the social environment (most specifically the displacement of two residences at Calfass Road and its proximity to the Morriston Park Nursing Home). **This alternative was eliminated from further consideration.**

Alignment 5

Alignment 5 has the potential to create impacts similar to those of Alignment 3 south of and in the immediate vicinity of Crieff Road. In this respect, it is undesirable. It is preferable to Alignment 4 in terms of displaced residences, but it would create the most significant proximity effects (noise/visual), specifically to the Krusch (formerly Hawthorne) and Descary properties and the Morriston Park Nursing Home. North of Calfass Road, it would create the most significant impact to agricultural activities. **This alternative was eliminated from further consideration.**

Alignments 1 and 2 both represented solutions which were technically acceptable to the Project Team. Consequently, Alignment 2 was developed in greater detail and refined for further comparison with Alignment 1.

Table 5.4 presents the comparative analysis of Alignments 1 and 2 for those factors considered to be determinant elements in the selection process and is related in terms of points in favour of each alignment. The two major areas where distinctions can be made relate to natural and economic factors.

In summary, with the exception of the need to channelize 300 m of a tributary to Fletcher Creek north of the CP Rail line, Alignment 1 is preferable with respect to impacts to the natural environment since it would cause less significant effects on the Fletcher Creek Swamp Forest and the Crieff Old Field Complex ESA.

With respect to the economic environment (agricultural operations), Alternative 2 represents a compromise in terms of distributing impacts but clearly creates additional and more significant adverse effects than Alternative 1, particularly with respect to the perceived integrity/viability of the Hollenbach operation and the potential for additional active agricultural land to be taken out of production (Sutton and Winer severances). **Based on the foregoing analysis and evaluation, the Project Team initially recommended that Alignment 1 be adopted as the technically preferred alignment for finalizing the preliminary design exercise.**

The results of the analysis and the recommended alignment were presented to the Township of Puslinch Council on May 22, 1987 with representatives of MTO Senior Management in attendance. Council's initial reaction was that the compromise solution (Alignment 2) was preferable but should be moved west to the mid-concession line fence through the Sutton and Winer properties and from there it should approximate Alignment 4 and avoid any farm severances other than the small parcel created in the Sutton farm and the bisection of the Townsend-McKinnon (formerly Metcalf) holding.

Council was advised that some compromise (westerly shift) could be introduced at Crieff Road but that the mid-concession alignment at Calfass Road is unacceptable due to the displacement of the Krusch (Hawthorne) and Descary homes and the proximity to the Morriston Park Nursing Home.

It was finally determined that a westerly shift of the alignment of approximately 20 m on the Sutton and Winer farms could be accommodated without compromising standards. This would create additional encroachment on the Hollenbach winter feedlot. In addition, it was agreed that the remainder of Alignment 2 would be retained with the exception of a marginal easterly shift (5 m) at Calfass Road to further reduce potential proximity effects to the Krusch (Hawthorne) and Descary homes.

The modified Alignment 2 was subsequently endorsed in principle by Council at a meeting held on June 11, 1987. On the evening of June 11, this alignment was presented at a meeting of owners of directly affected properties (those on which the highway right-of-way would encroach). All but three owners (Messrs. F. Hollenbach, B. Lillycrop and D. Stewart, Sr.) expressed apparent satisfaction with the proposed alignment. Subsequent efforts were made to address outstanding concerns during the preliminary design phase (refer to commitments to mitigation and further investigations in Section 6.2.2.3).

On September 30, 1987 a public information centre was held to give the public the opportunity to review progress on the Preliminary Design phase of the study and provide comments and additional information. The comments received reflected the general concurrence of study area residents and business operators with the recommended solution and the continuing concern of a number of owners immediately adjacent to the new route section.

The following is a synopsis of verbal and written comments received at and following the information centre. Some of these comments relate to localized design proposals resulting from Special Studies which are summarized in Section 5.5 of this report.

- Several attendees commented that this is the best solution to a difficult situation and expressed the hope of expeditious approval.

- There is still some concern over the indirect nature of the Highway 6 connection from the south to the Hanlon. In this regard it was suggested that the Hanlon is an incomplete freeway facility which should be extended south from Highway 401 to Freelton.

- There is uncertainty as to why the Connection Road north of Morriston is required rather than introducing moves to and from the east at the new Highway 401 interchange. The major concern is that E-S moves will still be required to make a left turn off the 401 ramp to Highway 6 (i.e. use the existing 401/Brock Road interchange which is considered unsafe and confusing).

TABLE 5.4

SUMMARY ANALYSIS OF ALTERNATIVES 1 AND 2

Factor	Alignment 1	Alignment 2
NATURAL ENVIRONMENT		
• Forestry	• Requires the removal of 18% less Class 1 woodlot area. • Affects 1 less private Class 1 woodlot	
• Vegetation and Wildlife	• Requires the removal of 27% less area from Fletcher Creek Swamp Forest (Class 1 wetland). • Requires 49% less area from Crieff Old Field Complex (South Wellington ESA 4) and does not sever the area	
• Water Quality	• Less encroachment on Fletcher Creek recharge and headwater areas.	• Avoids channelization of Fletcher Creek tributary north of CP Rail.
SOCIAL ENVIRONMENT		
• Noise	• Creates increased noise for 1 less property.	• Increases to levels over 55 dBA for 50% fewer homes[1].
• Visual Aesthetics	• Less visual intrusion since profile is in 2.5 m of cut and 1.5 m lower.	• Further removed from Hilborn (Billingsley) and Stewart homes and results in larger remainder on vacant Stewart lot (vis-a-vis attractiveness as building lot and provision of visual buffer).
ECONOMIC ENVIRONMENT		
• Agricultural Activities	• Results in 1 less severance (Hollenbach). • Requires 22% less active Class 1 and 2 agricultural land.	• Requires 2% less total property from agricultural operations; 5% less active agricultural land.

[1] Does not account for lower profile of Alignment 1

TABLE 5.4

SUMMARY ANALYSIS OF ALTERNATIVES 1 AND 2 *(cont'd)*

Factor	Alignment 1	Alignment 2
	• Requires 20% less area from Hollenbach winter feedlot; retains more of protective ridge which acts as buffer between feedlot and highway; results in larger remainder parcel.	• Retains a portion of protective ridge but not as highway buffer.
	• Exerts less development pressure for non-agricultural uses on severed Sutton parcel.	• Results in larger remainder parcel on Sutton farm but severed parcel less suitable for farming (size/configuration).
	• Exhibits superior soil conservation, drainage and salt spray retention characteristics on Sutton farm.	
	• Retains access to severed agricultural land and woodlot on Sutton farm. • Results in larger remainder parcel on Townsend-McKinnon (Metcalf) farm.	• Results in larger remainder parcel on Winer farm[2]
COST		
• Property	• Requires 3% less property; 1 less private holding.	

[2] But severance bought out resulting in larger total property requirement and potential loss of additional active agricultural land.

- The Wozniaks reiterated their opposition to the Hanlon/County Road 34 interchange proposal and its impacts to their property (refer to Section 5.5.1 Interchange Configurations at Hanlon Expressway/County Road 34).

- There is some concern that the new Connection Road will increase noise levels at residences on Calfass Road, particularly in rear yard areas.

- One resident on the east side of Freelton Road (backs onto Highway 6) requested improvements to drainage of the highway and measures to discourage trucks from using Freelton Road (Regional Road 551). In addition, he indicated that he and his neighbours would be willing to accept placement of fill (in the form of a berm) on their properties to reduce highway generated noise and that he would plant trees on the berm.

- The Harvey's still favoured a more easterly route (Alternative A-5), citing the environmental sensitivity of their farm site and the impacts to the Hollenbach and Lillycrop operations. They also took issue with the agricultural viability/status of the Sutton/Winer/Clarke holdings (i.e. retirement of operators; potential sale of land).

- Two property owners suggested that excessive consideration was afforded agricultural activities throughout the study and that Puslinch Council exhibited favouritism to one operator in particular at the expense of other business operators and residents in the route corridor during the preliminary design exercise.

- New information on the pond to be displaced by the new Connection Road at Morriston was offered. There is concern over its disappearance since it is used by the Niagara Retriever Club, Lab Owner's Club, Golden Retrievers Club to train dogs.

- Concern over perceived unsafe operating conditions at Hanlon Expressway intersections was reiterated.

- One owner requested relocation of his residence on his lot to increase the setback.

- The owner of a large horse farm in the southwest quadrant of Highway 6 and Concession Road 10 West is concerned about vehicle movements for his main access on Highway 6 (i.e. W-N turns across 2 lanes of southbound traffic) and inquired as to the possibility of the Ministry improving/extending his access from the sideroad if he agreed to close his main access. He was advised that, although this could improve the level of safety on Highway 6, any improvements to alternative access required by closures not introduced by the Ministry would be his responsibility.

- One owner on Gore Road expressed concern over retention of the offset T-intersections of Gore Road and Campbellville Road with Highway 6 in terms of safety. He was advised that the proposed increase in intersection spacing will be adequate to accommodate projected turning movements (refer to Section 5.5.3 Intersection Arrangement at Highway 6 and Campbellville Road/Gore Road).

- There was some concern expressed as to the degree of policing (re speed limits) that will be in effect on the portion of existing Highway 6 to be bypassed after it is assumed by the County of Wellington. The apparent lack of policing by the Region of Hamilton-Wentworth on former Highway 97 (now Regional Road 97) was cited as an example.

- D. Stewart Jr. reiterated his family's concern over impacts to the vacant parcel on part of Lot 35 Gore and suggested that the adjacent agricultural operation (Hollenbach) was favoured during deliberations on location of the horizontal alignment. He was advised that the Project Team still intends to meet with him on an individual basis to discuss his concerns and possible mitigation measures.

- Mr. Descary suggested that the alignment could have been moved further east to reduce proximity impacts to his property. He was advised of potential complications related to controls exerted by the Hydro Corridor at the Highway 401 interchange and geometrics to the south of his property. He suggested the alternative of a westerly shift and a buyout of both his and the Krusch (Hawthorne) properties.

In a joint meeting on November 3, 1987 the Technical and Steering Committees agreed that the modified version of Alignment 2 was the scheme which would be recommended to Councils for endorsement.

Consequently, the Project Team adopted the modified version of Alignment 2 as the solution to be finalized for preliminary design and be presented to other study participants. The cited dissatisfied owners were again approached individually during subsequent stages in the preliminary design exercise in an attempt to further identify their concerns and introduce measures to mitigate potential adverse condition changes. The results of these discussions are

presented in Section 6.2 Identified Potential Environmental Condition changes, Effects and Commitments to Mitigation.

5.4.5 Update and Supplementary Investigations - Alignment and Interchange Alternatives

As indicated in Section 3.1.1, during the pre-submission review of this Environmental Assessment Report, the Ontario Ministry of Natural Resources expressed concerns with respect to the following principal components:

- the proposed location of the new Hanlon Expressway/Wellington County Road 34 interchange;

- description and justification of impacts related to forestry/wildlife, fisheries and wetland resources, particularly as related to the preferred alignment of the new route segment between Crieff Road and Highway 401 (forestry/wildlife) and the County Road 34 interchange (fisheries and wetlands).

In response, MTO agreed to investigate additional interchange alternatives in the Hanlon Expressway/Wellington County Road 34 area and alignments on the new route section between Crieff Road and Highway 401.

5.4.5.1 County Road 34 Interchange Alternatives

Development of Alternative Interchange Concepts

The emphasis in this investigation was in attempting to develop an interchange scheme which would minimize, to the greatest extent possible, potential impacts to the provincially significant wetland in the existing Hanlon Expressway/County Road 34 intersection area, while at the same time maintaining a viable connection between the two major provincial and county roads.

In addition, the need to maintain the continuity of the County Road 34 corridor was recognized and related to its function as the major inter-regional arterial connection in the area (linking Waterloo, Wellington and Halton) and its role as an emergency/overflow route in the event of major incidents on Highway 401. Recognition of the Hanlon Expressway corridor improvement imperative of ultimate conversion to a full control of access facility was also included. This meant that any scheme developed would include removal of the existing at grade intersection.

Given the aforementioned objectives, the basic conceptual (1:5,000 scale) approach to the development of interchange alternatives involved a northerly relocation of the proposed interchange, away from the intersection area, and a grade separation of County Road 34 from the Hanlon Expressway. The five (5) concepts developed are illustrated in Figure 5.10.

The southern expansion of the City of Guelph in April 1991 is described in Section 4.3.1 of this report. It was considered prudent to examine a Hanlon Expressway interchange option in the immediate vicinity of the newly annexed area to provide ready freeway access for possible industrial and residential lands. Consequently, an additional separate concept (Alternative 6 on Figure 5.10) was developed in the vicinity of the existing Hanlon Expressway/Puslinch Road 4/15 intersection.

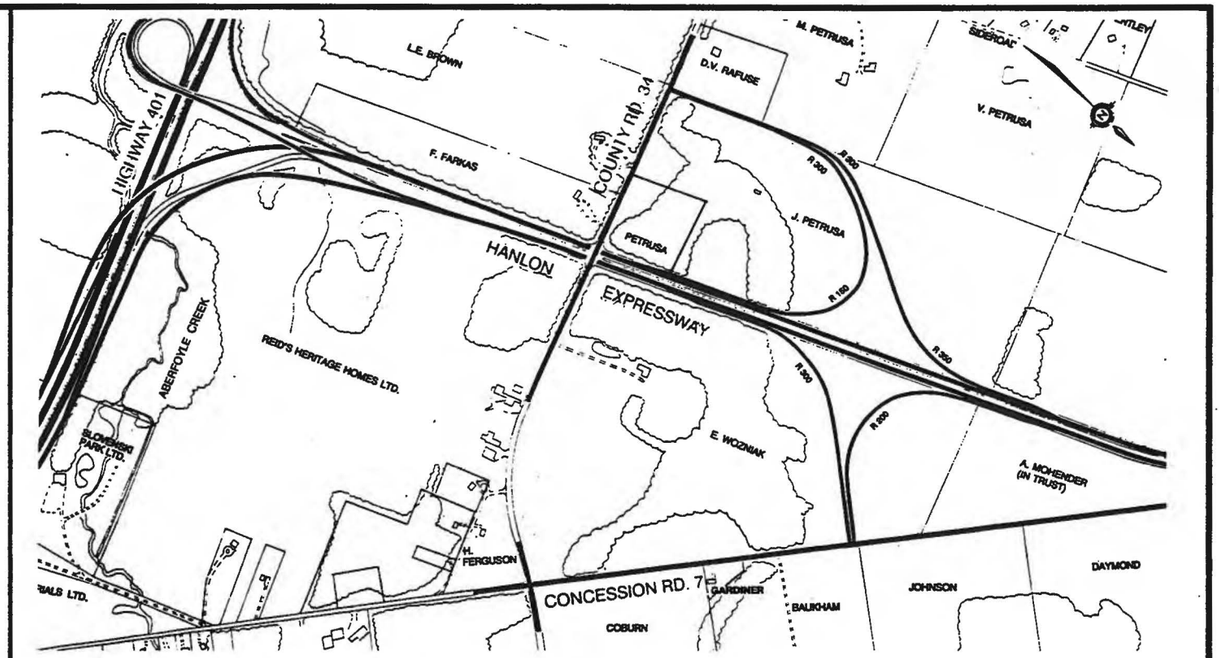
The six concepts were subsequently analyzed, in terms of potential advantages and disadvantages, and evaluated. This assessment was based on the premise that it would not be possible to construct interchanges north of County Road 34 as well as at Puslinch road 4/15 due to inadequate spacing of interchange ramps and associated weaving lengths. Further, based on demonstrated need, MTO would only fund one interchange and would only consider implementing Alternative 6 if agreement was reached with the participating municipalities that the Ministry would not be responsible for upgrading any municipal roads outside the interchange area.

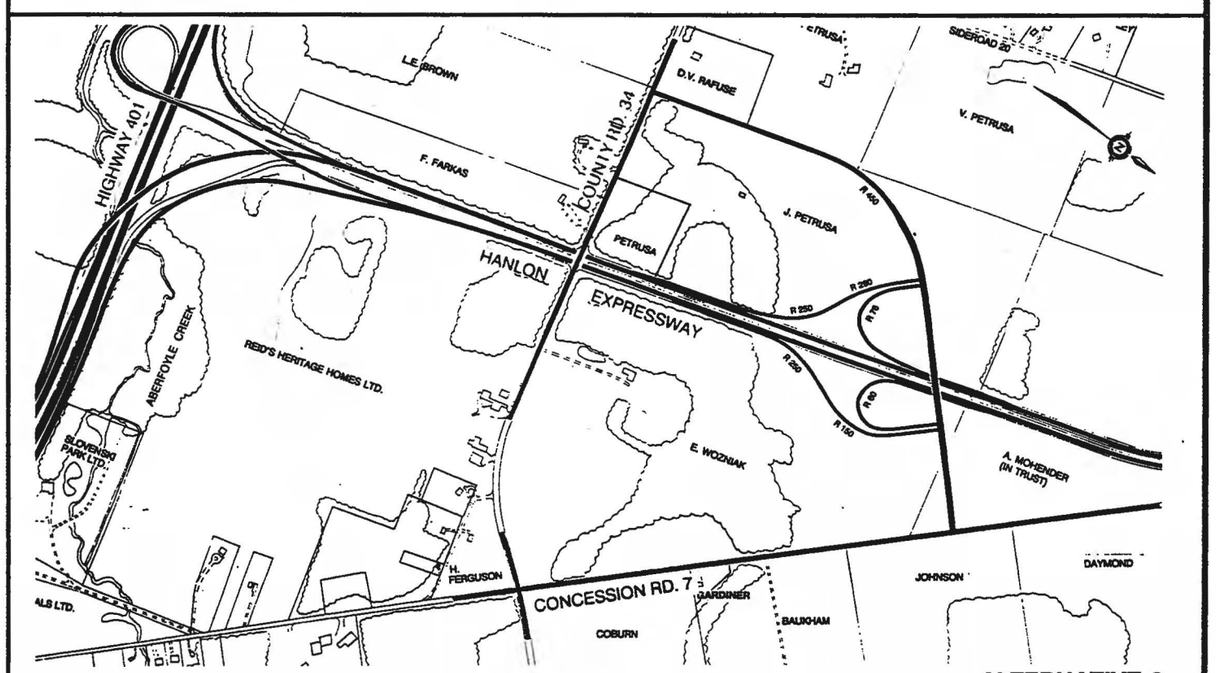
Assessment of Interchange Concepts

The **preliminary analysis (screening)** of the interchange concepts is presented in Table 5.5 and includes an indication of the ranking of the concepts with respect to their capability to satisfy project objectives. The intent of the screening process was to select one or two preferred concepts to carry forward for more detailed development (1:2,000 scale) and a comparative assessment with the scheme identified as the preferred option in 1988, modified to incorporate new construction timing and design changes in the Highway 401 corridor.

The preliminary analysis was presented at a public information centre in June 1993. Approximately 94% of those who indicated a preference favoured the County Road 34 interchange location over the Puslinch Road 4/15 location. Alternative 5 received the most support, primarily due to concerns over potential adverse impacts to homes on Sideroad 20 associated with Alternative 4. For additional details, refer to Environmental Technical Paper No. 7 which documents the results of the information centre.





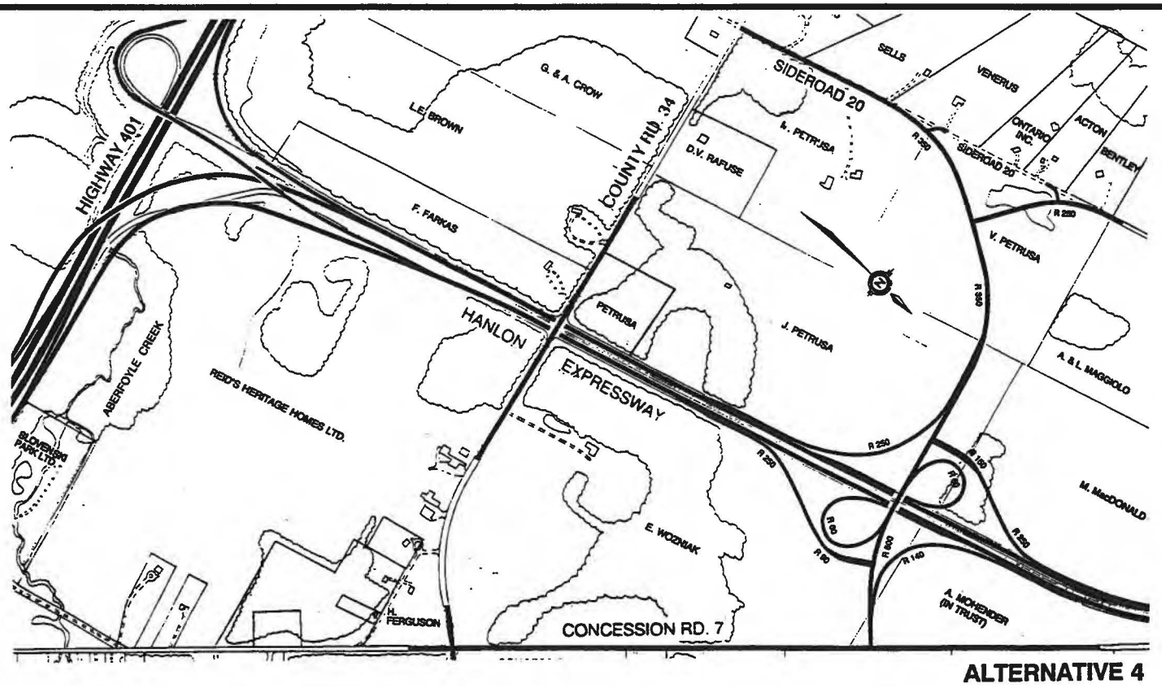


HIGHWAY 6

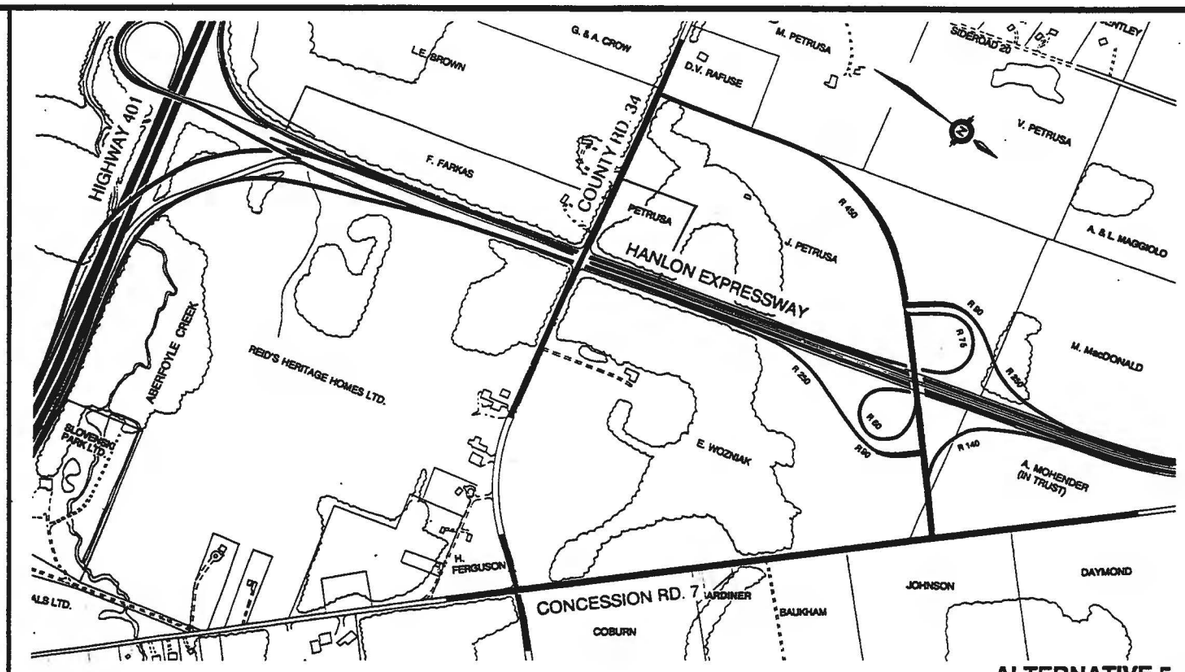
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.10a

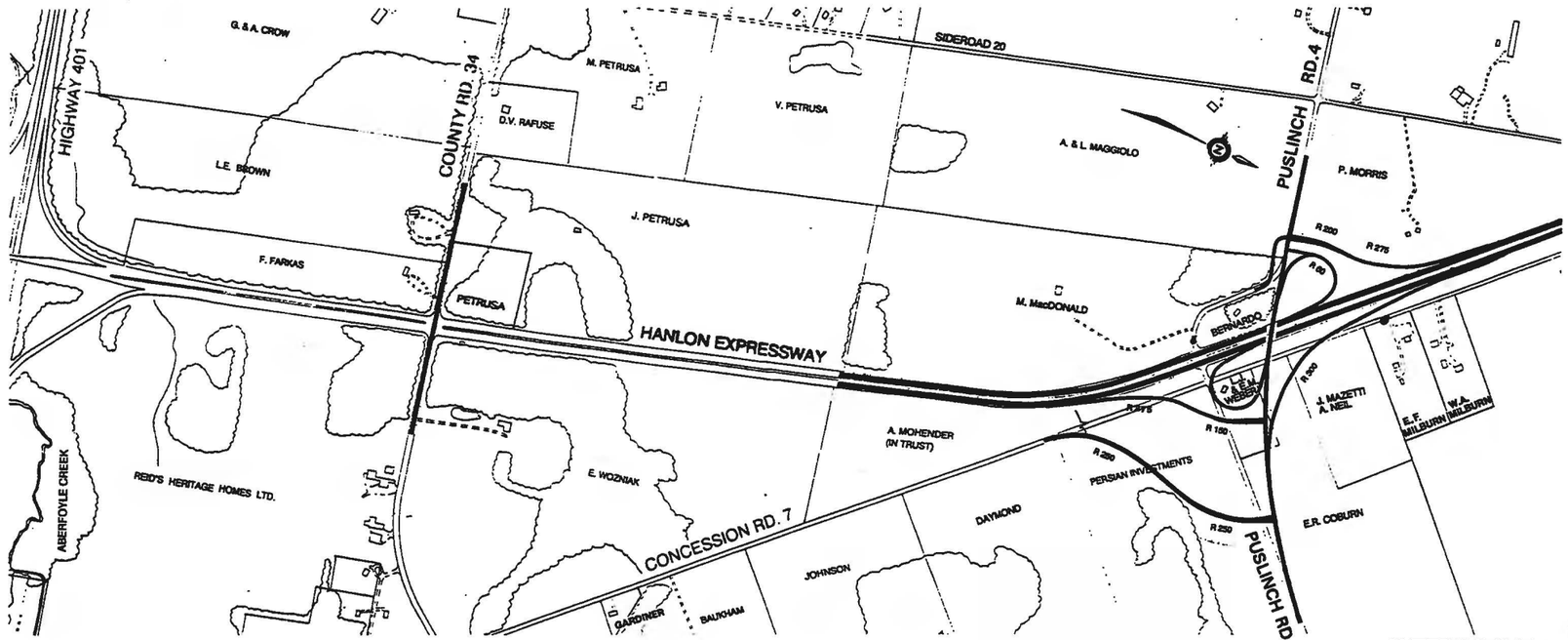
HANLON EXPRESSWAY INTERCHANGE CONCEPTS AT WELLINGTON ROAD 34 AND PUSLINCH ROAD 4/15



ALTERNATIVE 4



ALTERNATIVE 5



ALTERNATIVE 6

HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.10b

HANLON EXPRESSWAY INTERCHANGE CONCEPTS AT WELLINGTON ROAD 34 AND PUSLINCH ROAD 4/15

TABLE 5.5

PRELIMINARY ANALYSIS (SCREENING) OF HANLON EXPRESSWAY INTERCHANGE CONCEPTS

		HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE CONCEPTS					HANLON EXPRESSWAY/ PUSLINCH ROAD 4/15 INTERCHANGE CONCEPT
		ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6
Vehicle Travel Distance For DHV (veh. km)	County Rd 34 (east)	1421 vehicle km	1419 vehicle km	1488 vehicle km	1296 vehicle km	1268 vehicle km	1415 vehicle km
	County Rd 34 (west)	379 vehicle km	441 vehicle km	404 vehicle km	396 vehicle km	381 vehicle km	605 vehicle km
	Puslinch Rd 15 (northeast)	67 vehicle km	101 vehicle km	73 vehicle km	69 vehicle km	71 vehicle km	52 vehicle km
	Puslinch Rd 15 (northwest)	41 vehicle km	55 vehicle km	52 vehicle km	37 vehicle km	50 vehicle km	21 vehicle km
	TOTALS	1908 vehicle km 8% higher than Alt 5	2016 vehicle km 14% higher than Alt 5	2017 vehicle km 14% higher than Alt 5	1798 vehicle km 2% higher than Alt 5	1770 vehicle km	2093 vehicle km 18% higher than Alt 5
	RANKING	●	●	●	●	●	●
Vehicle Travel Time For DHV (veh. km)	County Rd 34 (east)	2009 vehicle min	1660 vehicle min	2215 vehicle min	1864 vehicle min	1921 vehicle min	2003 vehicle min
	County Rd 34 (west)	577 vehicle min	535 vehicle min	590 vehicle min	505 vehicle min	568 vehicle min	776 vehicle min
	Puslinch Rd 15 (northeast)	78 vehicle min	113 vehicle min	99 vehicle min	87 vehicle min	89 vehicle min	46 vehicle min
	Puslinch Rd 15 (northwest)	52 vehicle min	67 vehicle min	71 vehicle min	43 vehicle min	67 vehicle min	20 vehicle min
	TOTALS	2716 vehicle min 14% higher than Alt 2	2374 vehicle min	2975 vehicle min 25% higher than Alt 2	2499 vehicle min 5% higher than Alt 2	2645 vehicle min 11% higher than Alt 2	2845 vehicle min 20% higher than Alt 2
	RANKING	●	●	●	●	●	●
Engineering	Construction Implications	Major impact to County Road 34 alignment	Detour County Road 34 via new ramps	Detour County Road 34 via new Connecting Road	Detour County Road 34 via new Connecting Road	Detour County Road 34 via new Connecting Road	Local detour of County Road 34 or new structure offset to north
	COST	$4,919,000	$4,405,000	$6,031,000	$6,848,000	$6,249,000	$5,404,00
	RANKING	●	●	●	●	●	●

TABLE 5.5

PRELIMINARY ANALYSIS (SCREENING) OF HANLON EXPRESSWAY INTERCHANGE CONCEPTS *(cont'd)*

		HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE CONCEPTS					HANLON EXPRESSWAY/ PUSLINCH ROAD 4/15 INTERCHANGE CONCEPT
		ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6
Property Requirements	Interchange	9.6 ha	5.6 ha (on/off ramps)	8.3 ha	9.9 ha	8.0 ha	8.9 ha
	Connecting Roadways	10.2 ha	5.3 ha	3.1 ha	4.2 ha	2.9 ha	2.3 ha
	TOTAL	19.8 ha	10.9 ha	11.4 ha	14.1 ha	10.9 ha	11.2 ha
	RANKING	●	●	●	●	●	●
Property Impacts	Major Impacts	8 properties (Screened out early in process; total property requirements not calculated)	2 properties 52 ha parcel split into 40 ha and 7.5 ha parcels. 40 ha parcel split 20 ha and 12 ha parcels. * 12 ha parcel would be landlocked	1 property 40 ha parcel split into 25 ha and 8 ha parcels.	2 properties 40 ha parcel split into 33 ha and 2 ha parcels. 20 ha parcel split into 8 ha, 8 ha and 2 ha parcels.	2 properties 52 ha parcel split into 46 ha parcels. 40 ha parcel split into 27 ha and 9 ha parcels.	3 properties 40 ha parcel split into 31 ha and 5 ha parcels. 26 ha parcel split into 22.5 ha parcel. 2 ha –> buyout
	Minor Severances (Less Than 10% of Total Parcel)	4 properties	None	2 properties 4 ha severed (Wozniak) 1 ha severed (Mohender)	4 properties 5 ha severed (Wozniak) 2 ha severed (NW quad) 1 ha severed (Mohender) 0.5 ha severed (Sideroad 20)	2 properties 1 ha severed (Mohender) 1 ha severed (MacDonald)	31 ha –> 28 ha (Coburn) 7 ha –> 6.5 ha (Mazetti/Neil) 2 small severances (0.2 ha each) for Bernardo Access
	RANKING	●	●	●	●	●	●
Environmental Impacts	Natural Environment	• Severs a portion of Galt/Mill Creek wetland complex (Class 1) attending Aberfoyle Creek. Limited mitigation potential	• Avoids adjacent wetlands and woodlots	• Avoids adjacent wetlands and woodlots	• Avoids adjacent wetlands • Impacts a Class 1 woodlot • Approximately 80% of the woodlot would require removal. Unavoidable	• Avoids adjacent wetlands • Impacts a Class 1 woodlot • Approximately 80% of the woodlot would require removal. Unavoidable	• Adjacent to a significant mixed wildlife habitat area with wetland depressions, attended by tree and shrub vegetation • Offset structure (N) at Co Rd 34 encroaches upon the Galt/Mill Creek Wetland Complex (Class 1) and a Class 3 woodlot. Limited mitigation potential
	RANKING	●	●	●	●	●	●

TABLE 5.5

PRELIMINARY ANALYSIS (SCREENING) OF HANLON EXPRESSWAY INTERCHANGE CONCEPTS *(cont'd)*

		HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE CONCEPTS					HANLON EXPRESSWAY/ PUSLINCH ROAD 4/15 INTERCHANGE CONCEPT
		ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5	ALTERNATIVE 6
Environmental Impacts	Social Environment	■ Visual/noise impacts widespread throughout area. Limited mitigation potential (roadway screening) ■ Some residents will be inconvenienced as direct access is denied to the Hanlon at Co Rd 34 which will become a cul-de-sac and existing through traffic on Co Rd 34 is diverted 1 km north. Unavoidable	■ Visual impacts in vicinity of Rafuse and Petrusa properties. Vegetative and earthwork screening possible ■ Visual intrusion of flyover structure upon adjacent residences along Co Rd 34 in vicinity of the Hanlon. Limited mitigation potential ■ Some residents will be inconvenienced as direct access is denied to the Hanlon at Co Rd 34 which will become an overpass ■ 2 homes within 100 m may experience noise increases of 5 dBA. Cut sections provide some noise attenuation	■ Visual impacts in vicinity of Rafuse and Petrusa properties. Vegetative and earthwork screening possible ■ Visual intrusion of flyover structure upon adjacent residences along Co Rd 34 in vicinity of the Hanlon. Limited mitigation potential ■ Some residents will be inconvenienced as direct access is denied to the Hanlon at Co Rd 34 which will become an overpass ■ 2 homes within 100 m may experience noise increases of 5 dBA. Cut sections provide some noise attenuation	■ Visual impacts along Sideroad 20. Limited mitigation potential ■ Visual intrusion of flyover structure upon adjacent residences along Co Rd 34 in vicinity of the Hanlon. Limited mitigation potential ■ Some residents will be inconvenienced as direct access is denied to the Hanlon at Co Rd 34 which will become an overpass ■ 2 homes may experience noise increase of 10 dBA. Limited mitigation potential	■ Visual impacts in vicinity of Rafuse and Petrusa properties. Vegetative and earthwork screening possible ■ Visual intrusion of flyover structure upon adjacent residences along Co Rd 34 in vicinity of the Hanlon. Limited mitigation potential ■ Some residents will be inconvenienced as direct access is denied to the Hanlon at Co Rd 34 which will become an overpass ■ 2 homes within 100 m may experience noise increases of 5 dBA. Cut sections provide some noise attenuation	■ Visual impacts in vicinity of the interchange. Limited mitigation potential ■ Visual intrusion of flyover structure upon adjacent residences along Co Rd 34 in vicinity of the Hanlon. Limited mitigation potential ■ Some residents will be inconvenienced as direct access is denied to the Hanlon at Co Rd 34 which will become an overpass ■ 2 homes within 100 m may experience noise increases of 5 dBA. Limited mitigation potential ■ Displaces one business/ residence in the NE quadrant of Puslinch Rd 4/15 and Con Rd 7. Unavailable ■ Additional, localized changes to access will occur.
	RANKING	●	⬤	⬤	●	⬤	●

NOTE : The County Road 34 and Puslinch Road 4/15 Interchanges with the Hanlon Expressway are separate concepts. Only one of these interchanges can/will be built in this area. The exact location of the interchange will depend on the identification of area road network needs by the affect municipalities.

Capability to Satisfy Project Objectives : ● ⟶ ⬤ **Most Effective**

At a subsequent meeting (June 24, 1993), **the Steering/Technical Committee resolved to carry forward Alternative 5, modified to incorporate a Parclo A4 interchange configuration similar to Alternative 4 (hereinafter referred to as Alternative 5 - Modified).** The following points formed the primary rationale for this decision:

- results in least travel distance through interchange area;
- travel time through interchange area is comparable to the least time option (Alternative 2);
- similar to other most viable options with respect to construction implications (all require detour of County Road 34 traffic on new Connection Road during construction of County Road 34 grade separation);
- requires least property acquisition;
- creates few property severances;
- avoids adjacent wetlands;
- similar to other most viable options with respect to social environment impacts (noise, visual intrusion).

With respect to the **rejection of Alternative 6**, the following points were noted by the Committee:

- it does not offer a good connection between the interchange and County Road 34 (a County imperative);
- if one of Alternatives 1 through 5 is ultimately selected, Puslinch Roads 4 and 15 would be closed at the Hanlon Expressway as per the current MTO proposal to upgrade operations on the Hanlon. Municipalities could seek approval to construct a grade separation at Puslinch Rod 4/15 in the future in order to reinstate a crossing of the Hanlon corridor and this option would not be precluded by MTO.

The detailed analysis and evaluation of interchange alternatives involved a comparison of Alternative 5 - Modified and the interchange scheme from the Initial Recommendations, modified to reflect the following design constraints:

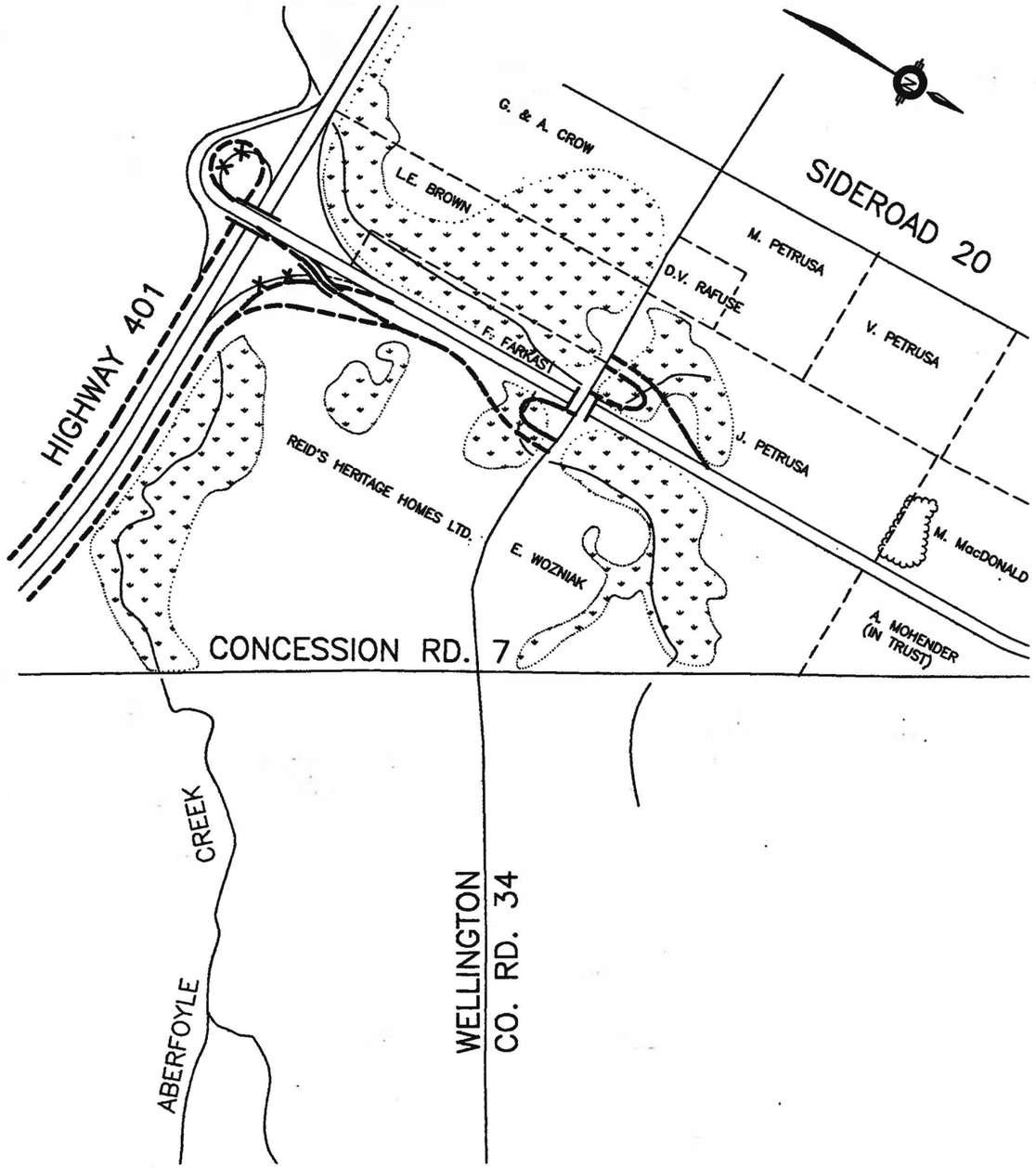
- MTO decision to replace existing N-E loop ramp at Highway 401/Hanlon Expressway interchange with fully directional N-E ramp;
- Changes in proposed highway improvements implementation timeframe (i.e. Highway 401 widening through study area will precede Highway 6 improvements), which further affects the Highway 401/Hanlon Expressway interchange configuration.

The differences between the initial scheme (Alternative 0) and the modified scheme (Alternative 7) are shown in Figure 5.11. Alternative 5 - Modified is illustrated in Figure 5.12.

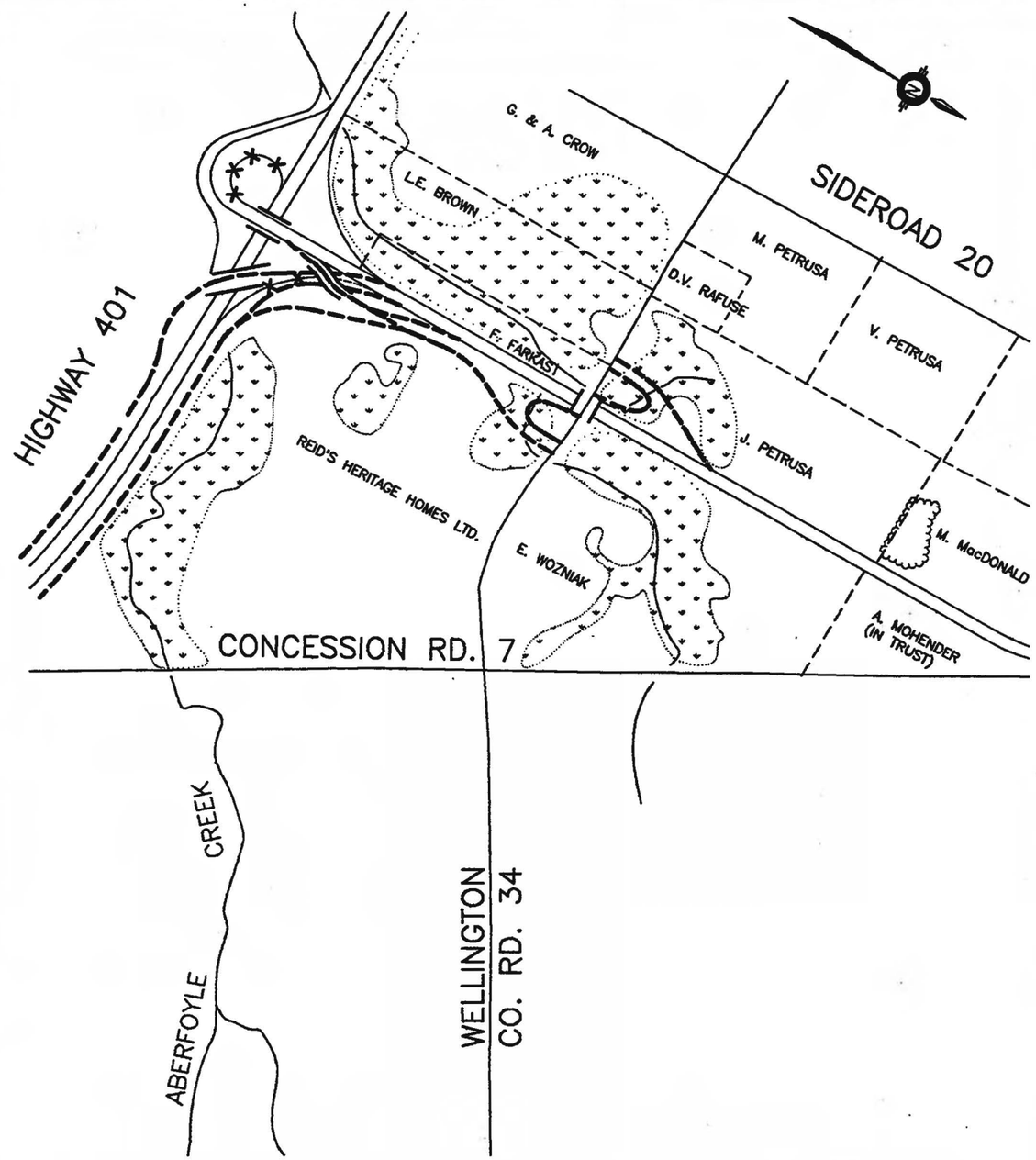
Tables 5.6 and 5.7 present the detailed comparative assessment and summary ranking, respectively, of Alternative 5 - Modified and Alternative 7. Additional details are provided in Appendices F (Natural Environment), I (Noise) and J (Agriculture). As indicated, the assessment was consolidated under four major factor group headings comprising what were considered to be the most determinant factors in the decision making process for this investigation.

In summary, Alternative 5 - Modified is the preferred interchange scheme. Although Alternative 5 - Modified does not serve traffic moving between County Road 34 and the Hanlon Expressway as well as Alternative 7, it was selected because it exhibits the following advantages:

- Much superior in terms of minimizing potential impacts to sensitive natural features
  - no construction proposed in immediate vicinity of Hanlon Expressway/County Road 34 intersection where high quality coldwater fish habitat, and spawning areas occur in association with Class 1 wetland
  - no realignment of watercourses required
  - Less encroachment of fill on adjacent wetland areas for County Road 34 grade separation
  - Loss of riparian vegetation minimal



ALTERNATIVE 0 - INITIAL RECOMMENDATION



ALTERNATIVE 7 - INITIAL RECOMMENDATION MODIFIED TO ACCOMMODATE PROPOSED CHANGES IN HIGHWAY 401 CORRIDOR

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

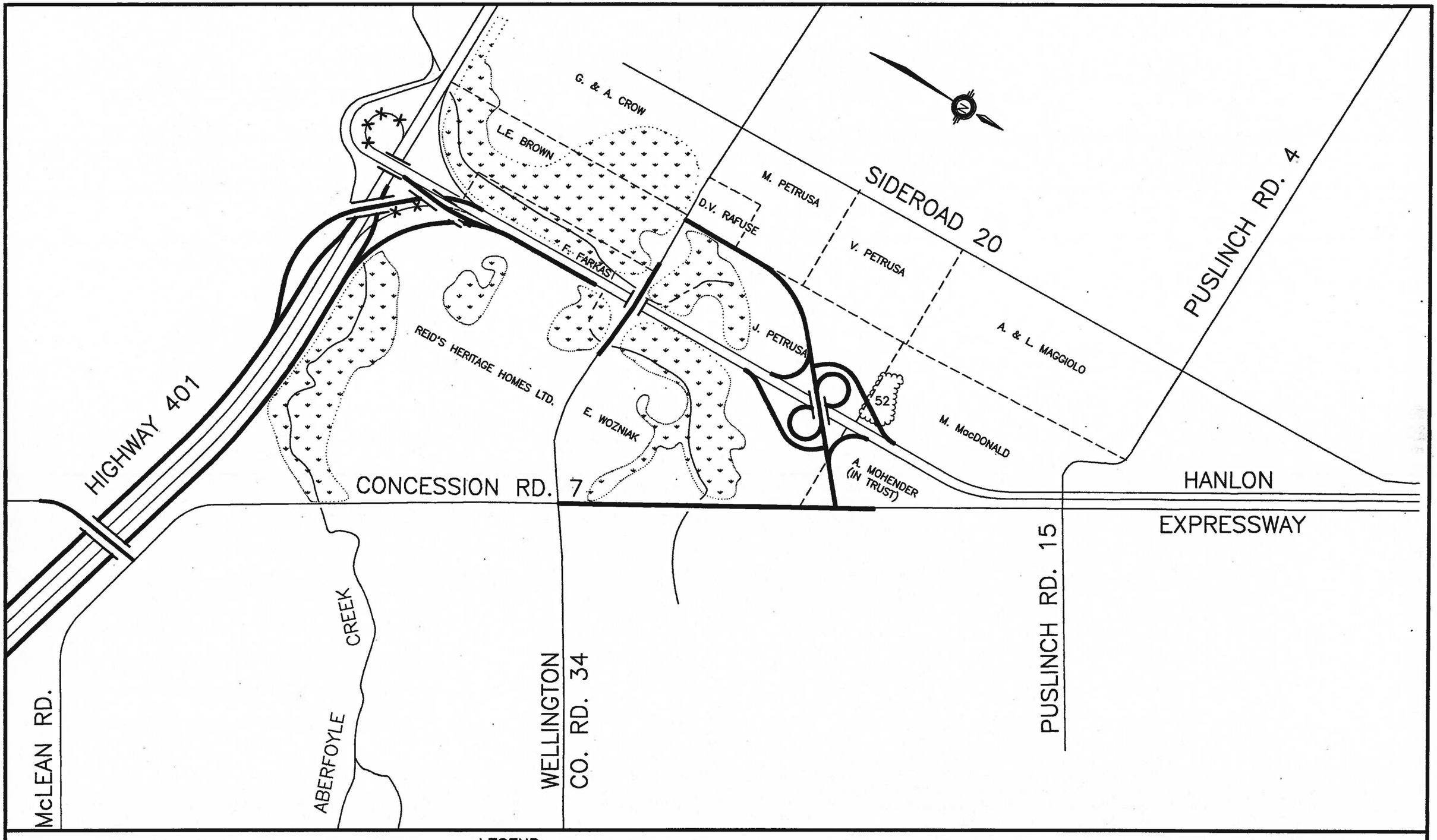
LEGEND:

WOODLOTS

WETLANDS

Figure 5.11

INITIAL AND MODIFIED INTERCHANGE SCHEMES AT COUNTY ROAD 34 INTERSECTION



HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

LEGEND:

WOODLOTS

WETLANDS

Figure 5.12

ALTERNATIVE 5-MODIFIED

TABLE 5.6

HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE ALTERNATIVES
DETAILED COMPARATIVE ASSESSMENT

AQUATIC RESOURCES

ALTERNATIVES	5 - Modified	7
RANKING	**1 (Less Sensitive)**	**2 (Most Sensitive)**
INDICATORS		
• Number of coldwater stream crossings	• one coldwater tributary crossing on Concession Road 7	• six coldwater tributary crossings located in northwest and southeast quadrants of Hanlon Expressway/County Road 34 intersection
• Number of other watercourse crossings	• Concession Road 7 • County Road 34 (east of Hanlon) • County Road 34 (west of Hanlon) *(Total of 3)*	• County Road 34 (east of Hanlon) • County Road 34 (west of Hanlon) • Northbound Hanlon offramp to County Road 34 • Northbound Hanlon onramp from County Road 34 • Southbound Hanlon onramp from County Road 34 • Southbound Hanlon offramp from County Road 34 *(Total of 6)*
• Length of stream diversion required	• None Required	• 390 m of undesignated coldwater stream
• Number of spawning/nursery areas affected	• None Affected	• 1 area in southeast quadrant of Hanlon/County Road 34 interchange
MITIGATION MEASURES	• Notify OMNR prior to instream work • Restrict instream work to avoid primary salmonoid spawning period and carry out instream work during low flow periods • Maintain riparian vegetation as much as and as long as possible • Implement standard erosion/sediment control measures • Keep surplus silt fence barrier on-site throughout construction as a contingency measure • Storage, disposal, refuelling and maintenance areas to be removed from watercourses • Ensure expeditious stabilization and revegetation of disturbed areas	• Channel realignment to include design features and mitigation to enhance fisheries potential (i.e., stream deflectors, planting along stream) • Notify OMNR prior to instream work • Restrict instream work to avoid primary salmonid spawning period and carry out instream work during low flow periods. The current regional construction window (June 15 to September 1) established by OMNR will be observed unless otherwise indicated by OMNR • Maintain riparian vegetation as much as and as long as possible • Implement erosion/sediment control measures to avoid entry of sediment laden discharge into the watercourse (e.g. sediment barriers, traps and check dams) • Keep surplus silt fence barrier on-site throughout construction as a contingency measure • Storage, disposal, refuelling and maintenance areas to be removed from watercourses • Ensure expeditious re-establishment of vegetation on removal areas and application of temporary (mulching) and permanent (rip-rap, geotextile) erosion control measure to minimize soil exposure • Compensation package most likely required to offset loss and disruption of fish habitat
NET EFFECTS	• No net effects anticipated	• No net effects anticipated

Remarks : **From an aquatic perspective Alternative 5-Modified is preferred over Alternative 7 for the following reasons :**

- **No construction proposed in immediate vicinity of Hanlon Expressway/County Road 34 intersection where high quality coldwater fish habitat, and spawning areas occur in association with the Class 1 wetland**
- **No realignment of watercourses required**
- **Minimal encroachment of fill on adjacent wetland areas for County Road 34 grade separation (Alt. 7 would entail greater impact on wetlands due to northerly shift in County Rd 34 grade separation)**
- **Loss of riparian vegetation minimal**

TABLE 5.6

HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE ALTERNATIVES
DETAILED COMPARATIVE ASSESSMENT *(cont'd)*

GEOLOGY/HYDROGEOLOGY

ALTERNATIVES	5 - Modified	7
RANKING	1 (Less Sensitive)	2 (Most Sensitive)
INDICATORS		
• Area of sand and gravel resources affected	• Primary = 0 • Secondary = 0 • Tertiary = 3.9 ha	• Primary = 1.8 ha • Secondary = 0 • Tertiary = 0
• Area of bedrock resources affected	0	0
• Number of Earth Science ANSIs affected	0	0
• Area of high potential upwelling areas affected	2.2 ha	8.9 ha
• Area of high potential recharge areas affected	3.9 ha	1.8 ha
• Number of wells potentially affected		
- directly	1	1
- within 150m of R.O.W.	0	0
MITIGATION MEASURES	• Prevent potentially contaminated roadway runoff from recharging into groundwater by use of roadside ditching • Reduce effects of dewatering by maintaining shallow operations and minimizing affected area	• Prevent potentially contaminated roadway runoff from recharging into groundwater by use of roadside ditching • Reduce effects of dewatering by maintaining shallow operations and minimizing affected area
NET EFFECTS	• Small reduction in recharge volume • Loss of a small amount of sand and gravel resources of low significance • One water well may require replacement	• Small reduction in recharge volume • Loss of a very small amount of sand and gravel resource of primary significance • One water well may require replacement

Remarks : **From a hydrogeological perspective Alternative 5 Modified is preferred over Alternative 7 for the following reasons :**
- **Potential impacts to primary sand and gravel resources are avoided**
- **Potential impacts to groundwater discharge and surface water movement are substantially reduced**

TABLE 5.6

HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE ALTERNATIVES
DETAILED COMPARATIVE ASSESSMENT *(cont'd)*

TERRESTRIAL BIOLOGY

ALTERNATIVES	5 - Modified	7
RANKING	1 (least sensitive)	2 (most sensitive)
INDICATORS		
• **Forestry Resources**		
- Class 1 & 2 woodlots	• Encroaches upon one Class 1 woodlot (Map Site 52). Total area loss includes 0.7 ha (58%)	None
- Other wooded areas	None	None
• **Ecosystem Integrity**		
- Upland Ecosystem	• Impacts 18.8 ha	• Impacts 3.9 ha
- Wetland Ecosystem	• Impacts 0.9 ha of the Galt/Mill Creek Wetland Complex - Class 1	• Impacts 8.1 ha of the Galt/Mill Creek wetland Complex - Class 1
• **Vegetation**		
- ESA's/ANSI's	• Impacts < 0.1 ha of the Galt/Mill Creek and Forest ESA	• Impacts < 0.1 ha of the Galt/Mill Creek and Forest ESA
- Other vegetation	• Impacts 17.6 ha of old-field/shrub	• Impacts 3.9 ha of old-field/shrub
- Effects on unique/rare herbaceous species or communities	• No rare species observed	• No rare species observed
• **Wildlife**		
- Effects on wildlife	• Moderate	• High
- Barrier effects on travel corridors	• Moderate	• Moderate
- Displaced wildlife habitat	• Upland forest 0.7 ha • Old-field/shrub 17.6 ha • Wetland 0.9 ha	• Upland forest (none) • Old-field shrub 3.9 • Wetland 8.1 ha
- Effects on rare/endangered wildlife species	• None	• One The Regionally rare pickerel frog has been observed in the northeast quadrant of County Road 34 and the Hanlon Expressway
MITIGATION	• Minimize removal of Class 1 woodlot, where possible	• Primary impact to Galt/Mill Creek wetland complex - Class 1
	• Protect portion of woodlot not impacted	• Other than avoidance, mitigation measures include maintain existing drainage regime and implement effective stormwater management
	• Minimize removal of old-field/shrub, where possible	
NET EFFECTS	• Unavoidable loss of old-field shrub and a portion of Class 1 woodlot	• Unavoidable loss of a portion of the Galt/Mill Creek wetland complex

Remarks : **Alternative 5 (Modified) would have significantly less impact on natural terrestrial systems. The main impact would be the removal of a considerable area of old-field/shrub habitat, which while valuable is not deemed as important as wetland. Alternative 7 would involve the removal of a significant amount of wetland and wetland forest, rare or otherwise interesting plant species and associated losses of wildlife habitat.**

TABLE 5.6

HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE ALTERNATIVES
DETAILED COMPARATIVE ASSESSMENT *(cont'd)*

AGRICULTURAL

ALTERNATIVES	5 - Modified	7
RANKING	2	1
INDICATORS		
• Property requirements from designated agricultural lands (for ROW and non-viable severances)	3.8 ha	0.9 ha
• Number of agricultural operations affected	1	0
• Class 1 & 2 land required	0 ha	0.8 ha
• Class 3 & 4 land required	1.3 ha	0.1 ha
• High intensity uses affected	0	0
• Main equipment routes/field accesses affected	0	1
• Main farm accesses affected	0	1
• Farm buildings displaced	0	0
• Large blocks of designated agricultural land affected	0	0
• Severances of active farming operations	0	0
• Development Pressure	High	High
MITIGATION MEASURES	• Minimize impacts upon active agricultural land	• Minimize impacts upon active agricultural land
NET IMPACTS	• Unavoidably, some agricultural land will be taken out of production	• Unavoidably, some agricultural land will be taken out of production

Remarks : **From an agricultural perspective there is not much difference between these two alternatives. However, based on fewer property requirements, Alternative 7 is preferred over 5-Modified. While Alternative 5-Modified does impact a greater amount of agricultural land, the lands impacted are currently inactive.**

TABLE 5.6

HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE ALTERNATIVES
DETAILED COMPARATIVE ASSESSMENT *(cont'd)*

NOISE

ALTERNATIVES	5 - Modified	7
RANKING	1	2
INDICATORS		
• Reduction or no increase	0	1
• 1 - 3 dBA increase (not perceptible)	4	3
• 3 - 5 dBA increase (minor)	0	0
• 5 - 10 dBA increase (moderate)	0	0
• 10^{+} dBA increase (significant)	0	0
MITIGATION	Not required	Not required
NET EFFECTS	No net effects anticipated	No net effects anticipated

Note : **The indicator measure is the number of single dwellings experiencing the subject noise level change.**
Remarks : **From a noise perspective both alternative 5-Modified and 7 will result in noise increases less than 3 dBA (not perceptible). Thus, neither alternative is preferred over the other.**

TRAFFIC SERVICE

ALTERNATIVES	5 - Modified	7
RANKING	1	2
INDICATORS		
• Traffic Operations	Good Weave between Highway 401 interchange and County Road 34 interchange is greater than 1000m.	Less than desirable E-N Ramp - consecutive exits for Hwy 401 west and County Road 34 are 450m apart on R=450m curve. W-N Ramp County Road 34 exit is 250m beyond vertical curve on a horizontal curve. County Road 34 entrance to Hwy 6 and Hwy 401 N-E Ramp - 750m weave.
• Interchange Configuration	Standard Parclo A-4. However for the most part requires turning left onto Connection Road.	Parclo A-2 - left turn required for W-S and E-N moves.
• Impacts on Adjacent Roads	Traffic moving between County Road 34 and Hwy 6 (Hanlon) is directed onto Concession Road 7 which is presently a local road.	None

Remarks : **From a traffic service perspective Alternative 5-Modified is preferred due to the better traffic operations along the Hanlon Expressway.**

TABLE 5.6

HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE ALTERNATIVES
DETAILED COMPARATIVE ASSESSMENT *(cont'd)*

CONVENIENCE

ALTERNATIVES	5 - Modified	7
RANKING	2	1
INDICATORS		
• Access to Hwy 6	Most of the traffic in the vicinity seeking access to Hwy 6 is from County Road 34. The traffic to/from Hwy 6 south must travel approx 2 km further than with Alternative 7.	Direct access to Hwy 6 from County 34.
• Access to Private Property	County Road 34 - 1 residential entrance (Farkas) requires relocation, 3 residential entrances require regrading. Concession Road 7 - 3 residential and 3 field entrances require regrading.	County Road 34 - 1 residential entrance (Farkas) requires relocation - 3 residential entrances require regrading. It should be noted the impact on the Farkas entrance is less since County Road 34 is shifted north and the relocated driveway can utilize the existing County Road 34 right-of-way.
Remarks : **From a convenience perspective Alternative 7 is preferred due to its more direct access to the Hanlon Expressway from County Road 34 and lower degree of impact on private access.**		

CONSTRUCTION IMPLICATIONS

ALTERNATIVES	5 - Modified	7
RANKING	2	1
INDICATORS		
• Road/Traffic Disruption	Close County Road 34 during underpass construction. Detour via Connection Road.	County Road 34 Structure offset to the north. Disruption to County Road 34 only to build ends of the approaches.
• Major Utilities Relocation	4 Ontario Hydro towers relocated on 125kV line parallel to Concession Road 7.	None
Remarks : **From a construction implications perspective Alternative 7 is preferred since a major detour would not be required.**		

COST

ALTERNATIVES	5 - Modified	7
RANKING	2	1
INDICATORS		
• Construction		Construction cost approximately $1.5 million less than Alt 5-Modified.
• Property		Requires approximately 8 ha less land than Alt 5-Modified.
Remarks : **From a cost perspective Alternative 7 is preferred.**		

TABLE 5.7

SUMMARY RANKING
HANLON EXPRESSWAY/COUNTY ROAD 34 INTERCHANGE ALTERNATIVES

ALTERNATIVES	5 - Modified	7
CONSOLIDATED	**13**	**14**
FACTORS		
Natural Environment		
• Aquatic Resources	1	2
• Geology/Hydrogeology	1	2
• Terrestrial Biology	1	2
Socio-Economic Environment		
• Agriculture	2	1
• Noise	1	2
Service to the Public		
• Traffic Service	1	2
• Convenience	2	1
Engineering		
• Construction Implications	2	1
• Cost	2	1
REMARKS	• Much superior in terms of minimizing potential impacts to sensitive natural features. • Only marginally less desirable with respect to socio-economic impacts. Agriculturally designated lands are inactive. • Superior in terms of traffic operations along the Hanlon Expressway.	• Net effects include impacts to natural features which may be difficult to mitigate. • Only marginally preferable with respect to socio-economic impacts. • More desirable in terms of convenience to County Road 34 users. • Less costly and less construction detouring required.

- Potential impacts to primary sand and gravel resources are avoided

- Potential impacts to ground water discharge and surface water movement are substantially less

- Avoids removal of a significant amount of wetland and wetland forest, rare or otherwise interesting plant species, and associated losses of wildlife habitat

• Only marginally less desirable with respect to socio-economic impacts

- designated agricultural lands affected are currently inactive

- comparable noise impact (less than 3 dBA increase over "Do Nothing" option; imperceptible)

• Superior in terms of traffic operations along the Hanlon Expressway
  - more desirable weaving distances and ramp geometrics

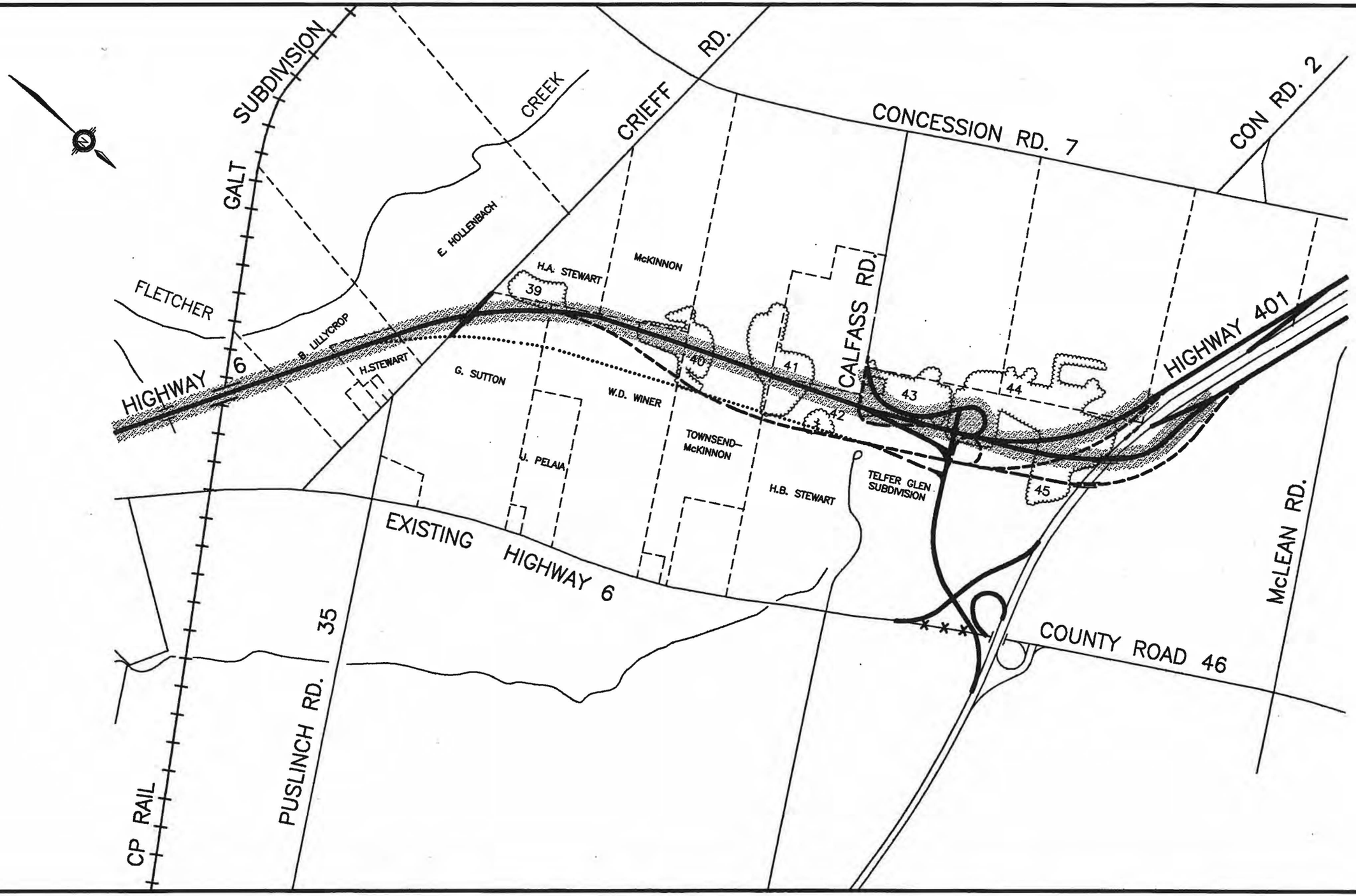
These conclusions and the adoption of Alternative 5 - Modified as the preferred interchange scheme were endorsed by the Steering/Technical Committee at its January 4, 1994 meeting.

5.4.5.2 Crieff Road to Highway 401 Alignment Alternatives

The objective of this investigation was to determine whether there exists a more reasonable alignment for the new route section between Crieff Road and the Calfass Road-Highway 401 area in terms of more balanced impacts on the natural environment, and the terrestrial biology component in particular.

Development of Alternatives

Due to the extensive nature of previous investigations completed during preliminary design with respect to the assessment of alignment options, the development of conceptual alternatives was considered unnecessary and a preliminary design level of detail (1:2,000 scale) was initiated. In addition to the preferred alignment from the Initial Recommendations (Alignment 1 in Figure 5.13), two new alignment alternatives were developed.



HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

LEGEND:

- ALTERNATIVE 1
- ALTERNATIVE 2
- ALTERNATIVE 3
- PREFERRED
- WOODLOTS

Figure 5.13

ALIGNMENT ALTERNATIVES
CRIEFF ROAD TO HIGHWAY 401

- Alternative 1 - the original rationale for this alternative was to optimize preservation of agricultural land by remaining relatively close to the rear lot lines in Concession VII. This advantage was offset by the severance of mature Class 1 woodlots.

- Alternative 2: the objective of this option was to minimize impacts to the affected woodlots, by swinging the alignment to the east, while at the same time attempting to preserve the integrity of the Sutton farm at Crieff Road (i.e. stay as close as possible to the line fence).

- Alternative 3: this option achieves total avoidance of the Class 1 woodlots by introducing a relatively tangential alignment approximately 300 m east of the line fence.

Assessment of Alignment Alternatives

Tables 5.8 and 5.9 present the detailed comparative assessment and summary ranking, respectively, of Alternatives 1, 2 and 3. Additional details are provided in Appendices F (Natural Environment), I (Noise) and J (Agriculture).

In summary, the assessment reaffirmed the Initial Recommendation that Alternative 1 should be pursued further based on the following rationale :

- Fewest number of homes experiencing significant (10+ dBA) noise impact
  - particular emphasis placed on creating least impacts to approved residential subdivision at north end of Morriston (Telfer Glen). Alternative 1 is furthest removed from first row receivers.
- Lowest degree of property impact and disruption of agricultural operations :
  - minimizes amount of active agricultural land taken out of production
  - fewest equipment/access routes affected
  - non-viable severances which are landlocked are small and would be acquired with right-of-way at fair market value
  - maximizes integrity of remainder parcels
- Net effects include potential for retention of portions of affected woodlots within proposed highway right-of-way

These conclusions and the retention of Alternative 1 as the preferred alignment alternative between Crieff Road and the Calfass Road - Highway 401 area were endorsed by the Steering/Technical Committee at its January 4, 1994 meeting and by members of the public at the January 18, 1994 public information centre (refer to Environmental Technical Paper No.8).

5.5 SPECIAL STUDIES

Described herein are studies conducted during the preliminary design exercise, essentially independent of alignment considerations. The investigations included here deal exclusively with interchange/intersection configurations and roadway cross-section elements. Conclusions reached during both the Initial Recommendations phase and the Update and Supplementary Investigations phase are described.

5.5.1 Interchange Configurations at Hanlon Expressway/County Road 34 (Initial Recommendation)

The need to investigate the implications of introducing an interchange at this location was initially identified during the refinement of route location alternatives based on the premise that any Highway 6 improvements north of Highway 401 would be developed in compliance with MTO's proposals for full control of access (CAH). At that time the following points were agreed upon with respect to the need and justification:

- At least a grade separation will be warranted at this location based on safety considerations (school bus, farm equipment movements on the crossroad);
- An interchange may be required with any schemes not involving a new route north of Highway 401 to accommodate N-E traffic if moves between the Hanlon and Puslinch Road 15 are restricted;
- The County of Wellington would prefer to retain major connections to the provincial highway system (i.e. an interchange is required).

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

AQUATIC RESOURCES

ALTERNATIVES	1	2	3
RANKING	1	1	1
INDICATORS			
• Number of designated coldwater stream crossings	None	None	None
• Number of other watercourse crossings	None	None	None
• Length of stream diversion required	None Required	None Required	None Required
• Number of spawning/ nursery areas affected	None Affected	None Affected	None Affected
MITIGATION MEASURES	None Required	None Required	None Required
NET EFFECTS	No Net Impacts Anticipated	No net impacts anticipated	No Net Impacts Anticipated
Remarks : **From an aquatic perspective none of the above alternatives are preferred over another as there are no watercourses impacted by any of the routes.**			

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

TERRESTRIAL BIOLOGY

ALTERNATIVES	1	2	3
RANKING	3 (most sensitive)	2	1 (lease sensitive)
INDICATORS			
• **Forestry Resources**			
- Class 1 & 2 woodlots	• Severs/encroaches upon 4 Class 1 woodlots (Total areal loss of 11.3 ha) • Severances include : Map Site 40 - loss of 3.0 ha (52%) Map Site 41 - loss of 1.8 ha (23%) • Encroachments include : Map Site 43 - loss of 2.5 ha (52%) Map Site 44 - loss of 4.0 ha (34%)	• Encroaches upon 5 Class 1 woodlots (Total areal loss of 4.5 ha) • Encroachments include : Map Site 40 - loss of 0.9 ha (16%) Map Site 41 - < 0.1 ha (1%) Map Site 42 - loss of 0.2 ha (16%) Map Site 43 - loss of 1.8 ha (36%) Map Site 44 - loss of 1.5 ha (12%)	• Encroaches upon 5 class 1 woodlots (Total areal loss of 4.1 ha) • Encroachments include : Map Site 40 - loss of 0.5 ha (9%) Map Site 41 - loss of < 0.1 ha (1%) Map Site 42 - loss of 0.2 ha (16%) Map Site 43 - loss of 1.8 ha (36%) Map Site 44 - loss of 1.5 ha (12%)
- Other Wooded Areas	• Removal of 2.4 ha (Map Site 45)	• Removal of 0.2 ha (25%) from Map Site 39 and 3.4 ha from Map Site 45 (Total areal loss of 3.6 ha).	• Removal of 3.4 ha (Map Site 45)
• **Ecosystem Integrity**			
- Upland Ecosystem	• Impacts 26.1 ha	• Impacts 25.4 ha	• Impacts 21.8 ha
- Wetland Ecosystem	• Impacts three small unclassified wetlands (Map Sites 18, 19, 21). Totalling less than 0.3 ha in size. • Removal of a Class 7 wetland at Map Site 24 (2.4 ha).	• Impacts an unclassified wetland at Map Site 19 (< 0.1 ha in size). • Removal of a Class 7 wetland at Map Site 24 (2.4 ha).	• Impacts an unclassified wetland at Map Site 19 (< 0.1 ha in size). • Removal of a Class 7 wetland at Map site 24 (2.4 ha).
• **Vegetation**			
- ESA's/ANSI's	• Impacts 7.0 ha of the Crieff Old Field Complex ESA.	• Impacts 8.4 ha of the Crieff Old Field Complex ESA	• Impacts 5.4 ha of the Crieff Old Field Complex ESA
- Other vegetation	• Impacts 12.4 ha of Old Field/Shrub.	• Impacts 18.9 ha of Old Field/Shrub.	• Impacts 15.9 ha of Old Field/Shrub
- Effect on Unique/Rare Herbaceous species or Communities	• No rare species observed.	• No rare species observed.	• No rare species observed.
• **Wildlife**			
- Effects on Wildlife	• High (due to reduction in size of woodlots)	• Moderate	• Moderate
- Barrier Effects on Travel Corridors	• High (severance would impede East-West movement)	• Moderate	• Moderate
- Displaced Wildlife Habitat	• Upland forest 13.7 ha • Old Field/Shrub 12.4 ha • Wetland 2.7 ha	• Upland forest 8.1 ha • Old Field/Shrub 18.9 ha • Wetland 2.5 ha	• Upland forest 7.5 ha • Old Field/Shrub 15.9 ha • Wetland 2.5 ha

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

TERRESTRIAL BIOLOGY (cont'd)

ALTERNATIVES	1	2	3
RANKING	3 (most sensitive)	2	1 (least sensitive)
INDICATORS			
- Effects on Rare/ Endangered Wildlife species	• May impact 5 rare species - Rare West Virginia White Butterfly (Map Site 43); regionally rare Marsh Hawk and Grasshopper Sparrow, threatened Henslow Sparrow and provincially rare Dicksissel which may breed in the Crieff Old Field Complex ESA.	• May impact 5 rare species - Rare West Virginia White Butterfly (Map Site 43); regionally rare Marsh Hawk and Grasshopper Sparrow, threatened Henslow Sparrow and provincially rare Dicksissel which may breed in the Crieff Old Field Complex ESA.	• May impact 5 rare species - Rare West Virginia White Butterfly (Map Site 43); regionally rare Marsh Hawk and Grasshopper Sparrow, threatened Henslow Sparrow and provincially rare Dicksissel which may breed in the Crieff Old Field Complex ESA.
MITIGATION	• 2 key features impacted include woodlots and wetlands, as well as associated wildlife habitat/species. *Woodlots:* Other than avoidance, alternative means of mitigation would include minimizing removals where possible and protect trees not to be removed. *Wetlands:* Other than avoidance, mitigation measures include maintain existing drainage pattern and implement effective stormwater management.	• 2 key features impacted include woodlots and wetlands, as well as associated wildlife habitat/species. *Woodlots:* Other than avoidance, alternative means of mitigation would include minimizing removals where possible and protect trees not to be removed. *Wetlands:* Other than avoidance, mitigation measures include maintain existing drainage pattern and implement effective stormwater management.	• 2 key features impacted include woodlots and wetlands, as well as associated wildlife habitat/species. *Woodlots:* Other than avoidance, alternative means of mitigation would include minimizing removals where possible and protect trees not to be removed. *Wetlands:* Other than avoidance, mitigation measures include maintain existing drainage pattern and implement effective stormwater management.
NET EFFECTS	• Unavoidable loss of a portion of woodlots and wetlands.	• Unavoidable loss of a portion of woodlots and wetlands.	• Unavoidable loss of a portion of woodlots and wetlands.
Remarks :	**Alternatives 2 and 3 have the least impact on natural terrestrial systems with Alternative 3 marginally better. Alternative 1 has a greater negative impact overall. The major concerns with Alternative 1 are the removal of mature forest areas, number of wetlands removed and associated losses of wildlife habitat.**		

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

GEOLOGY/HYDROGEOLOGY

ALTERNATIVES	1	2	3
RANKING	2 (most sensitive)	2 (most sensitive)	1 (least sensitive)
INDICATORS			
• Area of sand and gravel resources affected	• Primary = 0 • Secondary = 0 • Tertiary = 8.5 ha	• Primary = 0 • Secondary = 0 • Tertiary = 8.6 ha	• Primary = 0 • Secondary = 0 • Tertiary = 4.8 ha
• Area of bedrock resources affected	0	0	0
• Number of Earth Science ANSI's affected	0	0	0
• Area of high potential upwelling areas affected	0	0	0
• Area of high potential recharge areas affected	8.5 ha	8.6 ha	4.8 ha
• Number of wells potentially affected - directly - within 150 m of ROW	 0 3	 0 4	 0 5
MITIGATION MEASURES	• Prevent potentially contaminated roadway runoff from recharging by use of roadside ditches	• Prevent potentially contaminated roadway runoff from recharging by use of roadside ditches	• Prevent potentially contaminated roadway runoff from recharging by use of roadside ditches
NET EFFECTS	• Small reduction in recharge volumes • Minor impact on low significance sand and gravel resources	• Small reduction in recharge volumes • Minor impact on low significance sand and gravel resources	• Small reduction in recharge volumes • Minor impact on low significance sand and gravel resources

Remarks : From a hydrogeological perspective Alternative 3 is preferred over both Alternatives 1 and 2 based on the following rationale :

- **Both Alternatives 1 and 2 impact a significant area of high potential recharge (8.5 ha and 8.6 ha respectively) which is also considered a low significance sand and gravel resource. Alternative 3 potentially impacts only 4.8 ha of this recharge/sand and gravel resources area.**

- **In addition, for Alternatives 1 and 2, excavations into the high potential recharge areas are expected to be extensive. For Alternative 3 excavation requirements are minimal and impacts to groundwater flow are not expected.**

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

AGRICULTURAL

ALTERNATIVE	1	2	3
RANKING	**1**	**2**	**3**
INDICATORS			
• Property requirements (for ROW and non-viable severances)	12.5 ha	23.0 ha	28.2 ha
• Number of agricultural operations affected	5	5	5
• Class 1 & 2 land required	0 ha	0 ha	0 ha
• Class 3 & 4 land required	12.1 ha	12.2 ha	12.9 ha
• High intensity uses affected	• Impacts primary calving area and winter feedlot of one operation (Hollenbach). Alternative calving area available	• Impacts primary calving area and winter feedlot of one operation (Hollenbach). Alternative calving area available • Severs back portion of one operation threatening viability of cow-calf operation (Stewart).	• Severs large portion (26%) of farm threatening viability (Winer). • Severs back portion of one operation threatening viability of cow-calf operation (Stewart).
• Main equipment routes/ field accesses affected	2	4	4
• Main farm accesses affected	0	0	0
• Farm buildings displaced	0	0	0
• Large blocks of agricultural land affected	5	5	5
• Farm severances	6 3 viable 3 not viable*	7 3 viable 4 not viable*	6 4 viable 2 not viable*
• Development Pressure	Moderate	High**	High**
MITIGATION MEASURES	• Minimize property requirements where possible.	• Minimize property requirements where possible.	• Minimize property requirements where possible.
NET EFFECTS	• Unavoidably, some agricultural land will be taken out of production.	• Unavoidably, some agricultural land will be taken out of production.	• Unavoidably, some agricultural land will be taken out of production.

Notes : * **Non-viable parcels of land based on size of severance or lack of access.**
** **Based on the likelihood that large parcels of land no longer viable for agricultural purposes would be sold off as building lots.**

Remarks : Alternative 1 is preferred as amount of agricultural land impacted will be minimized. In addition, fewer access routes will be affected and less pressure for conversion of farmland to non-agricultural uses would result. In the case of Alternatives 2 and 3, approximately double the amount of agricultural land would be taken out of production.

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

AGRICULTURAL PROPERTY REQUIREMENTS

	Total Holdings (ha)	Land Required (ROW & non-viable severances) ha			Land Required (ROW & non-viable severances) %			Viable Severances ha			Size of severances compared to total holding %			Size of original farm ha			Original farm not affected %		
ALTERNATIVE		**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Hollenbach	89	3.1	3.1	2.3	3.5	3.5	2.6	5.0	5.0	5.0	5.6	5.6	5.6	80.9	80.9	81.7	91.0	91.0	91.7
Sutton	48	3.0	3.9	4.3	6.3	8.1	9.0	-	-	4.3	-	-	9.0	45.0	44.1	39.4	94.0	91.8	82.1
Winer	50	2.7	6.4	13.0	5.4	12.8	26.0	-	-	-	-	-	-	47.3	43.6	37.0	95.0	87.2	74.0
Townsend-McKinnon	93	1.5	2.1	2.2	1.6	2.3	2.4	*	*	*	-	-	-	91.5	90.9	90.8	98.0	97.7	97.6
Stewart	35	2.2	7.5	6.4	6.3	21.4	18.3	-	-	-	-	-	-	32.8	27.5	28.6	94.0	78.6	81.7
Cumulative Farmland Impacts	**315**	**12.5**	**23.0**	**28.2**	**3.9**	**7.3**	**9.0**	**5.0**	**5.0**	**9.3**	**1.5**	**1.5**	**2.9**	**297.5**	**287.0**	**277.5**	**94.4**	**91.1**	**88.1**

*** Notes : For each alternative the Townsend-McKinnon property will be severed into two large viable parcels**

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

NOISE

ALTERNATIVES	1	2	3
RANKINGS	**1**	**2**	**2**
INDICATORS			
• Reduction or no increase	7 (3*)	7 (3*)	7 (3*)
• 1-3 dBA increase (not perceptible)	6 (5*)	4 (4*)	4 (4*)
• 3-5 dBA increase (minor)	11 (9*)	7 (2*)	8 (2*)
• 5-10 dBA increase (moderate)	19** (11*)	16 (10*)	16 (10*)
• 10+ dBA increase (significant)	2	10 (9*)	9 (9*)
MITIGATION	• Mitigation is not viable, since 2 single properties are involved. The benefits achieved by a very long, high barrier are not considered economically justified.	• Mitigation may be possible in the vicinity of the Telfer Glen Subdivision. However, to obtain a 5dB reduction in noise levels would require a noise barrier approximately 650m in length and in excess of 10m in height. The desirability and benefit/cost of such a barrier would have to be investigated further.	• Mitigation may be possible in the vicinity of the Telfer Glen Subdivision. However, to obtain a 5dB reduction in noise levels would require a noise barrier approximately 650m in length and in excess of 10m in height. The desirability and benefit/cost of such a barrier would have to be investigated further.
NET EFFECTS	• Unavoidably, 2 individual homes will experience noise increases in excess of 10dBA.	• Unavoidably, 1 individual home will experience noise increases in excess of 10dBA. An area within the Telfer Glen Subdivision will be impacted in excess of 10dBA. Approximately 9 properties will be affected. Mitigation may be possible.	• An area within the Telfer Glen Subdivision will be impacted. Approximately 9 properties will experience noise increases in excess of 10dBA. Mitigation may be possible.

Notes : **All receiver locations represent single dwellings with the following exceptions :**
*** Represents the number of properties affected within the Telfer Glen subdivision which are included in the total number**
**** Includes an institutional dwelling (Morriston Park Nursing Home)**

Remarks : **In reviewing the number of homes which will experience a significant impact Alternative 1 is preferred, as only 2 homes will be affected significantly as compared with 10 homes (Alternative 2) and 9 homes (Alternative 3).**

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

TRAFFIC SERVICE

ALTERNATIVES	1	2	3
RANKING	**1**	**1**	**1**
INDICATORS			
• Traffic Operations	Good Hwy 6 minimum radius is 1200m	Good Hwy 6 minimum radius is 750m	Good Hwy 6 minimum radius is 2000m
• Interchange Configuration	Partial Interchange at Calfass Road	Partial Interchange at Calfass Road	Partial Interchange at Calfass Road
• Impacts on Adjacent Roads	Cul-de-sac Calfass Road east Calfass Road west connected to interchange	Cul-de-sac Calfass Road east Calfass Road west connected to interchange	Cul-de-sac Calfass Road east Calfass Road west connected to interchange
Remarks : **From a traffic perspective none of the above alternatives are preferred over another.**			

CONVENIENCE

ALTERNATIVES	1	2	3
RANKING	**1**	**1**	**1**
INDICATORS			
• Access to Hwy 6	No access at Crieff Road Access to Hwy 6 from Calfass Road west	No access at Crieff Road Access to Hwy 6 from Calfass Road west	No access at Crieff Road Access to Hwy 6 from Calfass Road west
• Access to Private Property	No Access	No Access	No Access
Remarks : **From a convenience perspective the above alternatives are equal.**			

TABLE 5.8

ALIGNMENT ALTERNATIVES BETWEEN CRIEFF ROAD AND CALFASS ROAD - HIGHWAY 401 AREA
DETAILED COMPARATIVE ASSESSMENT

CONSTRUCTION IMPLICATIONS

ALTERNATIVES	1	2	3
RANKING	1	1	1
INDICATORS			
• Road/Traffic Disruption	Close Crieff Road during underpass construction	Close Crieff Road during underpass construction	Close Crieff Road during underpass construction
• Major Utilities Relocation	None	None	None
Remarks :	**From a construction implications perspective the above alternatives are equal.**		

COST

ALTERNATIVES	1	2	3
RANKING	1	2	3
INDICATORS			
• Construction	Equal to other Alternatives	Equal to other Alternatives	Equal to other Alternatives
• Property	No residual landlocked parcels	Severs 4.7 ha of Winer farm (landlocked)	Severs 4.4 ha of Sutton Farm (impacting best piece of land) and severs 11.4 ha of Winer farm (landlocked)
Remarks :	**From a cost perspective Alternative 1 is preferred due to the reduced property impact with associated lower cost.**		

TABLE 5.9

SUMMARY RANKING
CRIEFF ROAD TO CALFASS ROAD ALIGNMENT ALTERNATIVES

ALTERNATIVES	1	2	3
CONSOLIDATED	12	14	14
FACTORS			
Natural Environment			
• Aquatic Resources	1	1	1
• Geology/Hydrogeology	2	2	1
• Terrestrial Biology	3	2	1
Socio-Economic Environment			
• Agriculture	1	2	3
• Noise	1	2	2
Service to the Public			
• Traffic Service	1	1	1
• Convenience	1	1	1
Engineering			
• Construction Implications	1	1	1
• Cost	1	2	3
REMARKS	• Fewest number of homes experiencing significant (10+dBA) noise impact. • Potential impacts to significant area of groundwater recharge. • Highest degree of disturbance to Class 1 woodlots. • Lowest degree of property impact and disruption of agricultural operations. • Least costly due to least property impacts.	• Significant noise impacts to Telfer Glen Subdivision. • Potential impacts to significant area of groundwater recharge. • High degree of property impacts and disruption to agricultural operations.	• Significant noise impacts to Telfer Glen Subdivision. • Marginal advantage for least impacts to groundwater recharge area and Class 1 woodlots. • Highest degree of property impact and disruption of agricultural operations. • Most costly due to additional property impacts.

Deliberations during a subsequent assessment of the Hanlon Expressway (52) confirmed the potential for restrictions of local and road access to the Hanlon with the impetus for the development of interchange schemes relative to the need for property designation/protection. It must be noted that within the Hanlon Assessment study, the projected need for major improvements to the Hanlon/County Road 34 is beyond the plan period adopted for the present study (Year 2004).

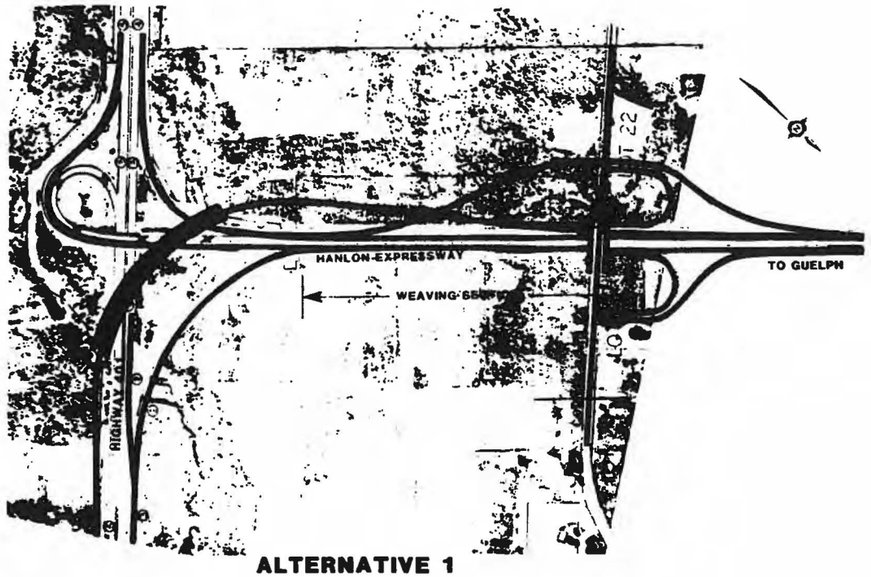
The alternative interchange configurations investigated during the Initial Recommendations phase are presented in Figure 5.14, the assessment of which is presented below.

Alternative 1 - features Parclo A-B at Hanlon Expressway/County Road 34 interchange, basket weave for North-East/West moves, and directional ramp for North-East move from Hanlon Expressway. Alternative 1 was rejected because of high cost (traffic volume does not justify costly directional ramp), severe property and environmental impacts on the west side of Hanlon Expressway, and operational deficiencies. A weaving problem on the northbound Hanlon, similar to the one identified with Alternative 2 is another reason for the rejection of Alternative 1.

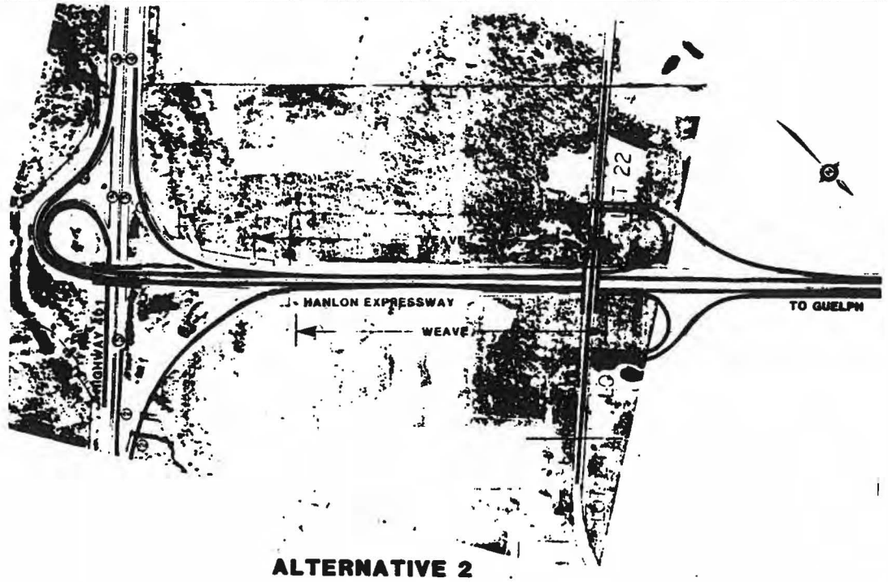
Alternative 2 - Parclo A-B but ramps located on the north side of County Road 34 to lengthen weaving section on the Hanlon Expressway. Alternative 2 was rejected because of severe impacts on the wetlands located in the north-east quadrant and the concerns of the owner of this property, as well as the low level of service on the weaving section on the northbound Hanlon.

Alternative 3 - This alternative features a Parclo A for southbound moves and a right-turn in, right-turn out connection to Towerline Road for northbound movements. Alternative 3 is not satisfactory operationally, with excessive lengths for turning moves, and creates jurisdictional problems by linking provincial and county roads via a lower tier (township) connector.

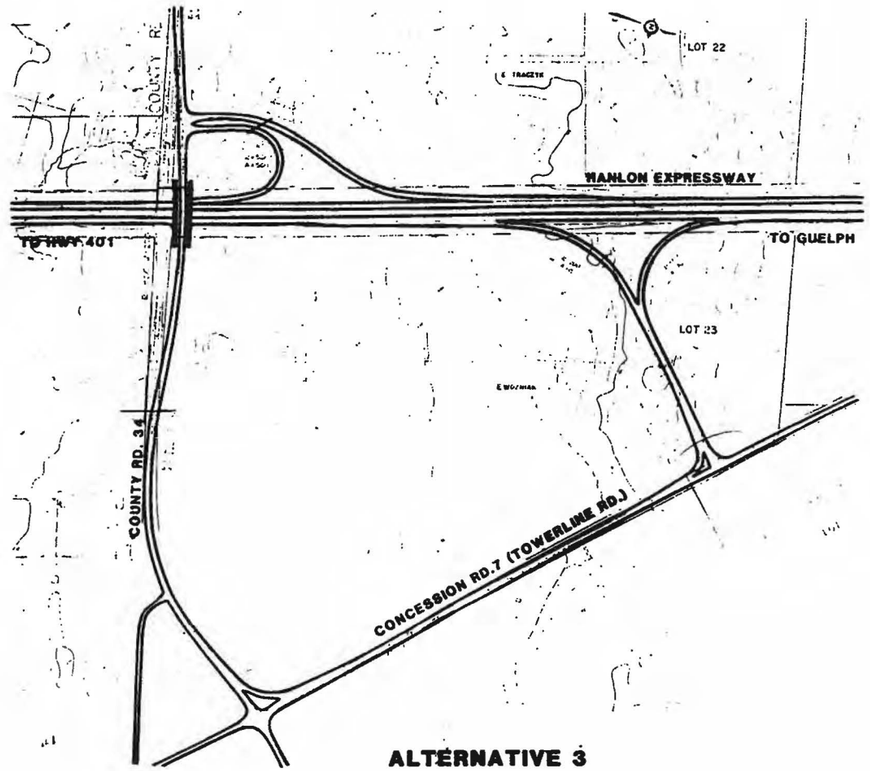
Alternative 4 - Recommended - (refer to Alternative 0 in Figure 5.11) - This alternative features a Parclo A configuration for southbound moves and basket weave ramp configuration for northbound moves. Alternative 4 solves the problem of weave on the Hanlon Expressway northbound, and reduces the impacts on the wetlands north of County Road 34, although these are still significant in the northwest quadrant. This alternative was initially recommended for preliminary design, and was to have been implemented in two stages, initially leaving the County Road 34/ Hanlon Expressway intersection at-grade and at a later time, in conjunction with the upgrading of the Hanlon Expressway to full CAH, constructing the interchange. During the



ALTERNATIVE 1



ALTERNATIVE 2



ALTERNATIVE 3

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.14

HANLON EXPRESSWAY /COUNTY ROAD 34
INTERCHANGE ALTERNATIVES

Update and Supplementary Investigations phase, this scheme was redesignated Alternative 0 for reference purposes (refer to Section 5.4.5.1).

5.5.2 Hanlon Expressway/County Road 34 Drainage Strategy (Initial Recommendation)

The East Branch of Galt/Mill Creek crosses County Road 34 just east of the intersection with the Hanlon Expressway and flows southwesterly towards the main watercourse. During construction of the Hanlon Expressway, a portion of this tributary was relocated along the east boundary of the Hanlon Expressway, and a CSP, culvert was installed under the roadway. For a distance of 300 m east of the Hanlon Expressway, County Road 34 serves as a spillway for the Regional Storm flow, thus preventing flooding north of the road.

Floodline mapping of Galt Creek and Irish Creek and an associated report were prepared for the Grand River Conservation Authority in October 1984 by MacLaren Engineers (17). This report noted specifically that County Road 34 should not be raised east of the Hanlon Expressway for a distance of approximately 300 m as such action would increase flood levels to the north.

During the Initial Recommendation phase, an interchange was proposed at the County Road 34/Hanlon Expressway location in the ultimate condition. This will require a raise in the profile of County Road 34, which will obstruct the spillway function of the road during the Regional flood. An investigation was conducted to determine alternative means of accommodating the Regional Storm flow to the satisfaction of GRCA. The hydrological/drainage study was carried out by MacLaren Engineers in the summer of 1987. The results are detailed in Engineering Technical Paper No. 2.

The study recommended a system of culverts under the interchange ramps and County Road 34. These culverts were to have 7.5 m clear span and a flow depth of approximately 1.8 m.

With the selected interchange configuration (Initial Recommendation), one culvert was required under County Road 34, to substitute for the spillway function, and culverts under the ramps were to have been introduced to accommodate normal local drainage requirements.

South of County Road 34, existing conditions during the flood period will be retained, unless under the Hanlon Expressway upgrading a decision is made to protect the area of the interchange with Highway 401 from submerging during the Regional Storm.

A similar strategy for retaining existing hydraulic conditions in the area was adopted for the County Road 34 grade separation scheme during the subsequent Update and Supplementary Investigations phase (i.e., 1800 mm CSP culvert under County Road 34). Further details in this regard are presented in Section 6.1 General Description of the Project and Section 6.2.2.1 which addresses potential hydrologic condition changes.

5.5.3 Intersection Arrangement at Highway 6 and Campbellville Road/Gore Road

The existing offset of the Gore Road and Campbellville Road T-intersections with Highway 6 (about 100 m apart) does not provide sufficient storage for left-turn movements and may create potential conflicts for the opposing moves. In addition, both locations exhibit a substandard intersection angle, thus creating a safety problem in terms of sight lines. A special study was conducted to select a realignment of these roads satisfactory to the Region of Hamilton-Wentworth and the Town of Flamborough. Eight alternatives were considered and evaluated (refer to Figure 5.15). The evaluation is presented in Table 5.10.

Alternatives 6 and 8 were deemed to warrant further development and assessment. Alternative 6 aligns the two roads across Highway 6 at an 80° crossing angle. Alternative 8 offers a two-stage treatment as follows:

Stage I - Campbellville Road and Gore Road realigned to the south and north respectively to create an acceptable T-intersection offset (230 m).

Stage II - As a municipal undertaking, Campbellville Road could be extended across Highway 6 (to serve the designated rural industrial area) and connected to Gore Road approximately 620 m west of Highway 6. This would include the closure of the Stage I Gore Road/Highway 6 intersection which could be retained only as the entrance to Benson Chemicals. Other local property access off Gore Road could also be retained.

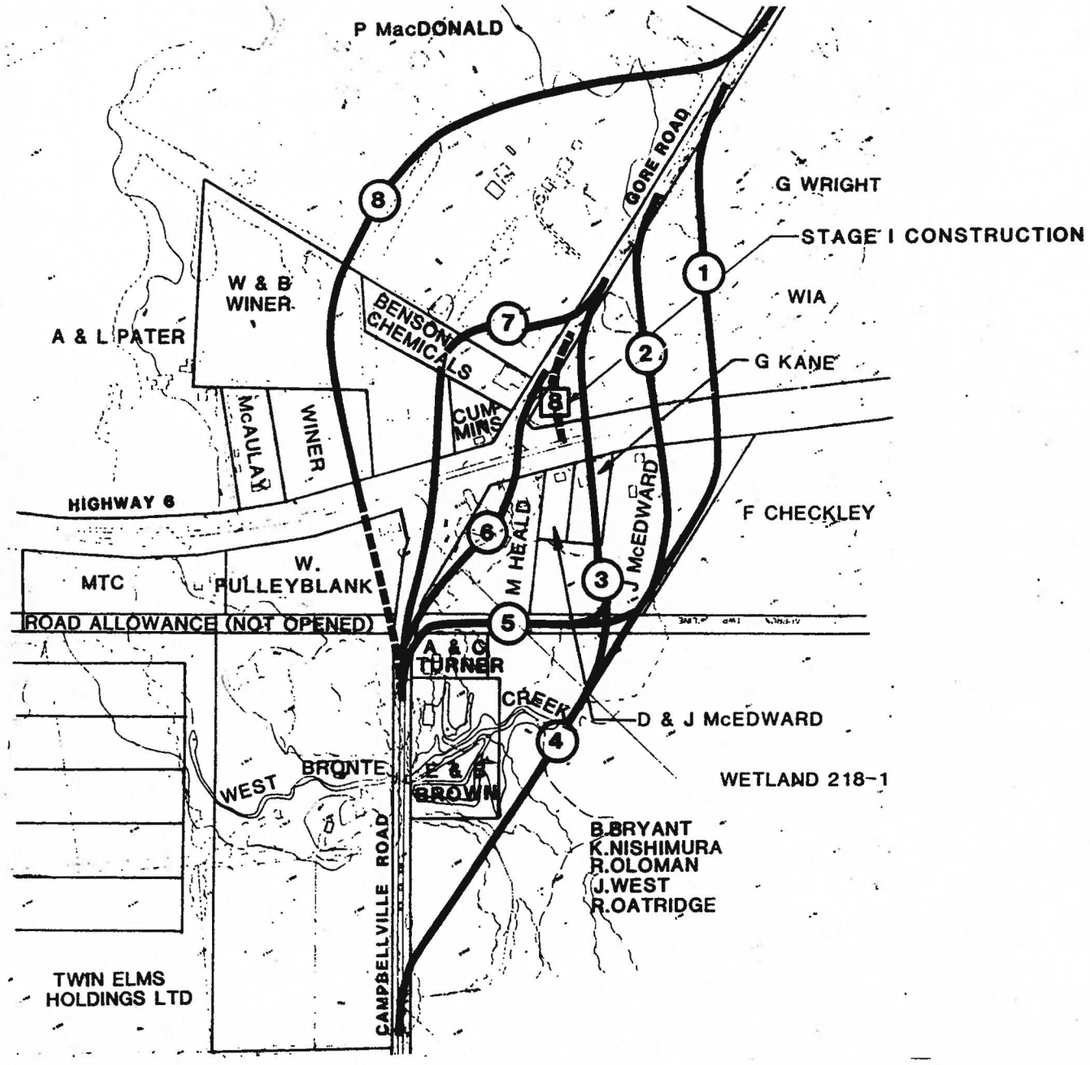
After consultation with the Region of Hamilton-Wentworth and the Town of Flamborough, Alternative 8 (Stage I) was selected for the following reasons:

- less serious property impacts on the east side of Highway 6
- better geometrics and safety features

TABLE 5.10

ASSESSMENT OF CAMPBELLVILLE ROAD - GORE ROAD REALIGNMENT OPTIONS

LINKS	ADVANTAGES	DISADVANTAGES
1-4 (1060 m) 1-5 (880 m)	■ Smooth horizontal alignment ■ Maximum intersection spacing (350 m) (Stage 1) ■ Least proximity impacts ■ Avoids primary trout nursery on West Bronte Creek	■ Sight distance (west side) ■ Requires 1.91/1.55 ha property ■ Requires 0.56 ha WIA area ■ Requires 0.80/0.70 ha Class 4 Wetland (#218-1) ■ Impacts to primary trout nursery on West Bronte Creek ■ Reduced accessibility, increased circuity associated with cul-de-sacs (maximum) ■ Highest construction cost
2-4 (940 m) 2-5 (740 m)	■ Smooth horizontal alignment ■ Good intersection spacing (280 m) (Stage 1) ■ Good staging flexibility ■ Avoids primary trout nursery on West Bronte Creek	■ Undesirable horizontal alignment ■ Sight distance (west side) ■ Requires 1.67/1.27 ha property ■ Severs 1 residential lot (R. McEdward) ■ Proximity impacts (R. McEdward) ■ Requires 0.36 WIA area ■ Requires 0.80/0.64 Class 4 Wetland (#218-1) ■ Impacts to primary trout nursery on West Bronte Creek ■ Reduced accessibility, increased circuity associated with cul-de-sacs
3-4 (820 m) 3-5 (580 m)	■ Smooth horizontal alignment ■ Maximum intersection spacing (190 m) (Stage 1) ■ Good staging flexibility ■ Avoids primary trout nursery on West Bronte Creek ■ Provides opportunity to buffer McEdward properties	■ Undesirable horizontal alignment ■ Requires 1.93/1.39 ha property ■ Displaces 1 residence (G. Kane - buyout) ■ Requires 0.24 ha WIA area ■ Requires 0.74/0.52 ha Class 4 Wetland (#218-1) ■ Impacts to primary trout nursery on West Bronte Creek
6 (250 m)	■ One stage construction ■ Smooth horizontal alignment ■ Retains use of existing Gore Road/Highway 6 intersection point ■ Eliminates cul-de-sac ■ Creates saleable remainder parcel (0.70 m) ■ Avoids WIA area, wetland and trout nursery ■ Reduces conflict points on Highway 6 (Heald accesses relocated) ■ Lowest construction cost ■ One stage construction ■ Acceptable horizontal alignment	■ Requires 0.50 ha property (G.M. Heald) ■ Requires relocated primate accesses (Heald) ■ Proximity impacts (Heald) ■ Lowest construction cost ■ Requires 1.50 ha property ■ Severs 1 industrial property (Benson Chemicals)
7 (360 m)	■ Retains existing Campbellville Road/Hwy 6 intersection point ■ Avoids WIA area, wetland and trout nursery	■ Proximity impacts (Cummins) ■ Requires 0.39 ha active agricultural land ■ Creates 1 agricultural severance (not viable) ■ Reduced accessibility, increased circuity, increased circuity associated with cul-de-sac
8 (1040 m)	■ Smooth horizontal alignment ■ Acceptable intersections spacing (230) in stage 1 ■ Avoids Benson Chemicals	■ Requires 1.68 ha property ■ Requires 1.68 ha active agricultural land ■ Creates 3 agricultural severances ■ Possible requirement for 3 private access relocations ■ Reduced accessibility, increased circuity associated with cul-de-sac



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.15

CAMPBELLVILLE ROAD/GORE ROAD REALIGNMENT ALTERNATIVES

- compatibility with predominant traffic moves (very low demand for E-W through moves with current land use)

- lower cost

The two municipalities subsequently endorsed the preferred scheme (refer to Appendix B Selected Correspondence).

5.5.4 Crieff Road/Highway 6 New Intersection Treatment

Several alternative treatments of the Crieff Road/Highway 6 New intersection were studied (refer to Figure 5.16):

Alternative 1 - at-grade signalized intersection with local realignment of Crieff Road to provide for a desirable intersection angle. Different locations of the intersection, various crossing angles and different radii at approaches were considered.

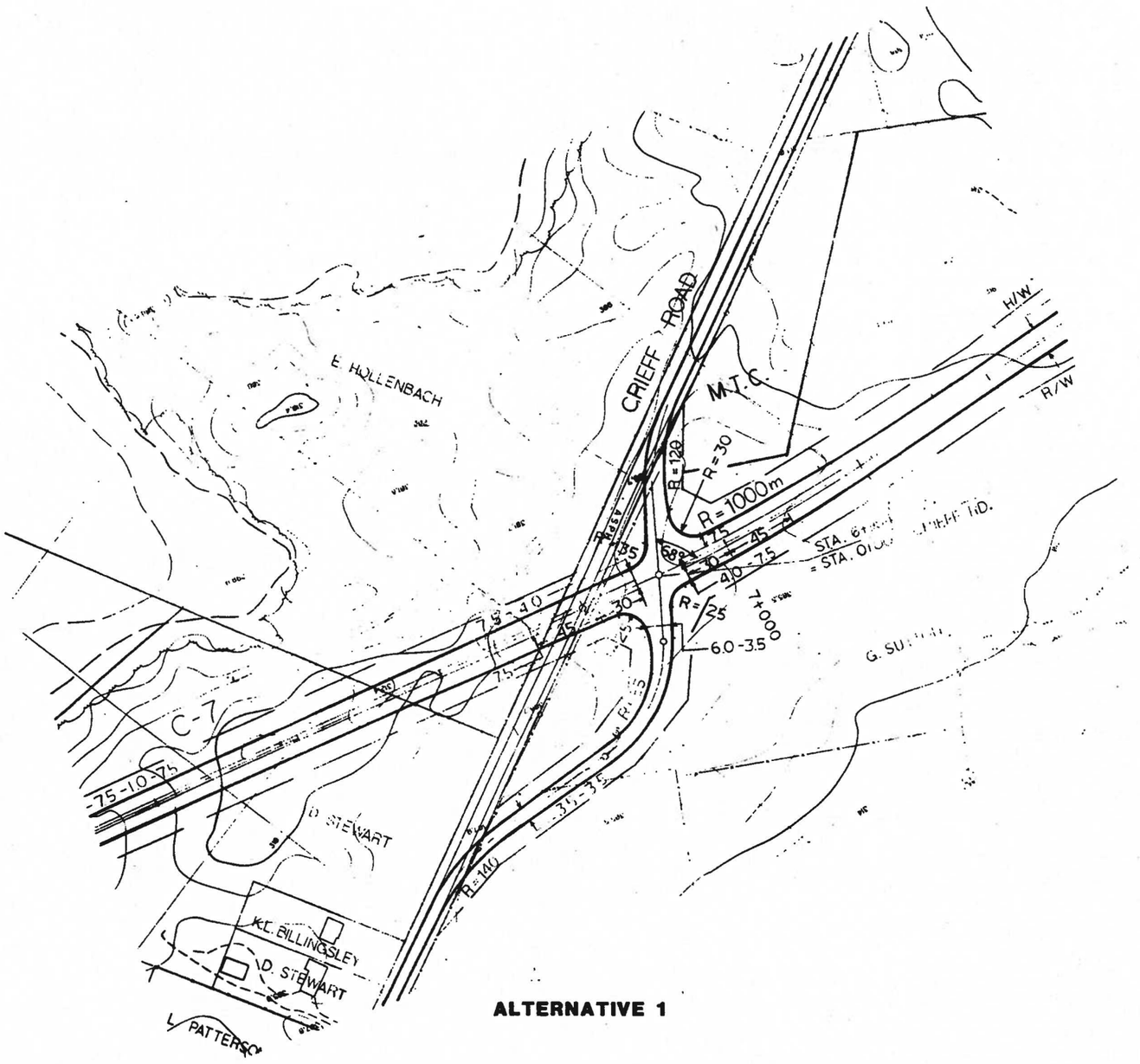
Alternative 2 - grade separated crossing with a buttonhook connection of Crieff Road to Highway 6 New.

Alternative 3 - modified Parclo 'A' interchange.

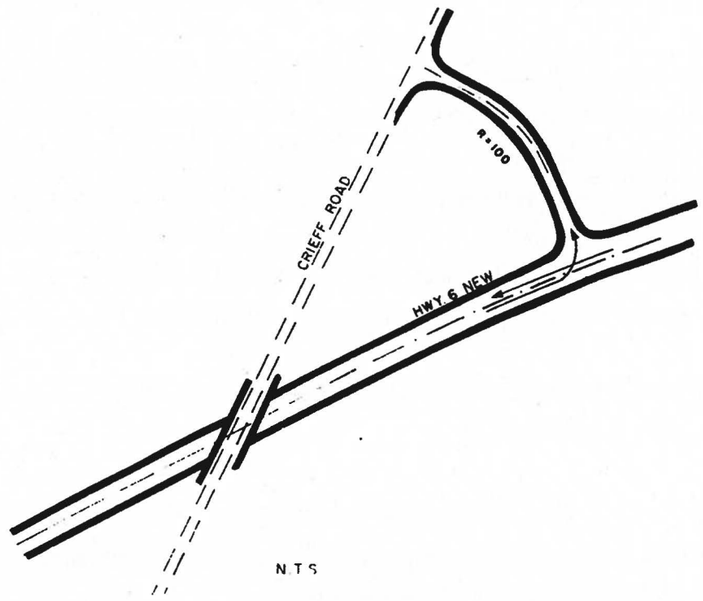
Alternative 4 (Recommended - refer to Design Plate 20) - grade separation, with Crieff Road on existing alignment overpassing Highway 6 New.

The four options were compared in terms of impacts, traffic operations and cost. Alternative 2 was discarded due to concerns over various operational deficiencies and property impacts. Alternative 3 exhibited high costs, significant property impacts to the Stewart and Sutton farms and was unwarranted on the basis of light turning traffic volumes.

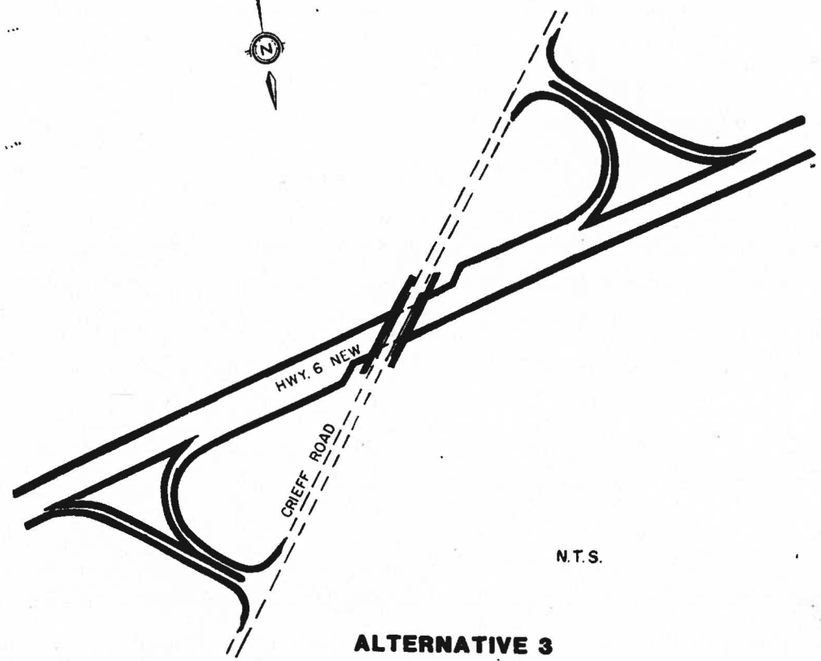
Alternative 1 was deemed more acceptable in terms property impacts but potential safety concerns emerged relative to high speed N-S traffic running the traffic signals. This, combined with low projected turning movements, led to the adoption of Alternative 4 (grade separation; no connecting ramps).



ALTERNATIVE 1



ALTERNATIVE 2



ALTERNATIVE 3

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.16
CRIEFF ROAD/HIGHWAY 6 NEW
INTERSECTION ALTERNATIVES

5.5.5 Interchange Configurations at Calfass Road/Connection Road/Highway 6 New

With the recommended alignment, the Connection Road between Highway 6 New and existing Highway 6 south of Highway 401 was introduced to provide the required link of Highway 6 New with Brock Road and Highway 401 east. Moves to and from the south will be required only at this location. The moves from/to the north/west will be accommodated at the existing Highway 401/ Highway 6/Brock Road interchange. At the same time, it was determined that E-W moves across Highway 6 in the Calfass Road corridor should not be precluded. In order to facilitate these network requirements, the following options were studied (refer to Figure 5.17).

Option 1 - Highway 6 New/Calfass Road intersection at grade. Highway 6 New/Connection Road intersection at grade (moves E-S only).

Option 2 - Highway 6 New/Calfass Road intersection at grade. Highway 6 New/Connection Road grade separated for S-E and E-S directional moves. An option is available to extend the Connection Road to the west if development warrants it.

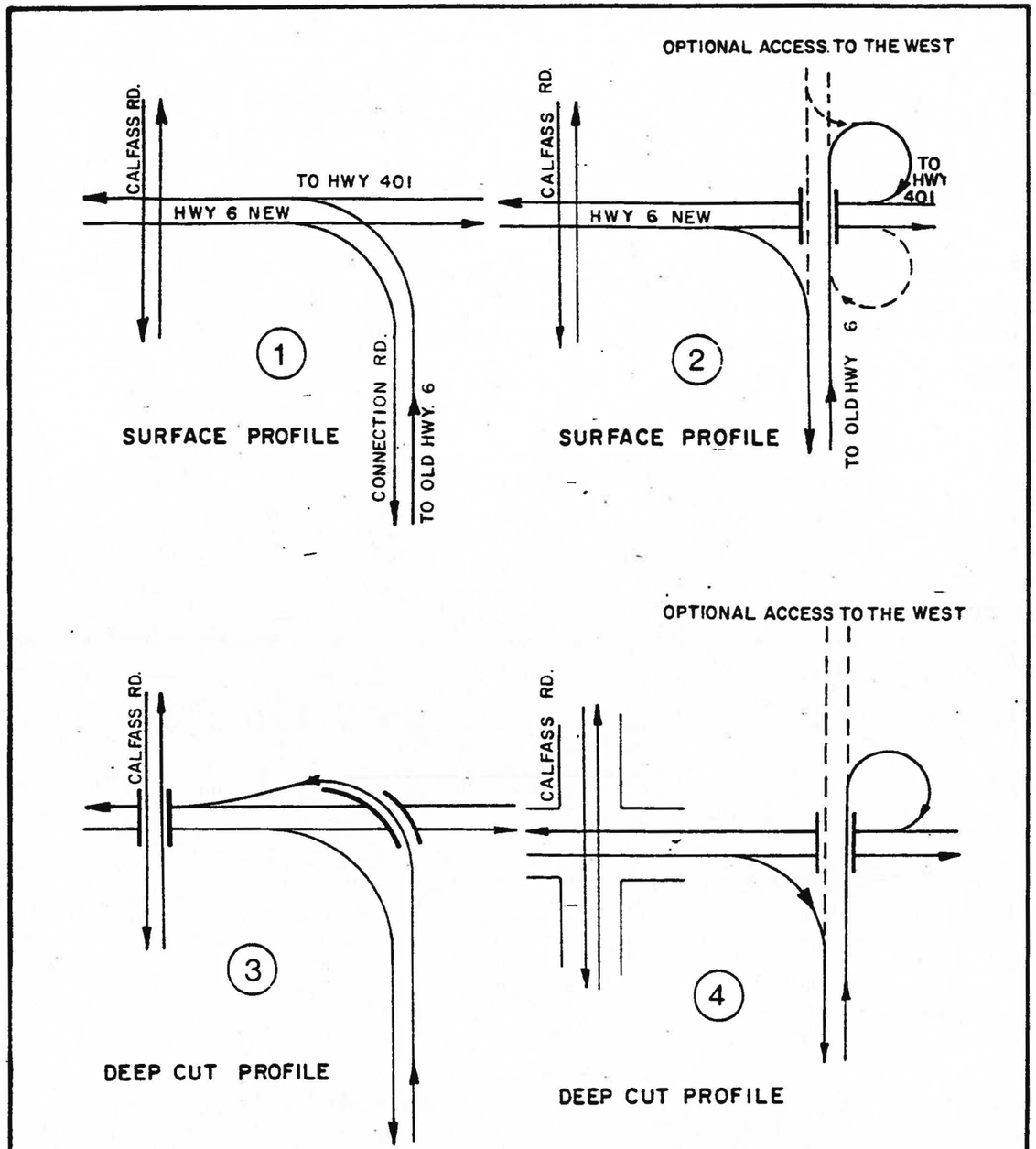
Option 3 - Highway 6 New/Calfass Road grade separated crossing (lowered profile on Highway 6 New). Highway 6 New/Connection Road - S-E and E-S moves grade separated via directional ramp.

Option 4 - Highway 6 New/Calfass Road at-grade (both on low profiles). Highway 6 New/Connection Road grade separated via loop ramp.

Option 5 - (Recommended (1987) - refer to Design Plate 24) - Calfass Road (West) relocated opposite Connection Road; Calfass Road (East) closed. Highway 6 New/Connection Road grade separated with a loop connection for E-S move. There is a possibility of extending the Connection Road to the west, and adding additional ramps for W-E/N and N-E/W moves.

Option 5 was selected as the most advantageous in terms of traffic operations and property impacts and was used with the recommended preliminary design.

At a request from the Township of Puslinch, the future possibility for N/W - E/W moves at the Connection Road/Highway 6 New interchange to serve potential new development in Morriston was studied. These ramps could be built later as a municipal initiative.



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.17
CALFASS ROAD / CONNECTION ROAD / HIGHWAY 6 NEW INTERCHANGE OPTIONS

5.5.6 Highway 6 Parallel to Highway 401

Typical Cross-section for Highway 401/Highway 6 Parallel Lanes

The 1989 Recommendation proposed an initial scheme for the Highway 401 corridor where Highway 6 traffic would merge with Highway 401 traffic. A continuous auxiliary lane would be constructed between Highway 6 New and the Hanlon Expressway (i.e. Highway 401 would be widened from 4 to 6 lanes in this section). However, due to the dramatic increase in traffic along Highway 401 in the past few years, Highway 401 will be widened to 6 lanes prior to the implementation of this project. This eliminates the possibility of implementing the initial scheme so the ultimate scheme will be implemented at the outset. In the ultimate scheme it is proposed that Highway 6 be constructed parallel to Highway 401 in a form similar to collectors in a mini express-collector system. The Highway 6 parallel lanes will have 2 through lanes in each direction plus one continuous speed change lane to accommodate the transfers to and from Highway 401.

During the Update and Supplementary Investigations work, the cross-section of Highway 401/Highway 6 was reviewed to ensure that implementation of the Highway 6 parallel lanes would not unnecessarily preclude the further widening of Highway 401 in the future. Three alternative typical cross-sections were developed for Highway 6 along Highway 401 and reviewed (refer to Figure 5.18):

- Maximum 6-lanes for Highway 401
- Protection for 8-lane Highway 401
- Protection for 10-lane Highway 401

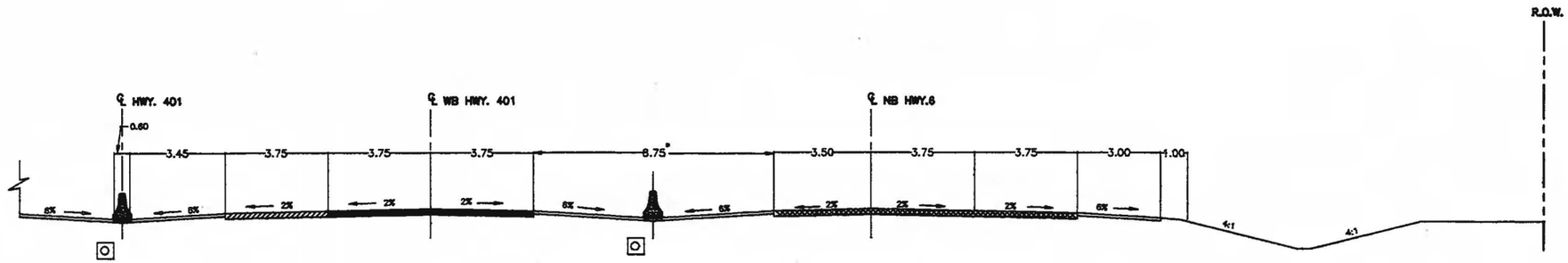
In each case the separator between Highway 401 and Highway 6 protected for an ultimate Highway 401 median width of 8.5 m and an ultimate Highway 401/Highway 6 separator width of 8.5 m. Highway 401 is presently programmed to be widened to 6 lanes with a 7.5 m median. An 8.5 m median can be achieved in the future by reducing the width of the left lane from 3.75 m to 3.5 m (which is in accordance with MTO standards) and shifting the Highway 401 lanes to the right by 0.25 m, which the Highway 401/Highway 6 separator protects for. The 8.5 m width is required to ensure the left shoulder width is not reduced below 3.0 m at structural pier locations.

Upon review of the cross-sections, it was concluded that protection for an 8-lane Highway 401 adjacent to Highway 6 would provide enough flexibility for future expansion while not incurring undue upfront property and structure costs. The possible ultimate lane requirements for Highway 401 were suggested as 10 lanes from the Highway 407 interchange westerly to the transfer lanes to/from Highway 6, and 8 lanes easterly to Cambridge/Kitchener.

Barrier Protection Between Highway 401 and Highway 6 Parallel Lanes

For a 6-lane Highway 401 cross-section, the separator between Highway 401 and Highway 6 will be 12.5 m for a significant length. The issue was raised as to whether a barrier would be required where the separator width is 12.5 m. The MTO `Roadside Safety Manual' notes that, for a 12.5 m median, a barrier is optional. For median widths where barriers are noted as optional, the Manual states that "Barriers are not required and should not be installed except in special circumstances such as when a median crossover accident problem has been identified by the Regional Traffic Section, where an identified geometric deficiency cannot be readily corrected, or for continuity with adjacent sections". It was **recommended that no barrier protection be constructed between the Highway 401 and the Highway 6 parallel lanes (with a 6-lane Highway 401 cross-section)** for the following reasons :

- There are no special circumstances, as noted in the Manual, to warrant barrier installation.
- Traffic will be travelling in the same direction, so a vehicle crossing the separator will not result in a head-on collision.
- A significant length of the separator (60 %) is greater than 15 m wide and does not require a barrier. In the interest of continuity, it is preferable not to have a barrier through the 12.5 m wide separator section either.
- Comments received at the public information centres with respect to turn-around provision for emergency services vehicles indicated that it is preferable to avoid having a barrier between Highway 6 and Highway 401.



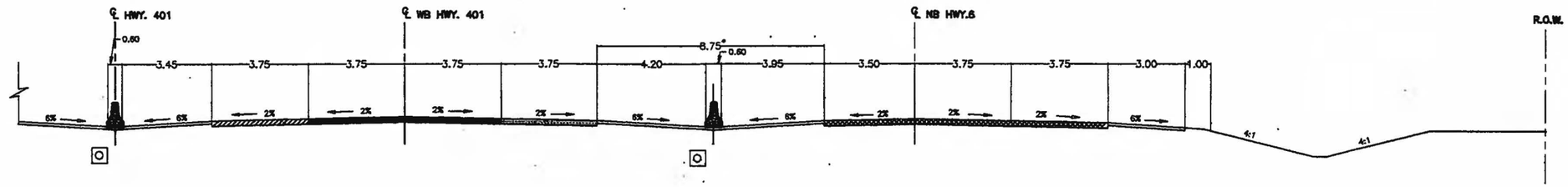
LEGEND:

- EXISTING PAVEMENT
- INITAL WIDENING HWY. 401
- ULTIMATE WIDENING HWY. 401
- NEW HWY. 6

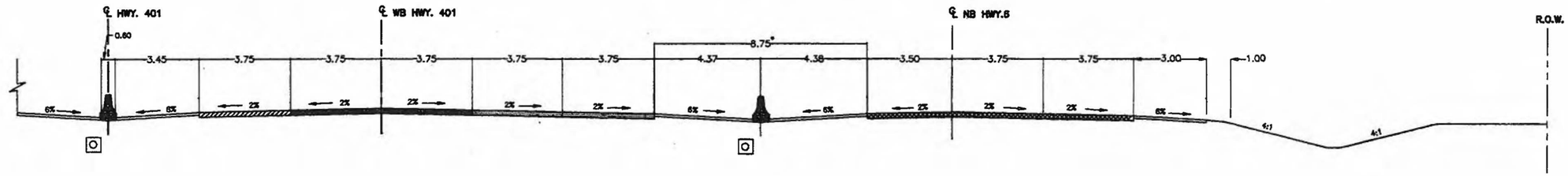
NOTE:

* INCLUDES 0.25m FOR POSSIBLE MEDIAN WIDENING TO ACCOMODATE SUFFICENT SHOULDER WIDTH ADJACENT TO STRUCTURE PIERS.

Maximum 6-lane Highway 401



Possible 8-lane Highway 401



Possible 10-lane Highway 401

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.18

ALTERNATIVE CROSS-SECTIONS FOR HIGHWAY 401/HIGHWAY 6 CORRIDOR

Impact on Slovenski Park

In determining the typical cross-section for Highway 401, Slovenski Park was noted as particularly sensitive to having property acquired for Highway 401/Highway 6 right-of-way (i.e. encroachment on landscaped berm and other treed areas which provide visual/noise screening from Highway 401). In an effort to reduce the property requirements, the option of utilizing an urban cross-section along the north edge of pavement adjacent to Slovenski Park was reviewed.

The impact upon the trees adjacent to Highway 401 was examined for both an urban and rural cross-section. An urban section would reduce the area of vegetation removed by 13%. At the west end of the Park, in the vicinity of the best trees, there is little difference between an urban and rural section since the Highway is in shallow fill at that point. **It was concluded that there is not a significant difference in impact between the urban and rural cross-sections. Therefore, the rural section is recommended due to the cost, maintenance and stormwater management implications of an urban section.**

Single Lane Transfer from Highway 6 Northbound to Highway 401 Westbound (S-W move)

It is desirable to have 2-lane ramps (transfers) between Highway 6 and Highway 401 where they run parallel. However, a single lane transfer from Highway 6 northbound to Highway 401 westbound (S-W move) is proposed due to the proximity of the Hanlon Expressway structure over Highway 401. There is insufficient lateral clearance under the structure to accommodate a speed change lane which would be required with a 2-lane ramp (transfer). The single lane ramp will have sufficient capacity to comfortably accommodate the traffic for the S-W move.

5.5.7 Directional Ramp from Hanlon Expressway to Highway 401 East (N-E Ramp)

The initial recommendation (ultimate scheme) previously showed the N-E loop ramp leading into a parallel roadway. During the Update and Supplementary Investigations work a directional ramp was proposed for the N-E move from the Hanlon Expressway to Highway 401. The following outlines the **rationale for abandoning the N-E loop ramp in favour of incorporating a directional N-E ramp into the project**:

SAFETY

The Hanlon Expressway is currently being upgraded to a fully controlled access facility (freeway) with a posted speed of 100 km/h. Once the Hanlon Expressway is upgraded the interchange with Highway 401 will become a freeway to freeway interchange. The MTO Geometric Design Standards Manual states that partially-directional (i.e. some loop ramps included) freeway to freeway interchanges "have applications where there are severe property limitations, significant environmental impact, or where some left-turn volumes are low". Based on the most recent land use proposals in the interchange area, none of these stated reasons was found to be applicable at the subject location. The Geometric Design Standards Manual also states that for a Highway with a 120 km/h design speed (as Highway 401 has and the upgraded Hanlon Expressway will have) the minimum ramp curve radius is 130 m (6% superelevation). The present radius of the N-E loop ramp is 70 m. However, the Hanlon Expressway is posted at only 80 km/h today. Safety problems will increase when the upgrading is compete and the posted speed is increased to 100 km/h.

TRAFFIC OPERATION

The present (1991) AADT for the N-E move is 4,100 vehicles. This is an increase of over 70% since 1984. The projected traffic volume for this ramp is 11,980 AADT for the year 2011. Although the existing loop ramp could accommodate the 2011 projected volumes, this is a high volume of traffic to be using a substandard design loop ramp.

ROUTE CONTINUITY

The N-E ramp forms part of the Highway 6 route. The Hanlon Expressway was built in part to discourage traffic from using Brock Road to access Guelph. The present loop ramp is operationally restrictive. The introduction of a directional N-E ramp from the Hanlon Expressway to Highway 401 will improve traffic operations and help encourage people to use the Hanlon Expressway rather than Brock Road.

5.5.8 Hydraulic Impact Study for Highway 6/401 N-E and W-N Ramps

The objective of the study was to determine the effects of the N-E and W-N ramps on the Regional and 1:100 year water levels on Aberfoyle Creek and recommend appropriate alternatives to mitigate against hydraulic impacts.

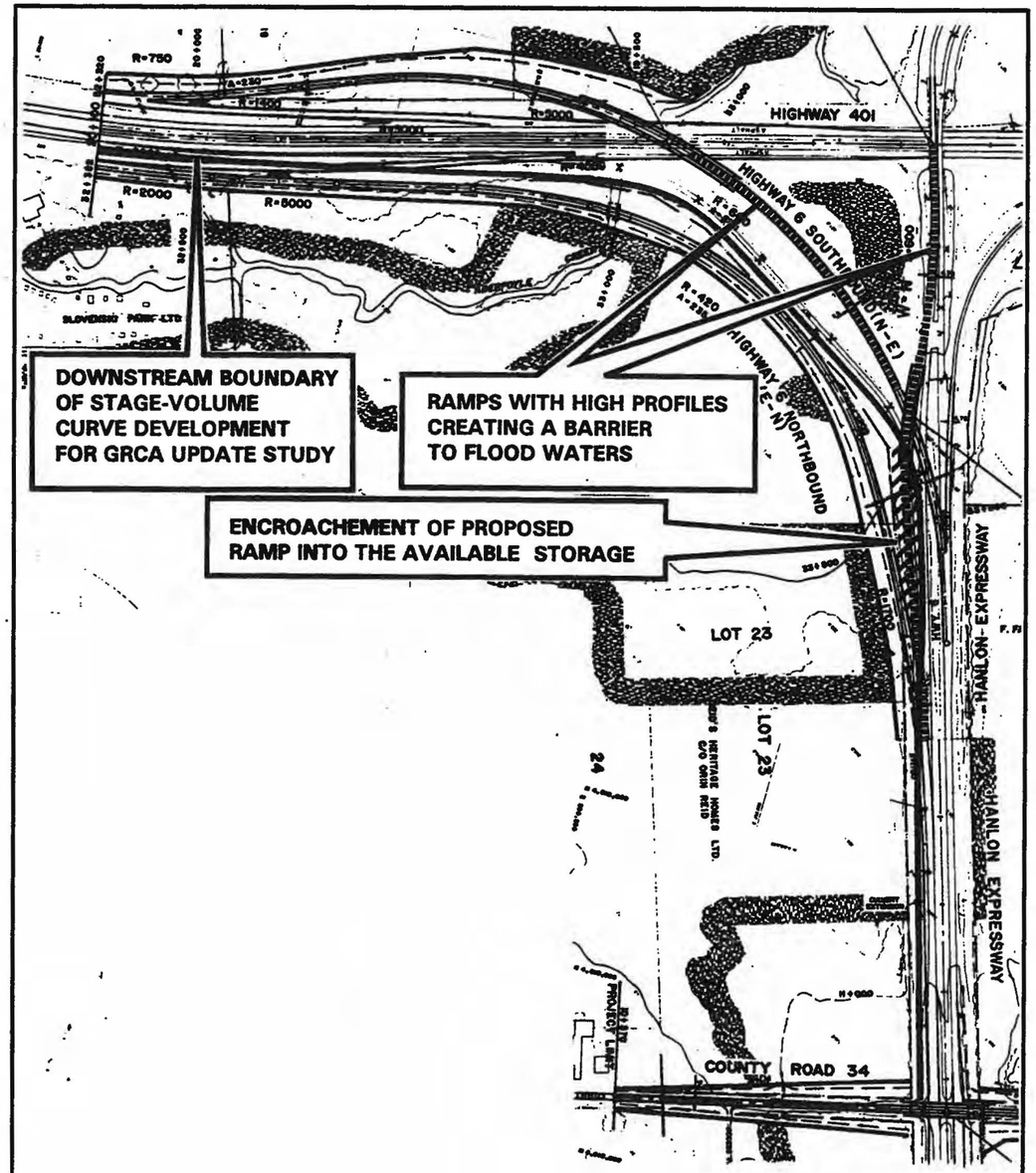
In June 1992, the Grand River Conservation Authority (GRCA) updated the flood elevations upstream of the Highway 401 culvert crossing of Aberfoyle Creek. This was in response to the Ministry of Transportation of Ontario's (MTO's) proposal to construct a solid centre median along that stretch of Highway 401.

The GRCA update study utilized the storage routing capacity of the area upstream of the Highway 401 culvert. A stage volume relationship was developed for the area together with a discharge rating curve for the culvert. The developed rating curve for the culvert assumed no weir flow over the highway. To determine the upstream flood elevations, the hydrographs of the various design storms were passed through the culvert using a reservoir routing algorithm. This analysis showed that without weir flow over the highway, the effects of upstream storage would result in a slightly lesser Regulatory Flood elevation. Thus, the Highway 401 solid centre median would not have an impact on the Aberfoyle Creek upstream regulatory flood levels.

The findings of this GRCA update study were used to determine the impacts of the proposed N-E and W-N ramps on the Regional Flood and 1:100 year flood levels on Aberfoyle Creek. Figure 5.19 shows the location of the ramps relative to the downstream boundaries used in developing the stage volume curve in the GRCA study. A section of our W-N ramp encroaches upon the storage used in the stage volume curve development, but the amount of storage displaced by our ramp is insignificantly small compared to the total available flood storage. Furthermore, our N-E ramp is located outside the area that was used in developing the stage-volume curve. Therefore, the proposed W-N and N-E ramps will not have an impact on the Aberfoyle Creek upstream flood levels, both for the Regional and the 100-year floods.

5.5.9 From Highway 6 South to Highway 401 East Ramp

At the Connection Road/Brock Road interchange with Highway 401, access from northbound Highway 6 to eastbound Highway 401 (S-E move) was designed to share the loop ramp with the N-E move. This would require the S-E traffic to make a left turn to enter the ramp. During the Update and Supplementary Investigations work this was identified as a major move between the two provincial highways which should be improved by constructing a direct S-E ramp rather than having this move share the N-E loop ramp.



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.19
HYDRAULIC IMPACTS OF N-E AND W-N RAMPS

With the introduction of a new direct ramp to carry the S-E move, the design of the N-E loop ramp was improved by utilizing a compound radius of R=55 and R=90 m. The compound radius was selected in favour of a constant 55 m radius in order to move the bullnose further west along Highway 401 away from the existing Brock Road structure since there is not sufficient width under the existing structure to accommodate a gore area. The redesign of the N-E ramp allowed the W-N/S ramp to be shifted further northeast by 25 m which reduced the property requirements in that quadrant (refer to Design Plate 26).

The impact of the new ramp was reviewed. With respect to natural environment, it was determined that none of the vegetation removed, including woody species, would represent a significant loss. Total loss of woody vegetative cover would be no more than 0.2 ha. With respect to social environment and agriculture, no impacts were noted.

Adding the direct S-E ramp improves the interchange geometrics and traffic operations. The only disadvantage is that, whereas the original design had a free flow traffic movement from existing Highway 6 to Brock Road north, such a move cannot be provided in the proposed design. Vehicles from existing Highway 6 going to northbound Brock Road will have to go through the traffic signals.

As a further consideration, a Brock Road to Highway 401 (N-W) directional ramp was not precluded by the design proposals of this project. However, this ramp would be the subject of another study.

5.5.10 Access to the Farkas Property

It was previously proposed (1989 Initial Recommendation) that County Road 34 would be offset 25 m to the north in conjunction with the construction of an interchange at the present Hanlon Expressway/County Road 34 intersection. That recommendation has since been revised due to environmental concerns regarding the wetlands in this area (refer to Section 5.4.5.1). It is presently recommended that a grade separation only be constructed at County Road 34 and the Hanlon Expressway, with the interchange located further north. Further, it is recommended that reconstructed County Road 34 remain on the existing alignment to minimize encroachment on the wetlands north of County Road 34.

The current recommendation significantly increases the impact on the entrance to the Farkas property in the southwest quadrant of the Hanlon Expressway/County Road 34 intersection. With the previous proposal the Farkas driveway could utilize the old County Road 34 right-of-way to raise the driveway grade prior to connecting to County Road 34. With the current proposal County Road 34 will remain on the existing alignment so the driveway grade raise will have to take place on the Farkas property. The Farkas driveway will have to be raised approximately 5 m and realigned westerly to match the new profile on County Road 34. Also, utilizing the existing alignment will require that a strip of property from the front of the Farkas property be acquired for the approach fill grading for the County Road 34 grade separation.

Two alternatives for reconstructing the Farkas driveway were developed. For both alternatives the driveway entrance would be relocated to the west limit of the Farkas property so as to intersect with County Road 34 at the lowest possible grade, as well as maximize the sight distance to crest of the new County Road 34 structure over the Hanlon Expressway. Design features of the alternatives were as follows:

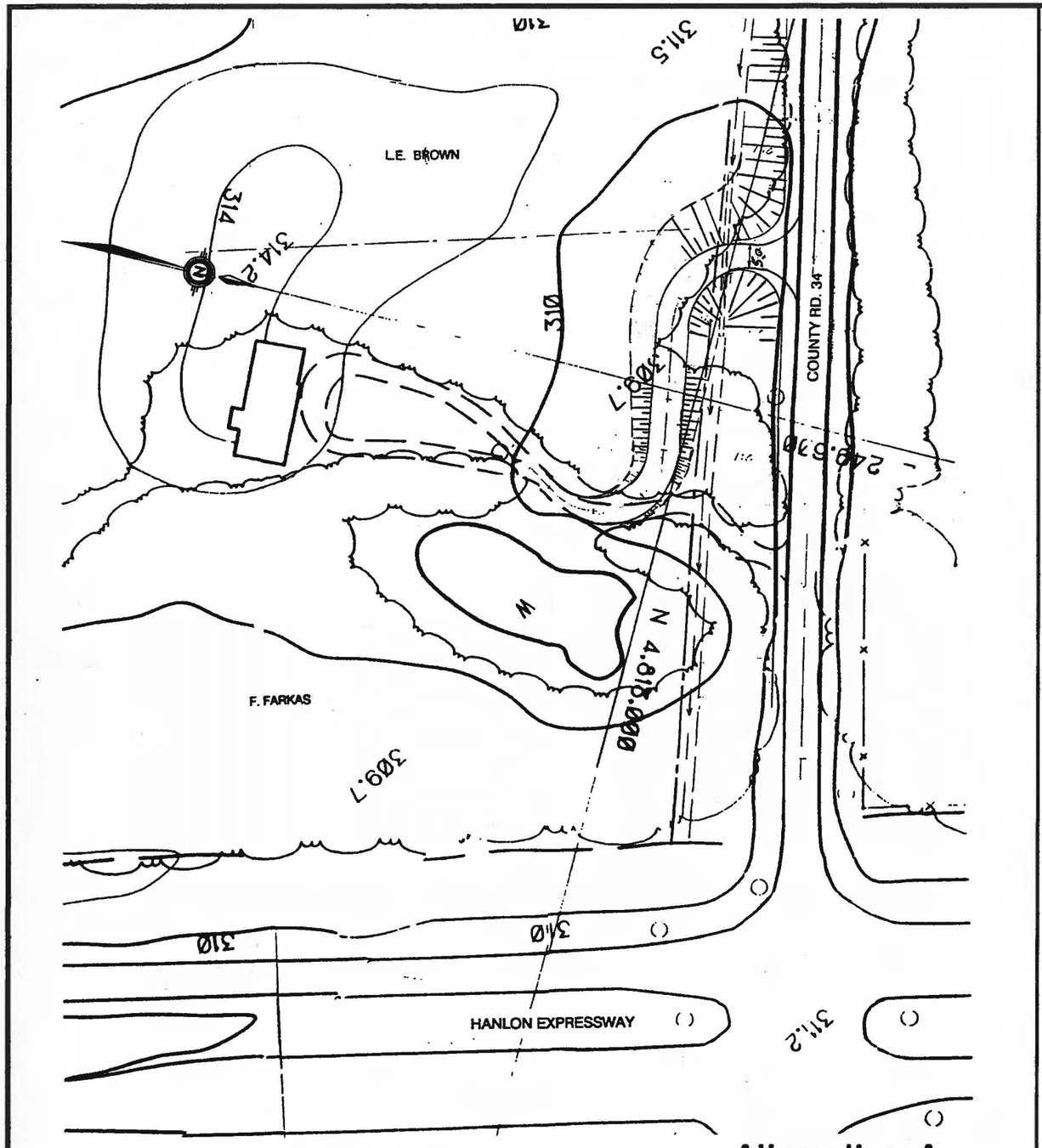
Alternative `A'

The driveway would be re-aligned to an "S" curve shape so as to tie into the existing entrance approximately 42 m south of the centreline of County Road 34 (refer to Figure 5.20). The profile for the relocated section would require a grade of 8% for approximately 60 m to match the raised grade on County Road 34.

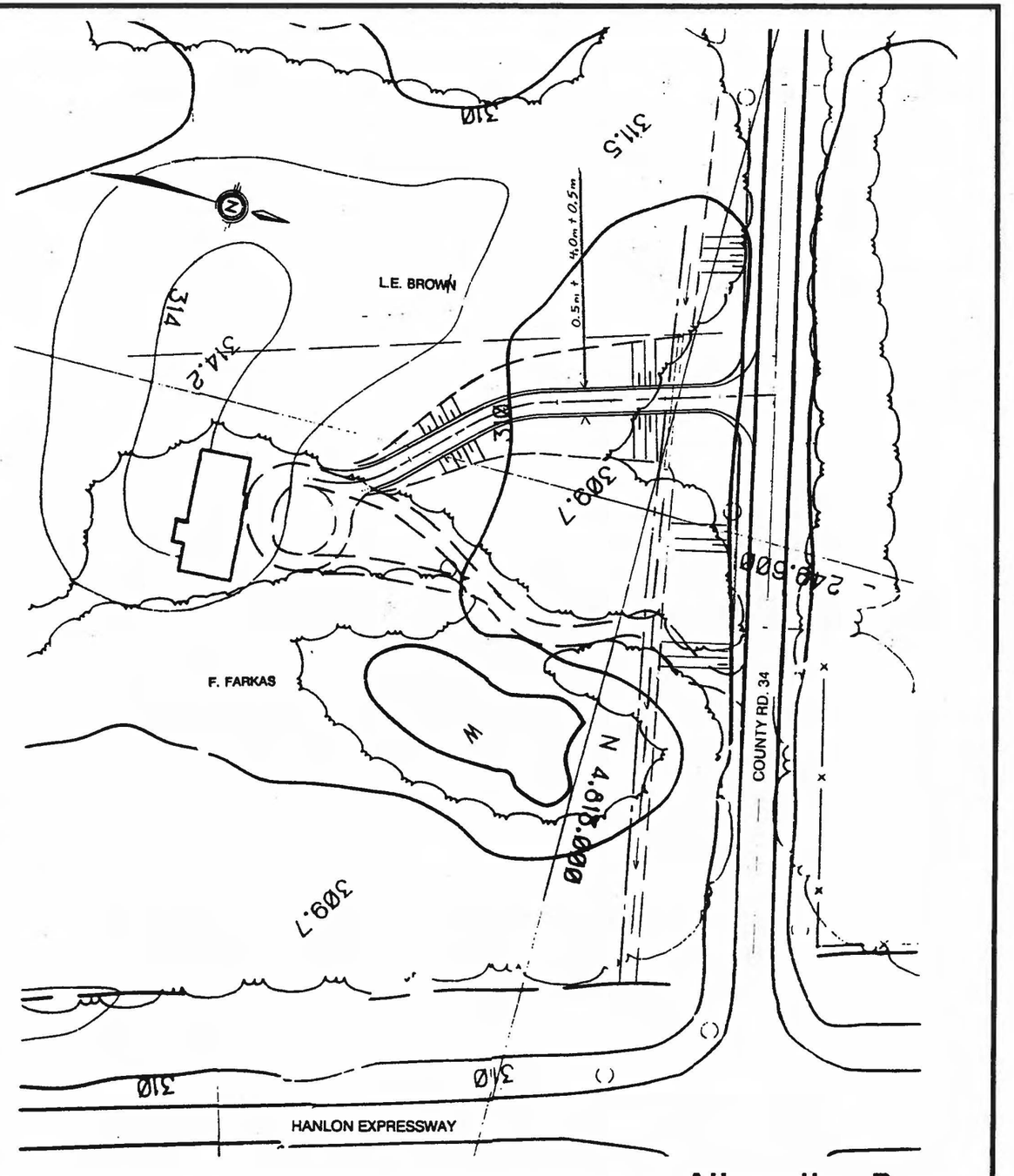
Alternative `B'

The driveway would be re-aligned along the west limit of the Farkas property, curving at the end to tie into the circular drive in front of the Farkas residence (refer to Figure 5.20). The profile for the relocated driveway would have a grade of 5.5% for approximately 60 m to match the raised grade on County Road 34.

Alternative `B' would provide a more direct entrance to the property with a more desirable grade, but would result in the removal of a greater number of trees.



Alternative A



Alternative B

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.20

ALTERNATIVES FOR RELOCATION OF FARKAS DRIVEWAY

Both alternatives were presented to the Farkases for review and comment. The Farkases did not note a preference between the two alternatives but felt both alternatives significantly affected their property adversely. They noted that the trees which would be removed to relocate the entrance and the grading for County Road 34 are mature. Planting seedlings to screen the entrance would not be acceptable. They also noted that noise/visual impact would result from raising County road 34 above the existing treetops.

The above noted impact was reviewed in relation to the impact associated with offsetting County Road 34 to the north. The wetland on the north side of County Road 34 is more sensitive than on the south side. It was concluded that, on balance, offsetting County Road 34 to the north would have a significantly greater impact than reconstructing the Farkas driveway in the wetland area to the south.

5.5.11 Maddaugh Road Re-alignment

As a result of concerns expressed by a property owner (Reynolds) at our January 18, 1994 Public Information Centre, a review of the proposed realignment of Maddaugh Road at Highway 6 was undertaken. The objective of the review was to determine if the impact on the southeast quadrant (Reynolds) could be reduced.

The realignment of Maddaugh Road shown in the 1989 report (see Figure 5.21) shifted the alignment to the south by as much as 60m. A revised alignment for relocated Maddaugh Road was developed (see Figure 5.22) to reduce the shift in the alignment to less than 40m. Also the distance from the house in the southeast quadrant (Reynolds) was significantly improved with the revised alignment, increasing from 50m to 75m.

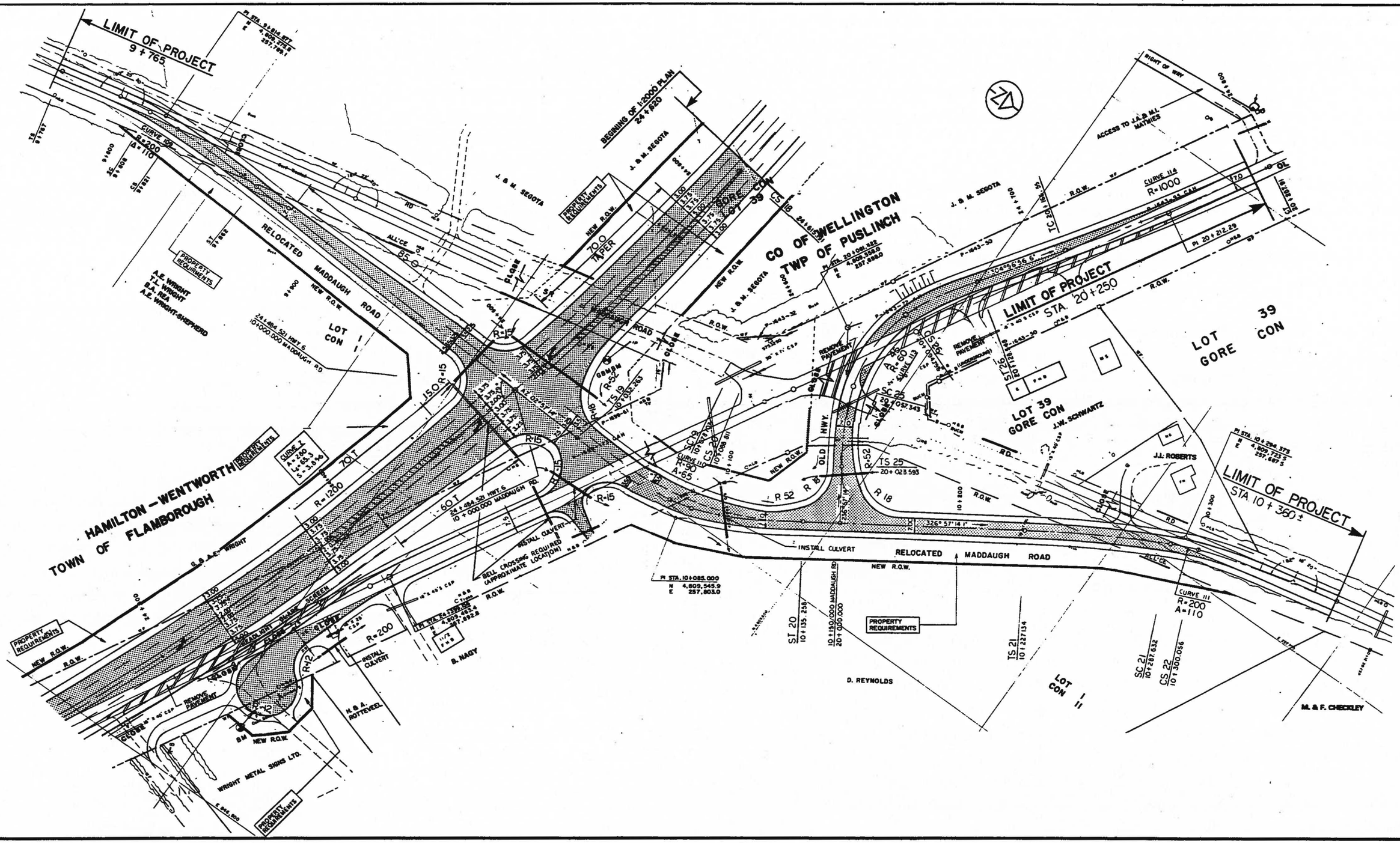
The revised alignment for Maddaugh Road was designed to adhere to the design standards agreed upon for the 1989 design. There are two significant differences between the two designs. First, the length of tangent between the intersection and the first curve on Maddaugh Road west of Highway 6 and the length of tangent between the two back to back reverse curves on Maddaugh Road east of Highway 6 have been reduced. In the former case the tangent has been reduced from 110m to 25m and in the latter case has been reduced from 94m to 55m. In both cases the minimum requirements are met or exceeded in the revised design. Secondly, the spirals along Maddaugh Road were removed since they are not warranted for this low traffic volume municipal road.

With respect to property impacts the latest proposed alignment requires significantly less property from both the southeast quadrant (Reynolds) and the southwest quadrant (Wright). The new proposed design reduced the property requirement in the southeast quadrant from 0.6ha to 0.25ha and in the southwest quadrant from 0.4ha down to 0.05ha. The impact on the northwest quadrant would be approximately the same for both proposals. For the northeast quadrant (Bush/Klug) the impact by the latest proposal would be slightly more since relocated Old Highway 6 would be 15m closer to the house. However the relocated Old Highway 6 would still be 45m south of the house and the house is only 32m east of existing Highway 6. The advance Highway 6 widening project (W.P. 65-76-02) has requested a small parcel of land in the southwest corner of the Bush/Klug property. It is expected no additional property would be required in this quadrant for the latest proposal.

In summary, the revised alignment is recommended since it is essentially the same as the 1989 proposal from a traffic operations point of view and offers the following advantages:

- **reduced length of Maddaugh Road to be reconstructed**
- **reduced property requirements**
- **responds to landowner's concerns in southeast quadrant (Reynolds) with respect to minimizing property impacts**

It should also be noted (for consideration in Detail Design) that in a letter, dated October 31, 1994, the Halton Region Conservation Authority noted that the "Maddaugh Road intersection with Highway 6 will require the placement of fill material within a fill regulated wetland associated with the Bronte Creek. We request that the Detail Design should incorporate all practical measures to minimize the loss of wetland area and function. We also request that measures such as installation of culverts to equalize flows between wetland areas be incorporated if the highway will sever wetland areas"

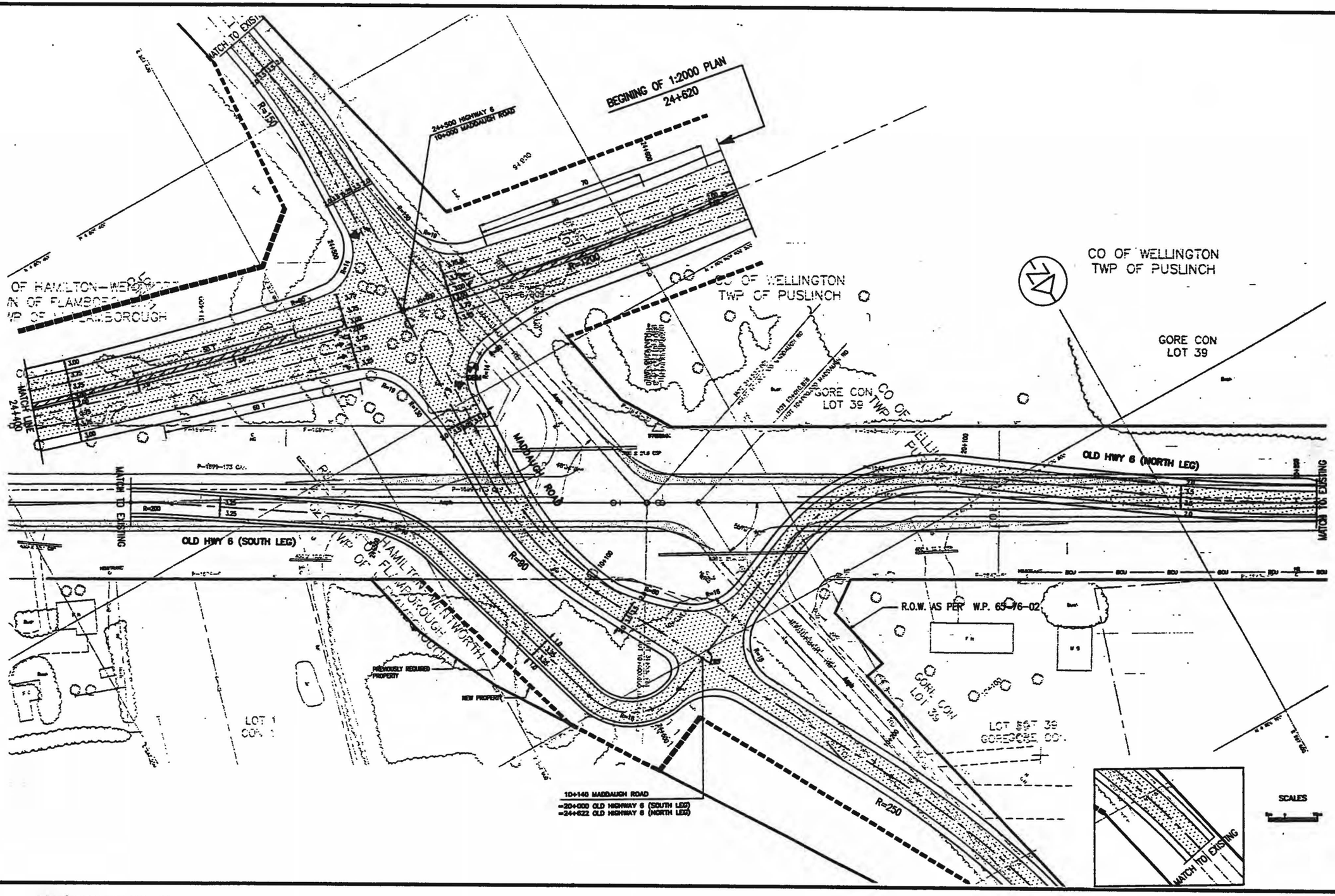


HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.21

1989 DESIGN OF MADDAUGH ROAD RE-ALIGNMENT



HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 5.22

PROPOSED DESIGN OF MADDAUGH ROAD RE-ALIGNMENT

TABLE OF CONTENTS

Page

6.0 PROJECT DESCRIPTION, POTENTIAL CONDITION CHANGES, MITIGATION MEASURES & COMMITMENTS TO FURTHER WORK

6.1 General Description of the Project 6-1
6.1.1 Location 6-1
6.1.2 Maintenance Implications 6-4
6.1.3 Project Implementation 6-5
6.1.4 Structural Planning 6-5
6.1.4.1 Construction Sequence 6-5
6.1.4.2 Contract Breakdown 6-6
6.1.4.3 Construction Timing & Earth Moving Strategy . . . 6-10
6.1.4.4 Structural Planning 6-10

6.2 Identified Potential Environmental Condition Changes, Effects and Commitments to Mitigation 6-11
6.2.1 Detailed Description of the Project Area 6-11
6.2.2 Potential Environmental Conditions Changes, Effects and Mitigation Measures 6-11
6.2.2.1 Natural Environment 6-11
6.2.2.2 Social Environment 6-24
6.2.2.3 Economic Environment 6-30
6.2.2.4 Cultural Environment 6-33

6.3 Commitment to Further Work 6-34
6.3.1 Further Investigation, Liaison and Documentation 6-34
6.3.2 Design and Construction Reports 6-36
6.3.3 Monitoring 6-36
6.3.3.1 Contract Compliance 6-36
6.3.3.2 Environmental Measure Effectiveness 6-37
6.3.3.3 Condition of Approval Compliance 6-37
6.3.3.4 Post-Construction Monitoring of Stormwater Quality Control Measures 6-37
6.3.3.5 Responsibility for Monitoring 6-38

6.4 Summary of Concerns, Identified Impacts, Associated Mitigation Measures, and Commitments to Further Work 6-38

6.0 PROJECT DESCRIPTION, POTENTIAL CONDITION CHANGES, MITIGATION MEASURES & COMMITMENTS TO FURTHER WORK

6.0 PROJECT DESCRIPTION, POTENTIAL CONDITION CHANGES, MITIGATION MEASURES AND COMMITMENTS TO FURTHER WORK

The undertaking under consideration has been defined as **the introduction of transportation system improvements in Highway 6 corridor between Freelton and the City of Guelph which contribute to a reduction in the growth of road congestion, accident potential and associated costs, as well as support municipal Official Plan objectives.** Previous sections of this report have demonstrated the need and justification for the proposed undertaking and identified a preferred alignment for a re-routing of the Highway 6 corridor within the study area.

This chapter provides a description of the proposed Highway 6 improvement project, the environmental effects and resultant impacts associated with the construction, operation and maintenance of the project and an outline of commitments to mitigation and further work to be undertaken relative to identified environmentally significant areas and issues.

6.1 GENERAL DESCRIPTION OF THE PROJECT

6.1.1 Location

The selected alignment for the proposed Highway 6 improvements is illustrated in Figure 6.1. Greater detail is exhibited on the preliminary design plan and profile plates in Appendix O. Generally the project limits are defined by the existing 4-lane Highway 6 section at Freelton to the south and the north oriented speed change lanes of the proposed Hanlon Expressway/Wellington County Road 34 Connection Road interchange to the north.

The major design features of the undertaking are described within four basic sections as follows (refer to appropriate Design Plates in Appendix O).

Section A - South Project Limit to Maddaugh Road
Section B - Maddaugh Road to Highway 401
Section C - Highway 6 parallel to Highway 401
Section D - Hanlon Expressway to North Project Limit

As indicated in the Preamble to this report, due to the urgency of improvements to the existing Highway 6 route and the general absence of identified significant environmental issues on the section within the Region of Hamilton-Wentworth, MTO has secured approval from the Ministry of the Environment and Energy (MOEE) to finalize the planning and design for the widening section of the project (Section A) as a separate, Group "B" undertaking under the Provincial Highways Program Class Environmental Assessment. However, the description of Section A proposals has been retained in this report to provide reviewers with a sense of project continuity and connectivity between the existing 4-lane section and the new route section north of Maddaugh Road.

Section A - South Project Limit to Maddaugh Road [Plates 1-16]

- Improvements on this section entail widening existing Highway 6 from 2 to 4 or 5 lanes, depending on turning lane requirements, while maintaining limited access status. The design affects 7 sideroads and 39 private entrances.

- The section between the south project limit and Flamborough Concession Road 12 is designed with a standard 4-lane plus 1.0 m flush median cross-section due to adjacent land use (primarily wetland). At the Concession Road 12 intersection, provision is made for right-turn (S-E move) and left-turn (N-E move) lanes. [1-3]

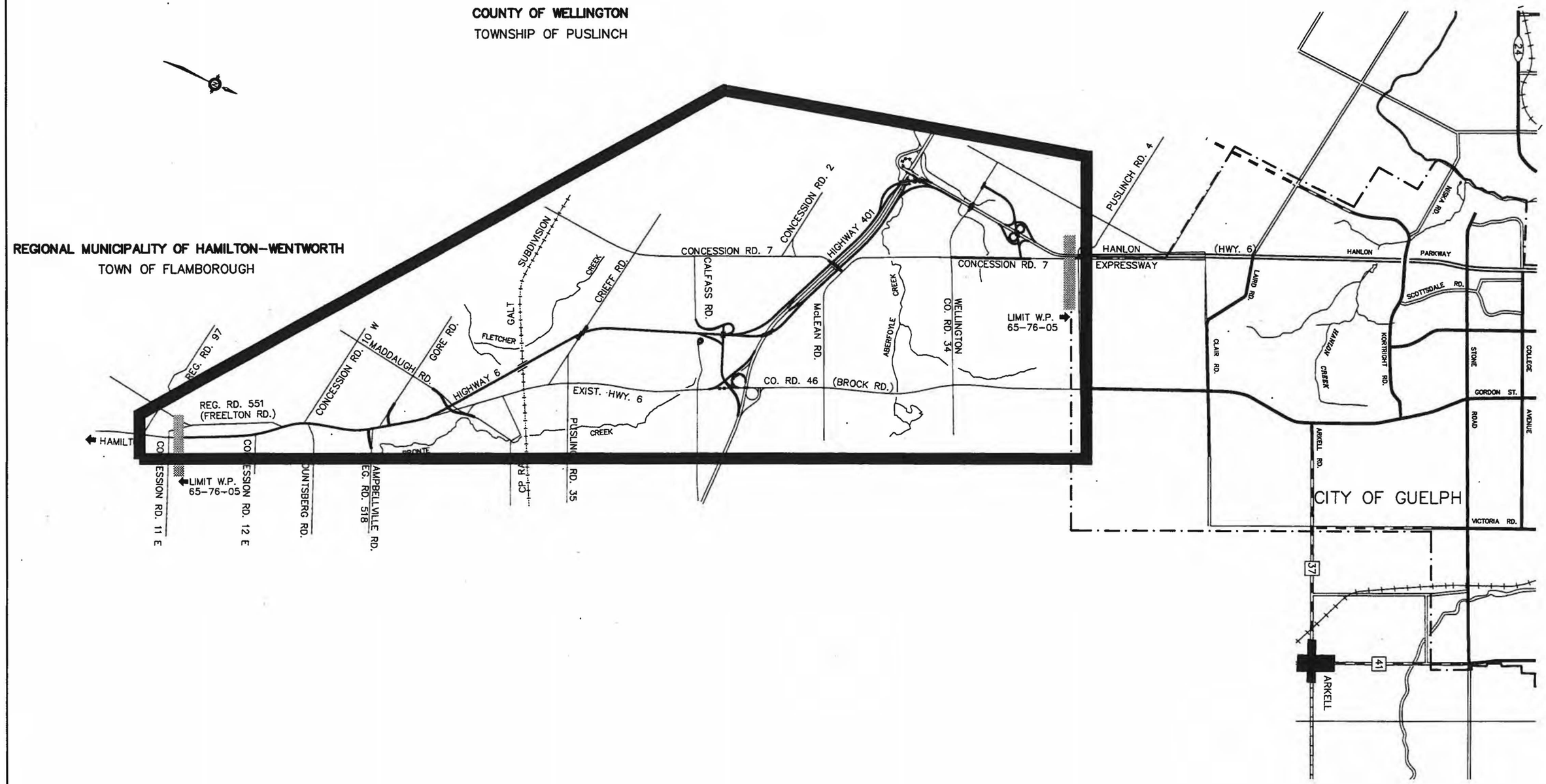
- From Concession Road 12 to Regional Road 551 (Freelton Road) the design incorporates a 5-lane cross-section (continuous left-turn lane). [4-5]

- At Freelton Road the raised island on Freelton Road channelizing N-W moves is shifted to the west. [5]

- The section from Freelton Road to Flamborough Concession Road 10/Mountsberg Road commences with asymmetrical widening on the curve north of Freelton Road into a 5-lane section which will serve three existing entrances. [5-6]

- Between Mountsberg Road and Campbellville Road, the design is based on a 5-lane cross-section. Nine existing entrances would be served. [6-9]

- Campbellville Road and Gore Road are realigned to the south and north respectively to provide improved intersection angles with Highway 6 and increased spacing (230 m) on Highway 6 between the two T-intersections. [9-11]



HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

STUDY AREA

Figure 6.1

STUDY AREA LOCATION SHOWING RECOMMENDED HIGHWAY 6 ROUTE

- A continuous turning lane is provided between the Campbellville Road and Gore Road intersections. The ultimate condition at this location includes provision for the westerly extension of Campbellville Road across Highway 6, connecting to Gore Road approximately 620 m west of Highway 6, and closure of the interim Gore Road/Highway 6 intersection. Existing property accesses would be retained. This would be a municipal initiative. [9-11]

- The proposal for the section between Gore Road and the divergence point of the new route calls for a full 5-lane section, despite the low number of side entrances, for reasons related to continuity and safety. [11-14]

- The connection with existing Highway 6 where the new alignment diverges to the west will comprise a reverse curve on existing Highway 6 from the north to a T-intersection with Maddaugh Road which will be re-aligned on both sides of Highway 6 to create an 80° 4-leg intersection with the new route. [15]

- A short section of existing Highway 6 will also T with re-aligned Maddaugh Road from the south and will be retained as a cul-de-sac (with turning basin for maintenance) to retain five existing private entrances which will lose direct access to Highway 6. This 250 m cul-de-sac would likely be assumed by the Town of Flamborough. [14]

- The Maddaugh Road intersection will be signalized with a flashing amber on the north leg to warn of the signals. [14]

- The left-turn lane on the north leg of the Maddaugh Road intersection will extend north to a point opposite the Mathies farm entrance to provide for safe access to the property for left-turning vehicles. [14]

- The standard 5-lane section for widening of existing Highway 6 will include 4 x 3.75 m lanes with 4.0 m flush median and 3.0 m shoulders with 0.50 m partially paved. A curb-and-gutter section with rolled curb will be used where there is limited right-of-way. [14&18]

Section B - Maddaugh Road to Highway 401 (Plates 18 -27)

- This section comprises a 4-lane roadway on a new alignment with full control of access status. An exception to this is just north of Maddaugh Road where a centre left turn lane will be provided for an access 200m north of Maddaugh road on the west side of Highway 6.

- At Fielding Lane a 4.0 m wide x 4.25 m high box culvert structure is proposed to provide single lane access to existing Highway 6 for properties west of the new route. [18]

- A new field access will be constructed immediately adjacent to, but outside of, the west Highway 6 right-of-way limit south of Fielding Lane. This will be a 4m wide berm which will replace the present field access to the Fieldings' land west of Highway 6. [18]

- The crossing of the CP Rail Galt Subdivision is 480 m west of the existing Highway 6 grade separation. The south and north approach grades are 3.0% and 2.5% respectively. [20]

- Crieff Road will retain its existing horizontal alignment with a raised profile to pass over new Highway 6. No access to the new route is to be provided or protected. [20]

- Calfass Road will be closed (cul-de-sac) on the east side of the new route and realigned from the west to join with the new Connection Road north of Morriston. Existing property access will be retained. The E-S ramp at the Connection Road will be designed as a simple circular loop and include a stop condition for W-S traffic, giving priority to E-S move. [24]

- The new Connection Road will link the new Highway 6 with existing Highway 6 and Brock Road north of Morriston. It will provide a link between the new route and Highway 401 (S-E and E-S moves) as well as a link to and from Morriston. [24&26]

- The new Connection Road will curve to the north to connect directly to Brock Road. Existing Highway 6 south of Highway 401 will be realigned to intersect with the Connection Road opposite the W-N/S ramp terminal. This intersection will be signalized. [26]

- A direct S-E ramp will be added to the Highway 401/Brock Road/Connection Road interchange so this move will no longer have to share the loop ramp with the N-E move. [26]

- The drainage strategy for this section essentially retains existing overland runoff patterns. Three stormwater management infiltration basins are recommended through this section. The infiltration basins would be located in existing land depressions.

- The 4-lane cross-section for new Highway 6 will feature a 6.0 m median with a concrete barrier between a point north of the CP Rail line to immediately south of 401. This cross-section provides a 2.7 m paved left shoulder.

Section C - Highway 401 Widening (Plates 28-33)

- Highway 6 will curve to the west and parallel Highway 401 in the form of collectors in a mini express collector system. The Highway 6 parallel lanes will have 2 through lanes in each direction plus one continuous speed change lane to accommodate the transfers to and from Highway 401. The separator between the Highway 401 lanes and Highway 6 lanes ensures that expansion of Highway 401 to 8 lanes in the future is not precluded.

- The widening of Highway 401 from 4 lanes to 6 lanes is scheduled for completion by 1996. For the purpose of the Highway 6 design, it was assumed that Highway 401 would be 6 lanes prior to construction of Highway 6.

- The work in this section includes reconstruction of the Concession Road 7 bridge over Highway 401. The new structure will be offset from its existing alignment to minimize temporary road closure requirements.

- Property will be required from both sides of Highway 401. The property requirements will be in the order of 10 m to 20 m additional width required on each side of Highway 401. There are additional width requirements in the vicinity of the Highway 6 connection from the south in the areas of stormwater management facilities and in the vicinity of the Hanlon Expressway.

- Runoff from a significant portion of the existing Highway 401 right-of-way is directed towards depressions which are drained by infiltration. The preferred stormwater management concept will also utilize this scheme with three areas delineated for infiltration basins. The runoff drained by the median sewer as well as the core-collector ditches will be directed towards a central BMP facility (between the Hanlon Expressway N-E ramp and Highway 401) before being discharged to Aberfoyle Creek.

- The interchange at the Hanlon Expressway will be reconstructed to remove the N-E loop ramp and replace it with a directional ramp. This will require the reconstruction of the W-N ramp to grade separate it from the N-E ramp. Also, the E-N ramp will be reconstructed to improve the ramp geometrics. [32]

Section D - Hanlon Expressway to North Project Limit (Plates 34 - 38)

- The Hanlon Expressway is designed as a 4-lane controlled access facility with sufficient median to widen to 6 lanes if required in the future. A speed change lane is carried northbound from Highway 401 for 1,400 m to provide a comfortable weave between the merge point of Highway 6 northbound (E-N ramp and the W-N ramp) and the County Road 34 Connection Road interchange to the north. This will be the only new pavement added to the Hanlon driving lanes associated with this project. [32,34&36]

- County Road 34 will be grade separated from the Hanlon Expressway. The grade separation will be on the existing County Road 34 alignment. The raise in profile of County Road 34 will require the relocation of one driveway (Farkas) and regrading of three others. [34]

- A Connection Road will be constructed to connect County Road 34 to the proposed interchange 875 m to the north. The Connection Road will be 2 lanes with sufficient right-of-way to be widened to 4 lanes in the future. The interchange itself will be a standard Parclo A-4 with 2-lane exit ramps. [34&36]

- Concession Road 7 will be reconstructed with an improved profile to form the east link between the Connection Road and County Road 34. Three accesses will require regrading. [36]

- The drainage strategy for this section is to direct runoff towards the south as in the existing condition. For the purpose of the drainage strategy, there are three main areas of construction: Connection Road/Hanlon Expressway interchange, Connection Road to County Road 34, and the Hanlon Expressway.

  - For the interchange area, an infiltration basin is recommended. The best location for an infiltration basin is the southern most tip of the land bounded by the W-S and S-E/W ramps.

  - For the County Road 34 Connection Road, the recommended conceptual stormwater management plan consists of vegetative BMPs (i.e. grass-lined buffer strips and grass-lined ditches and channel for collection, conveyance and treatment of stormwater runoff from the area).

  - Although there will be construction on the Hanlon Expressway, stormwater impacts will not be significant because the widening work will only involve one northbound lane (aforementioned 1,400 m speed change lane).

The undertaking will involve a significant amount of earthwork, particularly in Section B with the commitment to a generally depressed profile. This will produce a surplus of materials in the order of 134,000 m^3. The surplus material, depending on quality and suitability, may be used for landscaping purposes and upgrading of the Hanlon Expressway or may be disposed of at an approved site in an environmentally acceptable manner. Potential sites for stockpiling useable material include the MTO Morriston patrol yard or the MTO property in the southwest quadrant of the existing Highway 6 and Highway 401 interchange. In the latter area, care will be taken to minimize disruption to vegetation, particularly in the MNR Morriston Tract (reforestation area).

6.1.2 Maintenance Implications

The proposed Highway 6 cross-section includes 0.5 m partially paved shoulders. This additional pavement structure support, combined with the reduction in potential use of shoulders for passing manoeuvres on the 4-lane section, is expected to significantly reduce drop-off repair requirements and damage to the edge of the asphalt driving surface. Similarly, the addition of turning lanes on the widened section of existing Highway 6 and improved intersection angles of crossroads and T-intersections will limit the use of shoulders for turning movements, thereby reducing maintenance requirements at these locations.

Side ditches will generally require standard maintenance practices in terms of cleaning to ensure proper drainage. The section of the new alignment over adjacent agricultural properties south of Crieff Road includes elevated ditching (Station 26+700 to Station 26+850) which may require special monitoring to ensure that highway runoff is retained within the right-of-way. In addition, the design employs an urban cross-section (350 m of discontinuous curb-and-gutter) north of Concession Road 10 West which will require a departure from rural cross-section maintenance practices.

The MTO Morriston patrol yard is responsible for maintenance of Highway 401 between Highway 25 and Highway 24, and Highway 6 between Highway 401 and Highway 5. Available records indicate that the yard uses 17.2 tons of salt/year/2-lane kilometre of highway for winter maintenance purposes (5-year average annual total usage of 2,300 tons). The Highway 6 improvements are expected to increase the annual average total usage of salt by MTO District forces by approximately 10% and may require modification in the distribution pattern on a load-by-load basis.

The introduction of stormwater quality management facilities (grassed swales, filter strips, infiltration basins, buffer strips) may also result in nominal additional maintenance requirements. Visual inspection and the aesthetic attributes of swales will generally determine the need for their maintenance (e.g. occasional removal of debris). Maintenance activities for filter strips involve occasional monitoring and repairing the vegetated filters as necessary to ensure efficient operation (e.g., repairs of eroded areas). Maintenance of infiltration basins involves ensuring that sedimentation does not seal the bottom, thereby limiting infiltration potential. Maintenance of the pre-treatment facilities (grassed swales, filter strips) and implementation of source controls (salting and sanding practices) will be used to prevent sedimentation from occurring. In addition, plantings of deep rooted legumes in the infiltration basins may be introduced to assist in maintaining porosity. Buffer strips on roadway embankments, will not provide any location for concentrated collection of sediment and, therefore, are not candidates for programmed sediment removal.

In summary, the project is expected to result in cost savings without creating any extraordinary maintenance requirements.

6.1.3 Cross-section

The grading and property requirements shown for Highway 6 are based on 3:1 slopes which are preferred by MTO for maintenance purposes. The right-of-way requirements shown on the design plates (see Appendix O) represent the minimum requirements for 3:1 slopes and do not necessarily represent the actual right-of-way which will be negotiated in the future.

6.1.4 Project Implementation

6.1.4.1 Construction Sequence

Outlined below is a suggested construction sequence. Other staging sequences may be investigated during future design phases.

As noted previously, the project has four basic sections:

Section A - South project limit to Maddaugh Road
Section B - Maddaugh Road to Highway 401
Section C - Highway 6 parallel to Highway 401
Section D - Hanlon Expressway to North Project Limit

Section A encompasses widening Highway 6 from where the 4-lane section presently ends northerly to Maddaugh Road. The widening can be carried out independently of the other contracts. The only implication of this work being carried out in advance of work further to the north is that 45,100 m^3 of borrow material which is required may have to be obtained from a source external to this project. Construction of this section would bring an immediate benefit of improving driving conditions along a 4 km section of existing Highway 6.

After Section A, Section B is the highest priority for upgrading in terms of traffic demand in order to complete the widening of Highway 6 to 4 lanes northerly to Highway 401. This would suggest that this section of new alignment should be constructed next. However, it is suggested that the construction of Highway 6 parallel lanes alongside Highway 401, Section C, proceed prior to Section B for the following reasons:

- In order to open Highway 6 south of Highway 401 prior to constructing the Highway 6 parallel lanes alongside Highway 401, temporary connections (which would ultimately be waste construction) would be required to connect Highway 6 to Highway 401. The speed change lane for Highway 6 northbound would have to be continued under the existing Concession Road 7 structure. Due to the limited lateral clearance under the structure, the lane markings would have to be shifted to the left. The result would be substandard left and right shoulder widths.

- It is expected that the re-alignment and widening of Highway 6 will attract a higher volume of Highway 6 traffic from the south to the Hanlon Expressway via Highway 401. As Highway 401 is expected to be near capacity by the time construction on this section of Highway 6 is underway, there is a concern that the high volume of weaving vehicles may adversely affect the Highway 401 Level of Service.

- The earth moving strategy is more efficient if the work along Highway 401 (Section C) is completed prior to the new alignment for Highway 6 south of Highway 401 (Section B). If Section B were constructed first, the surplus earth would have to be stockpiled to be used later in Section C, resulting in the double handling of earth. With Section C constructed prior to Section B, advance cut would take place along Section B to be immediately utilized by Section C.

It is suggested that construction of Section B, new Highway 6 south of Highway 401, follow closely behind the improvements to the Highway 401 corridor in order to fully utilize the Highway 401 corridor improvements.

It was noted by MTO Structural Section that the existing Highway 6 bridge over the CP Rail line will likely require major rehabilitation in about 10 years. At that time, it would be desirable for the majority of Highway 6 traffic to be routed onto new Highway 6. Depending on the timing of the EA approval and funding of Highway 6 construction, it may be necessary to expedite the construction of Section B (Highway 6 from Maddaugh Road to Highway 401) ahead of the work for Section C (Highway 6 parallel to Highway 401) in order to provide a bypass for the rehabilitation work. This would involve temporary connections to existing Highway 401 and significantly changing the earth moving strategy. Further study would be required for this option.

In terms of traffic demand, Section D, improvements along the Hanlon Expressway including interchange access to the Hanlon Expressway at Wellington County Road 34 are presently a lower priority than the work for Sections A, B, and C. The work along the Hanlon Expressway is independent of the previous construction stages and can be constructed as a stand alone project. Traffic demand at this location is expected to increase significantly as development in the newly annexed lands in the south end of the City of Guelph proceeds in the currently anticipated 5 to 10 year timeframe.

6.1.4.2 Contract Breakdown

As a result of the above suggested construction sequence, the project has been divided into the following six contracts. Table 6.1 outlines the works involved, the value, the staging sequence, and traffic implications for each of the contracts. Figure 6.2 shows the six contracts. It should be noted the following suggested contract breakdown is considered preliminary and subject to change based on further design deliberations during subsequent phases of the project.

Section A

Contract 1

- Widening of Highway 6 on existing alignment from current end of 4-lane section (at Freelton) northerly to just south of Maddaugh Road
- Relocation of Campbellville Road
- Relocation of Gore Road

Work Project 65-76-02 has already been established for the reconstruction of "Highway 6, From 1.0 km North of Highway 97, Freelton, Northerly 4.0km". The project involves a northerly extension of the 4-lane cross-section on the existing alignment. As previously indicated, there are a limited number of environmental issues associated with this most southerly section of the study area, and the project can be constructed on a stand alone basis as a Group 'B' undertaking. For these reasons W.P. 65-76-02 is recommended for construction in Stage 1.

Section C

Contracts 2 and 3 encompass improvements in the Highway 401 corridor.

Contract 2

- Construction of new Concession Road 7 structure over Highway 401
- Construction of Highway 6 parallel lanes along Highway 401 including transfer lanes
- Reconstruction of the Highway 401 to Hanlon Expressway E-N ramp including adding a third lane to the northbound Hanlon Expressway which would extend north of County Road 34
- Demolition of existing Concession Road 7 structure

The existing Concession Road 7 structure over Highway 401 is a 4-span concrete box beam structure. In order to construct the Highway 6 lanes parallel to Highway 401, it will be necessary to construct a new longer Concession Road 7 structure over Highway 401 and demolish the existing structure.

The Central Region Structural Section has confirmed the feasibility of maintaining Highway 401 traffic under the 2 central structure spans of the existing structure as the end spans are being removed. It will then be possible to construct and utilize the Highway 6 parallel lanes as a Hwy 401 detour while the 2 central spans are removed. Due to the traffic demand on Highway 401, 6 lanes must be kept open at all times. It will be possible to maintain three Highway 401 traffic lanes in each direction during the demolition of the Concession Road 7 structure by temporarily utilizing the shoulders of transfer lanes as the third lane.

After construction is completed, the northbound Highway 6 parallel lanes will continue to be utilized for the E-N move onto the Hanlon Expressway. However, use of the southbound Highway 6 parallel lanes will be discontinued until the Highway 6 to 401 (N-E) directional ramp is constructed in Contract 3. If Highway 6 southbound parallel lanes were opened to traffic prior to the construction of the N-E directional ramp, the weave length between the existing N-E inner loop and the Highway 401W to Highway 6 S transfer lanes would only be 400 m. This weave length would be insufficient, causing a safety hazard. Therefore, the Highway 6 southbound parallel lanes cannot be opened until the existing N-E loop ramp is closed.

TABLE 6.1

PROPOSED CONSTRUCTION STAGING
W.P. 65-76-05
FREELTON TO GUELPH

CONTRACT	TYPE OF WORK INVOLVED	CONTRACT VALUE	WORK SEQUENCE WITHIN STAGE	TRAFFIC SERVICE AT THE END OF THE STAGE	NOTES
Contract 1 Widen Hwy 6 on the existing alignment from Freelton to Maddaugh Road	- Earthworks - Culverts extension - Paving - Traffic signals - Local cross roads realignments	$4.8 million		Open to traffic immediately after construction	Interim termination at Maddaugh Road
Contract 2 Construct Hwy 6 parallel lanes along Hwy 401. Includes transfer lanes, E-N ramp to Hanlon Expressway and adding third northbound lane to Hanlon Expressway to north of County Road 34	- Earthworks - Culverts extension - Paving - Demolition - Bridge construction: Structure No. 6	$9.2 million	- Construct new Concession Road 7 structure offset from existing structure - Open new structure to traffic (may require temporary closure of Concession Road 7 to complete approach fills) - Demolish end spans of Concession Road 7 structure over 401 - Build the new Hwy 6 northbound and southbound along Hwy 401 - Divert Hwy 401 traffic to the Hwy 6 (collector) lanes - Complete demolition of Concession Road 7 over 401 structure	Hwy 401 traffic back on the core lanes Northbound Hwy 6 along Hwy 401 used as Hwy 401-Hanlon E-N ramp Southbound Hwy 6 lanes along Hwy 401 closed to traffic Concession Road 7 traffic on new structure	Overbuilding of transfer ramps between Hwy 6 and Hwy 401 to 3 lanes required
Contract 3 Construct the N-E directional ramp at Hwy 401 and the Hanlon Expressway. This includes reconstruction of the W-N ramp	- Structures Nos. 7 & 8 - Earthworks - Paving - Removals	$6.0 million	- Local detour of 401/Hanlon Expressway (W-N) ramp in the vicinity of Structure No. 8 - Construct Structures Nos. 7 & 8 - Build Hwy 401 - Hanlon W-N ramp and open to traffic - Build Hanlon - Hwy 401/Hwy 6 (N-E) directional ramp and open to traffic - Remove pavement of Hanlon - Hwy 401 (N-E) loop	Hwy 401 - Hanlon Expressway W-N ramp reconstruction completed and open to traffic Hanlon Expressway/Hwy 401 N-E directional ramp open to traffic Hwy 6 southbound parallel lanes utilized by N-E ramp traffic	

TABLE 6.1 *(cont'd)*

PROPOSED CONSTRUCTION STAGING

CONTRACT	TYPE OF WORK INVOLVED	CONTRACT VALUE	WORK SEQUENCE WITHIN STAGE	TRAFFIC SERVICE AT THE END OF THE STAGE	NOTES
Contract 4 Advance construction of Structures Nos. 1, 2, 3, 4 and 5	Bridge Construction: Structures Nos. 1, 2, 3, 4 and 5	$6.8 million	Construct: - Hwy 6 over Fielding Lane (STR #1) - Hwy 6 over CP Rail Galt Subdivision (STR #2) - Crieff Road over Hwy 6 (STR #3) - Connection road over Hwy 6 (STR #4) - Directional ramp Hwy 6S to Hwy 401W (STR #5) - Complete roadworks for Crieff Road and open to traffic	No change in traffic service from Stage 3	
Contract 5 Construct new Hwy 6 from Maddaugh Road to Hwy 401	- Earthworks - Paving - Traffic signals	$14.2 million	- Construct Hwy 6 New - Construct Connection Road (except section which impacts existing Hwy 6) - Construct Calfass Road Re-alignment - Construct W-N/S and S-E ramps (except where they impact existing W-N/S ramp or Hwy 6) - Open New Hwy 6 to traffic - Complete roadworks in the vicinity of the Hwy 401/Brock Road/Connection Road interchange	Open the entire project to traffic	County Road 34 remains with an at-grade intersection with the Hanlon
Contract 6 Construct County Road 34 Connection Road including Interchange at Hanlon Expressway	- Structures Nos. 10 & 11 - Earthworks - Roadworks - Paving - Traffic signals	$7.1 million	- Build interchange at County Road 34 Connection Road - Reconstruct Concession Road 7 - Shift traffic from County Road 34 to new Connection Road - Close County Road 34 and build grade separation (Structure No. 10) - Re-open County Road 34	Open the entire project to traffic	

Contract 3

Reconstruction of the Hanlon Expressway/Highway 401 interchange:

- Reconstruction of W-N ramp to grade separate it from the N-E directional ramp
- Construction of N-E directional ramp
- Close existing N-E loop ramp

Section B

Contracts 4 and 5 encompass the construction of the new alignment for Highway 6 from Maddaugh Road to Highway 401. It is recommended the construction of Contracts 4 and 5 closely follow Contracts 2 and 3 since the work under Contracts 2 and 3 offer little benefit in the way of traffic service (with the exception of the Hanlon Expressway to Highway 401 N-E directional ramp) until Contracts 4 and 5 are complete. The work along the new alignment south of Highway 401 was divided into two contracts in order create more manageable contract packages.

Contract 4

Contract 4 is an advance structures contract. The following structures are included:

- Fielding Lane
- CP Rail
- Crieff Road
- Calfass Road/Connection Road
- Highway 6 S-W Ramp

With the exception of the Crieff Road structure, all the structures will be constructed with only a minimum backfill placement. The Crieff Road structure will include the approach fills and new pavement in order to open reconstructed Crieff Road to traffic.

Contract 5

This contract will include Grading, Drainage, Granular Base and Hot Mix Paving to complete the construction of Highway 6 south of Highway 401. Some earth will have been borrowed from this section and utilized in Contracts 2, 3 and 4. This contract includes work related to:

- Construction of Highway 6 New
- Construction of Calfass Road re-alignment
- Construction of the Connection Road to Brock Road
- Reconstruction of the south half of Highway 401 Brock Road interchange

Section D

Contract 6 is independent of the above five contracts. The timing of the implementation of this contract is related to the upgrading program for the Hanlon Expressway.

Contract 6

This contract is to eliminate the at-grade intersection of County Road 34 and the Hanlon Expressway. The works include:

- Construction of the Connection Road to County Road 34, including the interchange with the Hanlon Expressway.
- Reconstruction of Concession Road 7
- Construction of a grade separation for County Road 34

THIS PAGE INTENTIONALLY LEFT BLANK

CONSTRUCTION STAGES

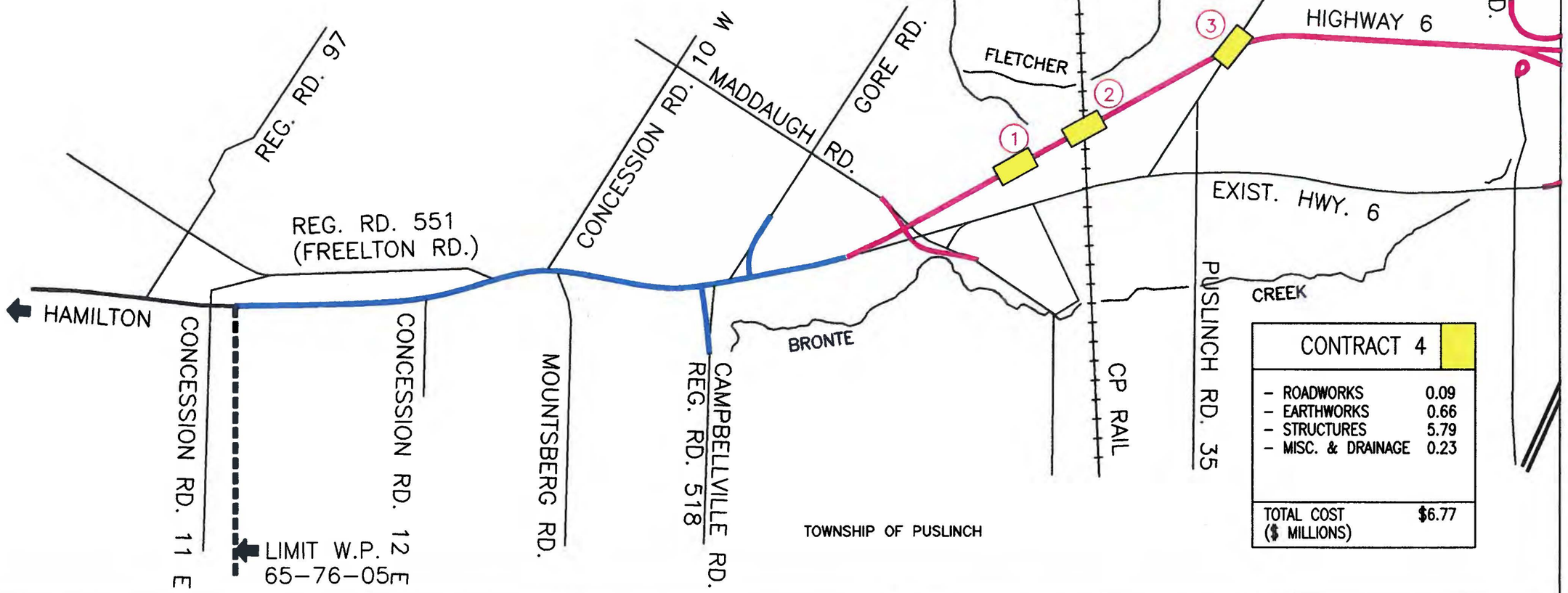
STAGE1
STAGE2
STAGE3
STAGE4
STAGE5
STAGE6

CONTRACT 1	
– ROADWORKS	2.89
– EARTHWORKS	0.65
– STRUCTURES	0.00
– MISC. & DRAINAGE	1.27
TOTAL COST ($ MILLIONS)	$4.81

COUNTY OF WELLINGTON

CONTRACT 5	
– ROADWORKS	5.37
– EARTHWORKS	4.60
– STRUCTURES	0.00
– MISC. & DRAINAGE	4.27
TOTAL COST ($ MILLIONS)	$14.24

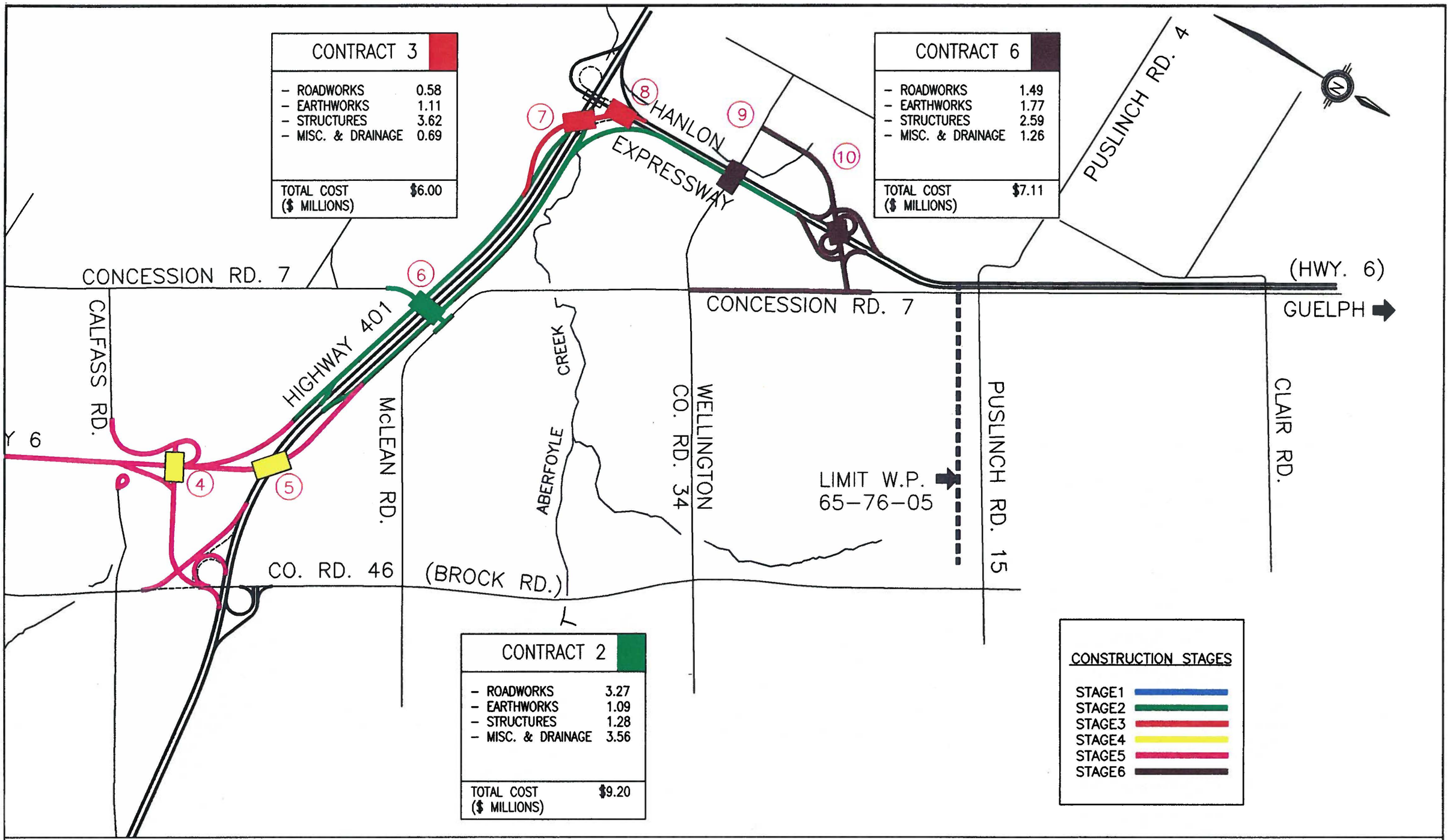
REGIONAL MUNICIPALITY OF HAMILTON–WENTWORTH



CONTRACT 4	
– ROADWORKS	0.09
– EARTHWORKS	0.66
– STRUCTURES	5.79
– MISC. & DRAINAGE	0.23
TOTAL COST ($ MILLIONS)	$6.77

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 6.2a
CONTRACT BREAKDOWN



HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 6.2b

CONTRACT BREAKDOWN

If sufficient funding becomes available at the time of construction, it would be desirable to construct Contracts 2 and 3 and Contracts 4 and 5 as combined larger contracts. This would speed up the construction process and reduce the risk of delays related to one contractor having to clear the site before another enters.

Preliminary contract quantities and construction cost estimates were prepared for each of the recommended construction stages.

6.1.4.3 Construction Timing and Earth Moving Strategy

While it is anticipated that Contracts 1 through 5 will proceed in a more or less sequential fashion, Contract 6 may not commence for some time after the completion of Contract 5. In addition, it is possible that Contract 1 may proceed well in advance of subsequent stages due to the urgency of improvements in the existing Highway 6 corridor.

Preliminary design earth quantity estimates indicate that Contract 1 through Contract 4 will be earth borrow contracts while Contract 5 and Contract 6 will be earth surplus contracts. The estimated earth balances for each contract are as follows:

Contract 1 - 45,100 m^3 borrow
Contract 2 - 90,200 m^3 borrow
Contract 3 - 131,100 m^3 borrow
Contract 4 - 67,600 m^3 borrow
Contract 5 - 322,200 m^3 surplus
Contract 6 - 100,600 m^3 surplus.

In developing the earth moving strategy (refer to Figure 6.3), it was assumed that an external borrow source would be utilized during the construction of Contract 1, as EA Approval and the purchasing of right-of-way within Contract 5 may not have been finalized prior to Contract 1 construction initiation. Under this scenario, the borrow requirements of Contracts 2 through 4 could be supplied by the surplus quantity of Contract 5, with a 33,300 m^3 surplus. However, if a borrow site can be established in the right-of-way within Contract 5 at the outset of Contract 1, 33,300 m3 would be available for Contract 1.

All Contract 4 advance structures are located within the right-of-way of Contract 5. Though Contract 5 roadwork construction will likely commence shortly after completion of the advance structural work of Contract 4, it is still desirable to minimize the amount of grading and drainage work done in advance of Contract 5. Therefore, only minimum structural backfill requirements for all Contract 4 structures have been estimated, with the exception of the Crieff Road structure, which will be fully operational at the conclusion of Contract 4.

At the completion of Contract 5, 33,300 m3 of surplus material will be stockpiled unless it can be utilized in Contract 1. At the completion of Contract 6, the 100,600 m3 of contract surplus material could be either stockpiled or utilized in work related to the upgrading of the Hanlon Expressway to the north of this project.

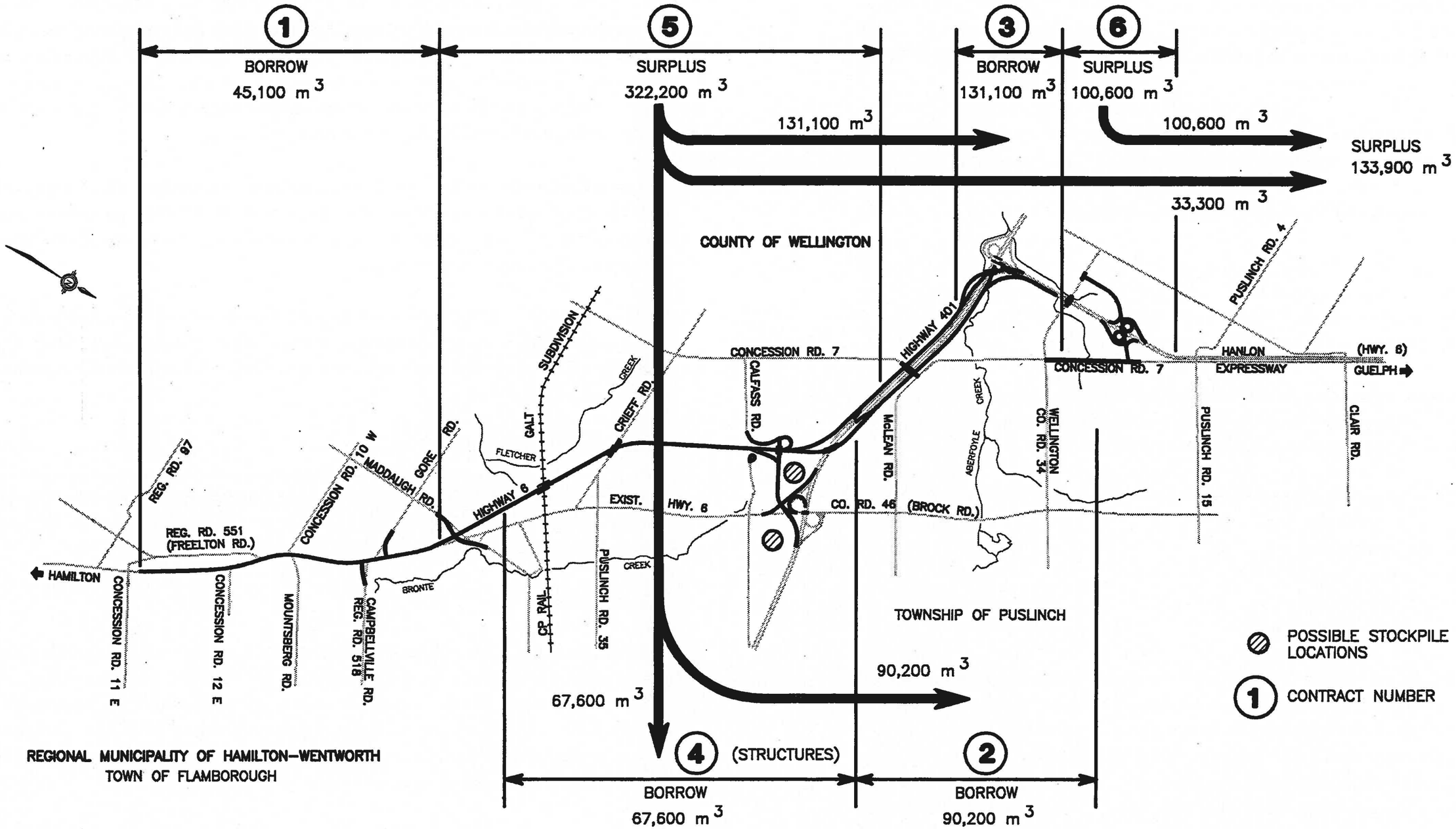
The southbound section of Highway 6 adjacent to Highway 401 will not be opened to traffic until the completion of Contract 3. In conjunction with the Contract 5 right-of-way, it could therefore be conveniently employed as a haul route between the Contract 5 surplus areas and construction areas of Contracts 2 and 3.

6.1.5 Structural Planning

There are ten structures to be constructed under this project (refer to Figure 6.2). Figure 6.4 shows the cross-section and elevation for each structure. The following two structures are of particular note due to their effect on existing local road operations.

Fielding Lane

The vertical clearance noted in the Initial Recommendation for the Fielding Lane structure was 4.0 m. Concern was raised with respect to emergency vehicles being able to use Fielding Lane with the low vertical clearance. A comment sheet was received from Fire Chief Slade, Township of Puslinch, which indicated that the clearance should be at least 13'6" (4.12m). The Project Team agreed that the Fielding Lane structure should be able to accommodate emergency vehicles. The clearance has subsequently been revised to 4.25 m.



HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 6.3

EARTHMOVING STRATEGY

Concession Road 7 over Highway 401

The option to have the new structure in the same location or offset from the existing structure site was reviewed. Offsetting the new structure would have the advantage of significantly reducing the time Concession Road 7 would be closed (i.e. time to permit localized tie-ins to existing Concession Road 7 and McLean Road versus closure for a full construction season). This structure is critical to the aggregate operators in the area. It is estimated 500 trucks a day use this crossing. In addition, it is expected this volume could double or triple once the TCG operation and the adjacent operations are fully underway. It is important to note that due to a recent OMB decision, gravel trucks are restricted through Morriston so the only available local Highway 401 crossing is Concession Road 7.

Based on the above it was decided the new Concession Road 7 structure would be offset. TCG expressed no concern over potential acquisition of their unusable property to the west of the existing Concession Road 7 (south side of Highway 401) so the new structure is proposed to be constructed to the west of the existing structure. It must be noted that the staging for the offset structure will have to be worked out in detail in the next design phase to keep McLean Road open.

Due to the close proximity of McLean Road at the north end of the structure, the requirement for a 10 m offset from the edge of pavement (Highway 401) to the structure abutment should be reviewed in detail design to determine if it may be reduced. Also, a closed drainage system in the vicinity of the north abutment of the new structure would allow the abutment to be moved further south. Moving the north abutment of the structure as far south as possible will improve visibility at the McLean Road/Concession Road 7 intersection and minimize reconstruction of the intersection.

6.2 IDENTIFIED POTENTIAL ENVIRONMENTAL CONDITION CHANGES, EFFECTS AND COMMITMENTS TO MITIGATION

Chapter 4 described existing and projected environmental conditions within the study area; Chapter 5 described the potential advantages and disadvantages associated with various planning and design alternatives. This chapter provides supplementary detailed information as required and an indication of potential direct and indirect, beneficial and adverse changes to baseline conditions which may occur as a result of implementing the selected Highway 6 design improvements. It also describes MTO commitments to mitigating identified potential adverse impacts associated with the undertaking and resultant net environmental effects. Subsequent report sections address commitments to further investigations, documentation, monitoring and liaison related to environmentally sensitive issues.

6.2.1 Detailed Description of the Project Area

With the development of alternative schemes at the Hanlon Expressway and County 34, and in light of identified natural environmental sensitivities along the new Highway 6 route between Maddaugh Road and Highway 401, it became evident that more detailed analysis of the selected alignment was required to determine potential impacts and formulate potential mitigation measures. In this regard, previous research and field reconnaissance exercises were supplemented with a detailed field study of the selected alignment between its divergence point from existing Highway 6 and the north limit of the project. The work was first conducted strategically from mid-July to mid-October 1987 and subsequently in late 1992 and early 1993 and is documented in Appendix F of this report.

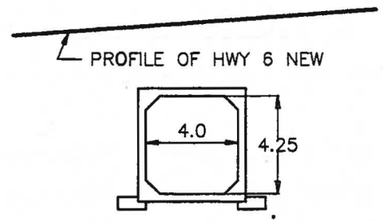
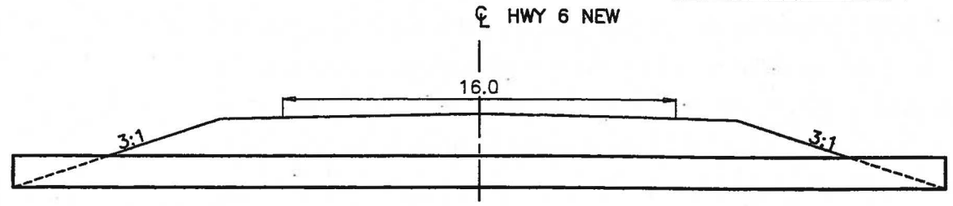
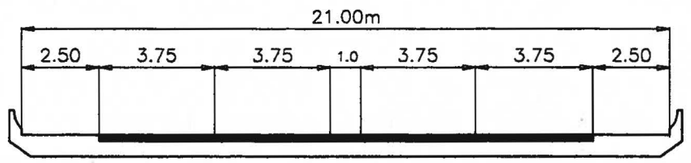
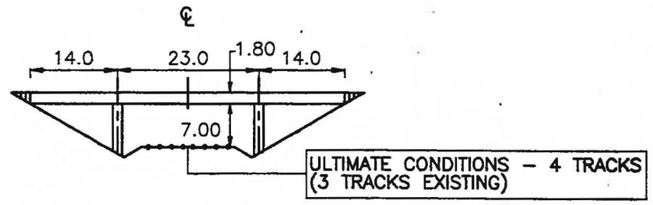
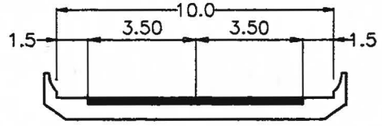
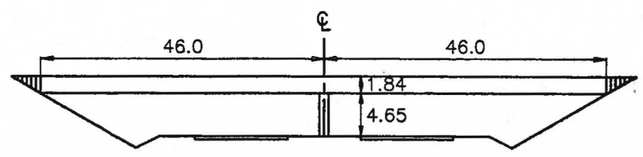
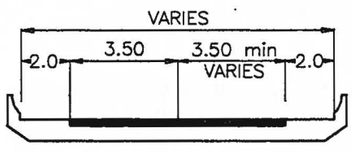
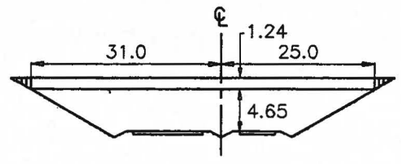
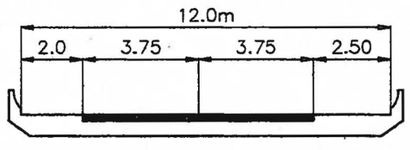
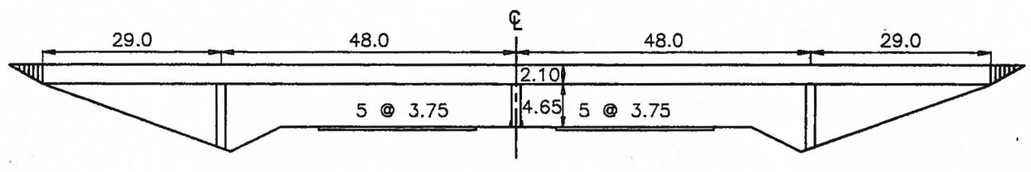
6.2.2 Potential Environmental Conditions Changes, Effects and Mitigation Measures

6.2.2.1 Natural Environment

i) Geological Resources/Soils

Potential Condition Changes and Effects

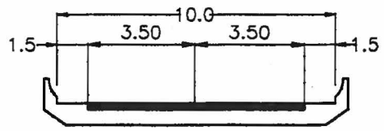
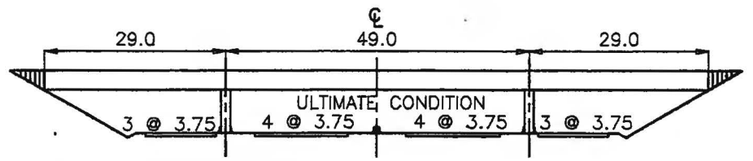
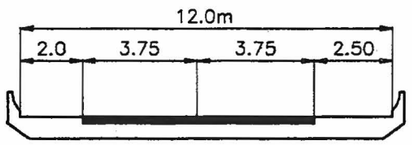
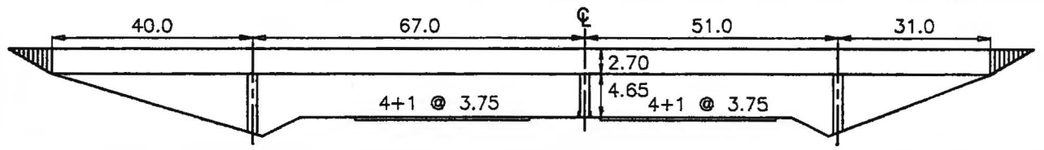
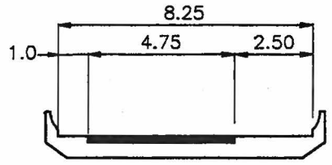
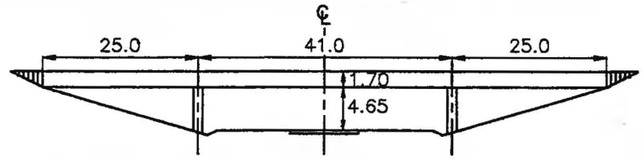
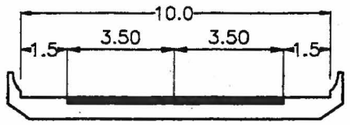
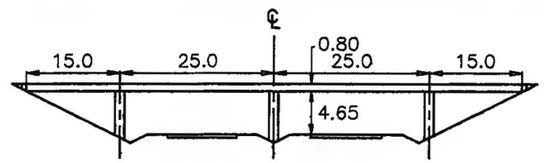
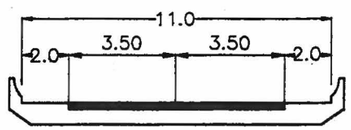
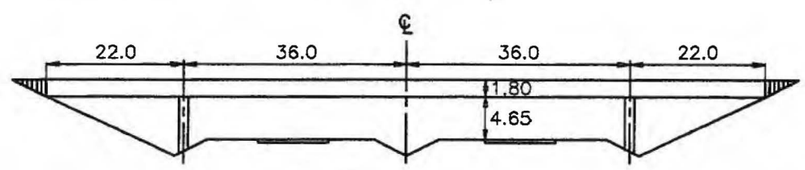
Highway 6 New will not impact any licensed or unlicensed quarry. It will encroach on and sterilize about 7 ha (0.07% of an area in the southern portion of Puslinch Township (west of the Hamlet of Puslinch) identified as Selected Bedrock Resource Area No. 4 in the Ontario Geological Survey. The total area exhibits an estimated workable thickness of 15 m under 8 m of overburden. Of the estimated 34 million tonnes of crushed stone resources currently available in this area, only a negligible proportion would be affected. The relative insignificance of this impact is accentuated by the fact that much of the resource area underlies the organic material constituting the Fletcher Creek Swamp Forest and, to date, no extraction has occurred due to the associated economic and technical constraints. Therefore, it is not anticipated that the resources underlying the new highway facility would be exploited in the foreseeable future.

STRUCTURE No.	LOCATION	CROSS–SECTION		REMARKS
		DECK	OPENING	
1	NEW HWY 6 OVER FIELDING LANE			BOX STRUCTURE
2	CP RAIL GALT SUBDIVISION OVERPASS			
3	CRIEFF ROAD OVER HWY. 6			
4	CALFASS ROAD CONNECTION TO COUNTY RD. 46 OVER HWY. 6			
5	HWY 6 NORTH–BOUND (S–W RAMP) OVER HWY 401			

HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 6.4a
STRUCTURES

STRUCTURE No.	LOCATION	CROSS–SECTION		REMARKS
		DECK	OPENING	
6	CONCESSION 7 OVER HWY. 401/ 6			
7	HWY 6 SOUTH–BOUND (N–E RAMP) OVER HWY 401			
8	HWY. 401 TO HWY.6 W–N RAMP OVER HWY. 6 SOUTHBOUND (N–E RAMP)			
9	WELLINGTON ROAD 34 OVER HANLON EXPWY			
10	CONNECTION RD. TO COUNTY RD. 34 OVER HANLON EXPRESSWAY			

HIGHWAY 6

FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

Figure 6.4b

STRUCTURES

The project will have no identifiable impact on recognized Selected Sand and Gravel Resource Areas outside of licensed pit operations; impacts to these operations are addressed under Section 6.2.2.3 ii) Mineral Aggregate Extraction Operations.

With respect to geotechnical (soils) concerns, this project will require acquisition of property from in excess of 50 parcels of land, including new rights-of-way either adjacent to or remote from existing highway rights-of-way. Inherent in the undertaking may be the potential for acquiring lands that may be contaminated or be a source of contamination associated with any of the following:

(a) hazardous waste;
(b) non-hazardous waste;
(c) contaminated soils;
(d) contaminated ground and surface water;
(e) municipal, industrial, or private landfill/disposal sites; and
(f) chemicals, building materials, equipment, etc., which have management/handling requirements specified/constrained by statute (eg. PCBs, asbestos).

This liability is a concern given the implications attached to the need for:

1) Environmental **audits** undertaken to ensure informed decisions on property conditions and possible clean-up costs (the responsibility for which may be subject to contractual negotiations);

2) The actual cost for **mitigation (clean-up)**, which can affect market value (property cost), proposed site activities and total project cost.

In accordance with interim MTO guidelines (67) a preliminary assessment of land use and site characteristics has concluded that the potential for property waste/contamination problems is low.

Commitment to Mitigation

The impacts of the selected alignment on bedrock resources will be unavoidable. Given the relative insignificance of the effects and low potential for development of the resource, no mitigation measures have been considered.

Where property with waste/contamination problems is purchased, MTO will assume the environmental liabilities and clean-up responsibilities associated with that property. In this regard, the potential for such problems will be investigated in more detail early in the detail design phase to maximize flexibility for potential solutions or mitigation.

The need for a soils management strategy will be based on the results of a systematic geotechnical investigation (boreholes) and soils quality testing program during detail design. The following general approach will be implemented relative to excavation and materials disposal.

- Excavation methods to be determined by the Contractor subject to conditions outlined by project specification document;
- Application of dust control measures (water, temporary cover and prompt resurfacing upon completion of work);
- Restrictions on stockpiling of soils materials on site;
- Daily monitoring of areas, depths, types of materials excavated;
- Soil quality classification to identify excavated material as hazardous waste within the meaning of Environmental Protection Act Regulation 309;
- Determine handling/transport procedures and disposal sites based on classification;
- Determine required quality/source of backfill in conformance with appropriate MOEE Soil Cleanup Criteria or similar guideline.

In these regards, liaison with MOEE Municipal Abatement staff will be required.

ii) Hydrogeology and Hydrology

Potential Condition Changes and Effects

Hydrogeology

The potential for measurable condition changes to ground water regimes is expected to be limited to Section B (Maddaugh Road to Highway 401) and Section D (Hanlon Expressway) since Sections A and C utilize existing highway corridors and involve no significant excavation of material.

Within Section B, changes may be considered in terms of impacts to the Fletcher Creek Swamp Forest wetland between Maddaugh Road and the CP Rail line and its ground water recharge area north of Crieff Road.

The new route traverses the eastern fringe of the wetland for a length of approximately 1,500m. The southern portion of this section (600 m), including the approach to CP Rail grade separation, will require excavation of existing organic material (1.5 - 2.0 m depth) and replacement with granular material that could alter the rate of ground water flow from the east to the main body of the wetland west of the new route. The particular area of concern will be the rail grade separation and potential obstruction effects created by structure abutments, retaining walls and sheet piling. This may create undesirable effects on the integrity and content of wetland plant communities.

North of Crieff Road, localized cut of up to 11 m has the potential to affect ground water patterns to the extent that levels/water quality in at least one pond and domestic well could be influenced. The nearest pond and well (Harvey) are approximately 110 m and 150 m west of the new centreline respectively. Potential effects include draw-down and elevated sodium chloride levels. The Gartner Lee ground water resource study (13) indicates that potential problems in this area may not materialize since static water levels in the overburden material appear to be 8-9 m below the elevation of the bottom of the cut section. However, it must be emphasized that the absence of detailed geotechnical data in the vicinity of the CP Rail line and Crieff Road has created the need for additional investigation to confirm the possibility/significance of such effects during detail design. Commitments in this regard are addressed in Section 6.3.

At the Hanlon Expressway/County Road 34 interchange area, construction requirements and resultant impacts will be similar to those in the Fletcher Creek vicinity with respect to ground water flow rates. Further geotechnical (foundation) investigation will also be required to confirm the depth of organics.

Hydrology

A preliminary drainage system study was conducted to establish the number, location and types of proposed crossings and identify any changes in the existing drainage pattern due to road construction and realignment. The drainage strategy was developed in accordance with MTO design criteria, including:

- South of Highway 401, Highway 6 is classified as RA 100 and the 25-year storm was used for culvert design.

- North of Highway 401, Highway 6 is classified as RFD and the 50-year storm was used for culvert design.

The resultant drainage pattern, major watercourses/tributaries and drainage basin boundaries are illustrated in Figure 6.5. In general, an open ditch drainage system is proposed for the majority of the route and no major changes in the existing drainage pattern will result from implementation of the project. The following is a description of the proposed drainage strategy and Best Management Practices (BMPs) for treating stormwater runoff from the highway (refer to Appendix M Conceptual Stormwater Management Plan).

Section A (South Project Limit to Maddaugh Road)

The existing drainage system in Section A (South project limit to Maddaugh Road) consists of open ditches and culverts under roadways. At the extreme south end, Highway 6 crosses low swampy terrain and there are recognized drainage problems in the area. Site reconnaissance indicated that the high water table in the west ditch of Highway 6 is a result of downstream obstructions of Bronte Creek rather than a deficient ditching/culvert system. The problem could be solved by lowering the water level on the east side by improving the channel or providing a direct outlet to Bronte Creek. Additional strategic assessment of this particular area will be required during detail design.

There are six existing culverts under existing Highway 6 (refer to Figure 6.5). Culverts 1 to 5 will need extension; Culvert 6 requires relocation due to a shift of alignment. In addition,

REGIONAL MUNICIPALITY OF HAMILTON–WENTWORTH
TOWN OF FLAMBOROUGH

COUNTY OF WELLINGTON
TOWNSHIP OF PUSLINCH

REG. RD. 97

CONCESSION RD. 10 W

MADDAUGH RD.

GORE RD.

SUBDIVISION

CRIEFF RD.

GALT

CREEK

FLETCHER

HIGHWAY 6

REG. RD. 551

(FREELTON RD.)

EXIST. HWY. 6

HAMILTON

CONCESSION RD. 11 E

CONCESSION RD. 12 E

MOUNTSBERG RD.

REG. RD. 518

CAMPBELLVILLE RD.

BRONTE

CP RAIL

PUSLINCH RD. 35

PUSLINCH CREEK

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

LEGEND:

- PROPOSED ALIGNMENT
- MAJOR WATERSHED
- (1) ← CROSSINGS
- DRAINAGE AREA BOUNDARY
- UNDRAINED DEPRESSION
- AREA PROPOSED FOR STORMWATER MANAGEMENT
- STUDY AREA

Figure 6.5a

DRAINAGE AREAS AND CULVERT LOCATIONS

COUNTY OF WELLINGTON
TOWNSHIP OF PUSLINCH

CRIEFF RD.
CONCESSION RD. 2
HIGHWAY 401
CONCESSION RD. 7
CALFASS ROAD
McLEAN RD.
PUSLINCH RD. 4
HANLON EXPRESSWAY (HWY. 6)
GUELPH
CONCESSION RD. 7
WELLINGTON CO. RD. 34
ABERFOYLE CREEK
PUSLINCH RD. 15
CLAIR RD.
CO. RD. 46 (BROCK RD.)
EXIST. HWY. 6
LAKE ONTARIO DRAINAGE BASIN
LAKE ERIE DRAINAGE BASIN

12 13 14 15 16 17 18 19 20 21

HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

LEGEND:
- PROPOSED ALIGNMENT
- MAJOR WATERSHED
- (1) ← CROSSINGS
- DRAINAGE AREA BOUNDARY
- UNDRAINED DEPRESSION
- AREA PROPOSED FOR STORMWATER MANAGEMENT
- STUDY AREA

Figure 6.5b
DRAINAGE AREAS AND CULVERT LOCATIONS

Culvert 7 is required under relocated Maddaugh Road.

All culverts under sideroads and entrances will require relocation with the exception of the existing culvert under Regional Road 551 (Freelton Road) which can be extended.

Section B (Maddaugh Road to Highway 401)

For the most part, Section B (Maddaugh Road to Highway 401) constitutes part of the Fletcher Creek basin. Terrain slopes generally to the west, although a number of local depressions are present. In the course of the preliminary design, the profile of the roadway was situated low to prevent highway runoff from spilling onto surrounding agricultural areas.

The drainage strategy for this section is to retain existing flow patterns so as not to adversely affect the hydrology/hydrogeology of the area. Consideration was give to the Fletcher Creek Swamp Forest and the major upland groundwater recharge area south of Crieff Road in developing the drainage and stormwater management strategy. Fletcher Creek Swamp Forest, which is a provincially significant wetland and regionally significant ANSI, is an important discharge area for coldwater fisheries.

From Maddaugh Road northerly to Crieff Road, the Highway runoff is directed to Fletcher Creek. Infiltration systems for stormwater treatment are not recommended for this section in order to avoid possible contamination of groundwater since a significant portion of this section lies in a major upland groundwater recharge area. Also, use of artificial wetlands or retention/extended ponds were not recommended because of their temperature increasing potential to the Fletcher Creek coldwater fishery area. For these reasons the recommended BMP's for this section were confined to grass buffer strips and grass-lined ditches.

Between Crieff Road and Highway 401, Highway 6 cuts through depressions which are presently drained by infiltration into the soil. Three infiltration basins are proposed to be located in existing low lying areas of the depressions in order to maintain the present drainage pattern as much as possible.

The Connection Road from Highway 6 to the existing 6/Highway 401 interchange is located on a ridge and will drain to the surrounding low area. The east end of the Connection Road will displace a small Class 7 wetland which is part of an undrained depression and the roadside ditch will outlet to the low point. The displacement of the wetland represents a loss of recreational opportunities for Niagara Region dog owners, who use the area for training purposes, as well as for other casual users.

North of Calfass Road, provision is also made for retaining overland flow to the West Bronte system, the undrained depression in the existing Highway 401 interchange area and to the Galt/Mill (Aberfoyle) Creek system.

Section C (Along Highway 401)

At Highway 401 Highway 6 curves to the west and runs parallel to Highway 401 in the form of collectors in the mini-express/collector system. The centre median will have paved shoulders and a concrete barrier and be drained by a sewer. It was assumed that Highway 401 will be widened to 6 lanes prior to construction of Highway 6 for the purpose of establishing a drainage strategy. The widening of Highway 401 from 4 lanes to 6 lanes is scheduled for completion by 1996.

Sensitive areas which influenced the drainage strategy included the recharge area along Highway 401 and the provincially significant Galt/Mill Creek wetlands in the Highway 401/Hanlon Expressway interchange area. Runoff from a significant portion of the existing Highway 401 right-of-way is currently directed towards depressions which are drained by infiltration.

The preferred stormwater management concept follows the existing drainage pattern to a large extent with five areas delineated for stormwater management infiltration basins. It is also noted that although three of the infiltration basins are located in ground water recharge areas, infiltration systems are the recommended BMPs. This is because of the goal of maintaining the existing drainage pattern so as to minimize the impact on the hydrology/hydrogeology of the area. These subcatchments are small and their runoff has been pre-treated by vegetative BMPs, thereby reducing the potential for groundwater contamination. The runoff drained by the median sewer, as well as the core-collector ditches, will be directed towards a central BMP facility (between the Hanlon Expressway N-E ramp and Highway 401) before being discharged to Aberfoyle Creek.

Section D (Hanlon Expressway)

In Section D (Hanlon Expressway) the proposed drainage system along the Hanlon Expressway is similar to that of Highway 401, with a median ditch and catchbasins draining to existing roadside ditches which outlet to the east and west branches of Galt/Mill Creek.

The proposed work along the Hanlon Expressway itself is limited to adding a northbound lane on the east side northerly from Highway 401 for 1,400 m, which will not significantly alter the present drainage strategy. There are four areas where significant new road works are proposed; construction of a Connection Road to County Road 34, its interchange with the Hanlon Expressway, the reconstruction of Concession Road 7 from the Connection Road to County Road 34 and grade separating County Road 34 from the Hanlon Expressway.

The County Road 34 Connection Road runoff will be directed southward to County Road 34 west of the interchange area. At County Road 34 the runoff is directed easterly to a tributary of Galt/Mill Creek at the Hanlon Expressway. This is consistent with the existing overland drainage pattern. With respect to stormwater management the recommended plan consists of vegetative BMPs (i.e. grass-lined buffer strips and grass-lined ditches and channel for collection, conveyance and treatment of stormwater runoff from the area).

In the interchange area, the general runoff flow is from north to south. An infiltration basin is the recommended type of BMP for the interchange area. An infiltration type BMP was chosen to address GRCA concerns regarding increased runoff quantities and MNR concerns regarding potential increases in temperature of water flowing to the sensitive Galt/Mill Creek wetlands. The recommended location for the infiltration basin is the southern most tip of the land bounded by the W-S and S-E/W ramps.

Concession Road 7 will be reconstructed to a 2-lane paved road with an improved profile. The existing drainage pattern will, for the most part, be maintained. MNR had expressed a concern with the reconstruction with respect to placing fill in the Galt/Mill Creek ESA attendant to the road crossing. In response, the profile of the road will not be raised in the vicinity of the Galt/Mill Creek crossing.

A new culvert (Crossing No. 20) will be placed under County Road 34 to facilitate the profile change for the proposed grade separation. This structure has been sized to retain hydraulic characteristics north and south of County Road 34 during the Regional Storm.

In summary, the introduction of Highway 6 New and the associated drainage strategy is not expected to create extensive hydrogeological impacts. Changes will be associated with organic material removal and replacement, soil compaction and mixing and resultant modification of water and air movement within the soil profile. Additional localized geotechnical investigations at the cited locations are required in this regard.

Limited data exist on the specific effects of highway stormwater discharge on the hydrologic regimes of receiving water bodies, particularly in wetland systems. However, in general the volume of total runoff could increase due to the increase in the impervious portion of the Fletcher Creek, Galt Creek and Bronte Creek watersheds. Other effects associated with this impact might include increase in the size of flood peak and a resultant increase in channel size, as well as a decrease in lag time (i.e. time of concentration). Since, for the most part, highway runoff will be directed to receiving watercourses either through a system of grassy ditches or by overland sheet flow, these effects are expected to be marginal in terms of measurability.

Commitment to Mitigation

The following measures will be employed to reduce the extent of changes and adverse effects to hydrogeological and hydrological regimes:

- Construction zone within wetland areas will be restricted to the right-of-way with protective temporary fencing erected during construction.

- Replacement of organic material with granular backfill which will permit ground water and air movement at a rate equal to or greater than that under existing conditions so as not to impede recharge of headwater areas.

- The profile of reconstructed Concession Road 7 will not be raised in the vicinity of the Galt/Mill Creek crossing. Fill placement will be limited to that required for a minor road widening. In the event of a Regional Storm flood, waters would flow over the road.

- Strategic installation of crossing culverts sized and located so as to maintain surface water flow between headwater areas and receiving watercourses.

- Design of drainage system to avoid direct discharge of highway runoff to receiving watercourses.

- Size and configuration of drainage structures (i.e. flow training wing walls) will be designed to maintain peak/storm flow hydraulic characteristics, thereby avoiding changes to flood plain contours.

- Reverse grading and curb-and-gutter section north of Mountsberg Road to avoid runoff onto adjacent residential front yard areas.

iii) Limnology

Potential Condition Changes and Effects

Limnological considerations addressed herein include the physical, chemical and biological effects on aquatic resources, with emphasis on changes in major watercourse and wetland water quality and effects on associated biological ecosystems (specifically fisheries) due to their emergence as an environmentally significant issue. The description of water quality impacts is reflected in general terms only and reliance has been placed on recent case study literature (53,54). A determination of specific measurable potential effects attributable to this project is impractical at this time for the following reasons:

- lack of water quality data (specifically for Fletcher Creek) for the establishment of baseline conditions

- impracticality of conducting original field research at this level of design

- lack of reliable modelling techniques

- difficulties in differentiating potential changes attributable to highway facility and other sources (e.g., Ca, Cl and Na from agricultural sources).

Water Quality

The selected design involves six stream crossings of potential significance - the headwaters of Fletcher Creek (new) and five existing tributaries to Galt/Mill Creek. These are associated with the Fletcher Creek Swamp Forest and Galt Creek and Forest wetlands respectively. Pollutants present in highway runoff may result in impacts on the wetland areas through either shock/acute loadings or long term accumulations within the water body and associated sediments and biota.

Acute loadings on this project would most likely occur during construction as a result of earthworks (i.e., soil exposure, compaction and erosion and resultant siltation, sedimentation and (turbidity) and any accidental spillage of fuel, herbicides, lubricants and other toxics.

Salt contamination is not expected to be associated with point-source occurrences (shock loadings) since runoff will generally be directed to receiving watercourses/wetlands via grassy ditches and overland sheet flow.

Long term effects on surface and ground water quality will result from the influence of operation and maintenance of the highway facility and will be reflected primarily in changes in the concentration of metals and salt ions in adjacent receiving waters and soils.

Heavy metals originate chiefly from vehicle use in the soluble form are an immediate threat to biota, because in this form they are easily incorporated into living tissue and readily available for chemical reactions toxic to many biological processes. The form of any heavy metal in highway runoff is dependent on both the physical and chemical character of the specific metal element, and on the characteristics of the runoff in which it is present (pH, hardness, presence of organic material presence of other metals, etc.). On entering a receiving water, the original form of the heavy metal may again change because of the characteristics of the receiving water. As an example, lead on the highway surface is normally in the insoluble form and associated with the dust and direct which accumulates there. In highway runoff, lead is generally associated with the solids present and especially with particles that are less than 2 mm in diameter. However, in highway runoff, 5 to 50 percent of the lead can exist in the soluble form (53).

Aquatic plants in the wetland complexes affected could temporarily immobilize heavy metals. Rooted aquatics obtain metals from sediments and other plants may absorb metals from the water

column as well as the sediments. Metals may also be absorbed onto plant surfaces. Decomposing plant litter also serves as a sink for heavy metals. Trace amounts of some heavy metals are required by all plants. However, plants respond uniquely to exposure to large concentrations of heavy metals. Large amounts can be toxic to plants. Little work has been performed which determines the levels of toxicity for various aquatic plants to heavy metals (53).

Heavy metals may become available to vertebrate or invertebrate populations but only indirectly. Primary accumulation by plants, litter, and sediments seem to be more important before accumulation into the fauna. Some evidence does suggest that accumulation from overlying waters can be important in certain circumstances. The chemical and physical characteristics of the environment influence the evolution and availability of heavy metals to consumer populations. Metals can accumulate in the food chain, but understanding of this process is incomplete (53).

Effects related to the use of de-icing salts for winter maintenance will be related to increases in usage required by the additional surface area introduced and proximity to the receiving area. On an annual basis, the use of de-icing agents in the area most directly influenced by the project could increase by 15%. It is estimated that the Fletcher and Bronte Creek systems could each receive 25% of this increase, while the Galt Creek system could receive the remainder. Only in the case of Fletcher Creek will there be any significant change in proximity of receiving areas to runoff or spray.

The application of de-icing agents to highways has been frequently shown to increase salt ion concentrations in nearby soils and water bodies (53, 54). The effects are less pronounced for flowing water systems where storm and melt waters have sufficient dilutive capacity to keep chloride levels below the criteria of 250 mg/l. For systems where water exchange is more gradual, such as wetlands, salts have been shown to accumulate, in some cases, to chloride concentrations an order of magnitude higher than the water quality criteria value. However, at least one case study (Wisconsin highways commencing in 1970) discovered that, in general, accumulation of sodium and chloride in roadside vegetation and water bodies was very slight beyond 125-18 m from the pavement (53). Potential adverse condition changes associated with the application of de-icing agents may also be related to the use of toxic anti-caking road salt additives such as sodium ferrocyanide and ferric ferrocyanide but little research has been completed in this regard.

Another water quality parameter which may be subjected to change, and which is particularly critical to fisheries habitat, is water temperature. The removal of riparian vegetation from shaded headwater streams will tend to increase ambient water temperature, thereby contributing to the degradation of the watercourse as a cold water habitat. MNR has expressed specific concerns in this regard relative to removals in the Galt Creek headwater areas associated with the future Hanlon Expressway/County Road 34 interchange.

Fisheries

Potential effects on fish populations are expected to be most dramatic during the construction phase of the project. The primary impact will likely be increased sediment loadings generated by equipment working in streambeds and by erosion from the adjacent construction site as a result of fill placement and exposure of erodible soils during grading operations.

If conventional erosion control measures are employed, turbidity is not expected to reach lethal levels. Hanlon Expressway investigations suggest that sediment concentrations would likely have to exceed 100,000 ppm to cause death and that the effects of suspended sediment will be indirect as opposed to direct (e.g., alteration of respiratory mechanisms, fin-rot, growth reduction (54).

Increased sediment can also reduce fish populations by reducing or destroying spawning habitat. Controlled investigations have demonstrated significant decreases in egg to fry survival in salmonids when the particle size composition of riffle areas is altered (i.e., gravel is covered by silt).

In Galt Creek, the alteration and loss of habitat were presumed to be the main impact of the Hanlon Expressway project. Flow reductions, sediment accumulation in traditional habitat and removal of available cover reduced the carrying capacity of the stream and hence total fish biomass. In Galt Creek, total fish biomass was, on average, almost three times greater at stations where stream cover was abundant. Similar potential impacts at the Hanlon/County Road 34 interchange area.

MNR has expressed particular concern over potential impacts to fish populations in the East and West Branches of Galt Creek upon ultimate implementation of the Hanlon/County Road 34 interchange due to recent and proposed habitat rehabilitation efforts in the area. The interim

improvements are not expected to create any significant effects in this regard.

The potential for increased chloride levels in runoff water to create significant adverse effects on fisheries and benthic communities is considered to be low (as discussed under Water Quality) and demonstrated by the Hanlon Expressway study. The anticipated resultant chloride levels will not likely cause increased mortality in fish and benthic invertebrates. The primary potential impacts will be salt-induced stress to aquatic communities in general and short-term elevation of drift levels of benthic invertebrates in the tributaries to Fletcher and Galt Creeks during periods of high chloride concentrations.

Drift serves as a good indicator of conditions. As conditions become unfavourable, the extent of drift increases. Crowther and Hynes (1977) investigated the effects of high salt pulses on aquatic invertebrates. In the laboratory, caddisflies (Hydropsyche betteni and Cheumatopsyche analis did not exhibit increased drift when exposed to pulses up to 1650 m/l. In the field, pulses from 500-700 mg/l of chloride did not effect the drift. However, greater drifting did occur once levels were greater than 100 mg/l. The Hanlon Expressway after-study (54) revealed that sodium and chloride levels in Galt Creek were elevated from about 7 mg/l and 14 mg/l in the pre-construction period to 30 mg/l and 55 mg/l respectively in the post construction period. Recent (1982-1984) winter and spring chloride levels in Galt Creek downstream from the Hanlon/401 area have been in the range of 15-26 mg/l.

Commitment of Compensation

In consultation with the Ministry of Natural Resources (MNR) and the Department of Fisheries and Oceans (DFO), MTO assessed the potential harmful alteration that crossings would have on Fletcher's Creek and the Mill Creek subwatershed. It was determined that compensation could be required (MNR/MTO meeting April 11, 1995). The four crossings of McCrimmon's Tributary (2 east branch crossings, 1 west branch crossing and 1 tributary) will probably require a combination of mitigation and compensation to address the proposed habitat alterations. However, mitigation should address the impacts of crossing Fletcher's Creek and Mill Creek. As a result, MTO is committed to developing a package that is acceptable to MNR, Grand River Conservation Authority (GRCA), Hamilton Region Conservation Authority (HRCA) and DFO in order to compensate for any net loss of productive capacity, as required under Section 35(2) of the Fisheries Act. Details of the compensation package will be determined during highway detail design, when the exact impacts to the fish habitat are known.

Commitment of Mitigation

In addition to the Commitment of Compensation noted above, the following conventional and special measures will be employed to reduce or eliminate potential adverse limnological impacts.

- A number of non-standard approaches to reducing the effects of de-icing agents (particularly in sensitive wetland areas) have been considered previously in relation to other projects. The conclusions reached in this regard are as follows:

  - Minimize the number of salt applications - number of applications is currently consistent with safe highway operations. No benefit without introducing potential safety hazard.

  - Minimize the amount of salt applied - proportion of salt in sand/salt mix (15% salt) has been established on the basis of safe operations. Reduction in salt component would result in the need for additional applications or later use of 100% salt to clear specific areas.

  - Lower maintenance standards - not compatible with safe highway operations or level of maintenance expected by motorists.

  - Use of Verglimit in asphalt - Verglimit (addition of calcium chloride chips to surface asphalt when it is laid down) is used primarily where temperatures are near freezing and briefly extends the time before salt treatment is needed but does not negate the need for standard maintenance practices.

  - Use of Open Friction Course pavement - this process, whereby voids in the surface layer of asphalt permit runoff to percolate through the asphalt rather than drain across it, has not demonstrated significant reductions in spray effects compared to normal asphalt friction courses.

- Use of coarse friction course - no evidence to suggest that a rough driving surface to improve traction would reduce the need for sand and salt; evidence suggests that rough surface would eventually wear smooth except with low traffic volumes.

- Removal of salt laden snow - in an effort to restrict the extent of impervious surface, the Highway 6 cross-section does not provide areas (i.e., shoulders) extensive enough for efficient snow storage.

- Use of alternative de-icing agents - under North American climatic and road conditions, no alternative has proven acceptable in terms of effectiveness, environmental impacts and cost. A suitable substitute would be considered if proven practical at the time of project implementation.

In summary, MTO District forces will continue to apply the most appropriate winter maintenance standards to optimize highway safety levels. This includes the minimum number of applications with the current sand/salt mix.

- Restrict instream work to avoid primary salmonid spawning period and make use of low flow. The current regional window established by MNR Cambridge District, restricting construction between April 1 and July 1, will be observed.

- Minimize extent/period of required instream work by heavy construction equipment.

- Ensure expeditious re-establishment of vegetation on all removal areas and application of temporary (mulching) and permanent (rip-rap, geotextile) erosion control measures to minimize soil exposure period.

- Strategic deployment of sediment barriers, traps and check dams in conjunction with staging approach to minimize reduction of watercourse flow rates.

- If dewatering of turbid water is involved, divert to onshore settling basin or vegetated area where filtering will occur.

- Use of soil binding adhesives.

- Restrict proximity to water bodies of waste disposal (including possible dredge spoils), materials stockpiling (including topsoil), construction equipment refuelling/maintenance operations and storage of toxic materials.

- Collect and deposit in a controlled manner, any construction debris and/or dislodged floating material from watercourses to reduce aquatic habitat degradation.

- In the southeast quadrant of the Hanlon/County Road 34 interchange, investigate practicality of advance construction and revegetation; deflectors and meandering channel configuration; rehabilitation of spawning and nursery habitat.

- Retain existing culvert under Hanlon which supplies headwater flows to major spawning/ nursery areas on West Branch of Galt Creek from East Branch.

iv) Forestry Resources *(Note: All references to Map Sites are related to the Appendix F documentation of late 1992 and early 1993 investigations)*

Potential Condition Changes and Effects

The selected alignment will encroach on or sever four Class 1 (high productivity upland hardwood) woodlots (Design Plates 22 and 24). The two most significant areas in terms of size, species content and current resource exploitation and management by owners are the two situated between Crieff Road and Calfass Road occupying portions of the Winer, Townsend-McKinnon, Stewart and Hawthorne properties (Appendix F Map Sites 40 and 41 which would be reduced in size by 52% and 23%, respectively). Both of these woodlots will essentially be bisected. The other two woodlots (Appendix F Map Sites 43 and 44 which would be reduced in size by 52% and 34%, respectively) lie north of Calfass Road on properties owned by 848837 Ontario Ltd. et al and MTO and are alternatively encroached upon or severed by the new alignment, realigned Calfass Road and the new Connection Road.

While no rare plant species were observed in these woods, these mature woodland communities are floristically interesting and are distinctly three-dimensional structures which provide habitat for a number of wildlife forms.

Two identified plantation areas will also be directly affected by the new alignment. These include the WIA area at the south end of the Wright property (0.24 ha from Map Site 37, a sparsely wooded plantation of immature red and white pines, white spruce and larch, portions of which are designated as Class 3 woodlot) and 4.9 ha from the Morriston Tract in the southwest quadrant of the Highway 401/Highway 6 interchange (Map Site 45, a Class 4 woodlot of red oak, white ash and red pine managed by MNR on land owned by MTO). The area from the Morriston Tract does not include that required for possible stockpiling of surplus materials referred to in Section 6.1.1.

Direct impacts to the woodlots in question include outright removal of mature specimens of primary resource trees (sugar maple and white ash generally 25 - 45 cm in diameter and ranging up to 60 -75 cm in diameter, white pine, black cherry and black walnut in Woodland 8 and similar but slightly smaller specimens in Map Sites 41, 43 and 44) and reforestation stock in plantation areas. Approximate areas of Class 1 woodlot to be removed on a property specific basis are as follows:

• Winer	1.8 ha
• Townsend-McKinnon	1.2 ha
• Stewart	1.4 ha
• Krusch	0.4 ha
• 848837 Ontario Ltd. et al	2.5 ha
• MTO	4.9 ha
TOTAL	**12.2 ha**

These losses also represent reductions in wildlife habitat; these are addressed in Section 6.2.2.1 v) Environmentally Sensitive Areas/Wildlife. Encroachment on the Morriston Tract plantation will also result in the reduction of area available for cited recreational activities (hiking, horseback riding, cross-country skiing, and hunting).

Remaining portions of the affected woodlots could incur indirect impacts from the selected design. Construction machinery operation could result in soil compaction, alteration in ground water characteristics and possible associated root damage to adjacent trees. Overstory trees could suffer some damage due to increased wind stress resulting in blowdown. Understory shade tolerant vegetation could show signs of sunscald and dieback due to increased exposure from canopy removal.

Other effects to vegetation outside of Environmentally Sensitive Areas incudes:

- Removal of approximately 5.4 ha of old-field and shrub vegetation north of Calfass Road near Map Sites 19 and 43.

- The proposed Highway 6 S - Highway 401 E directional ramp will be introduced in the southeast quadrant of the Highway 6/Highway 401 interchange. This would result in the removal of some old-field vegetation and approximately 0.2 ha of woody vegetation of low value. None of the vegetation removed, including woody species, represents a significant loss, and in general, the proposed impacts are considered insignificant.

- Upland forest communities at Map Site 46 immediately west of the wetland at Map Site 25 (1.1 ha), a small clump (<0.1 ha) of white cedar, sugar maple, and basswood where McLean Road abuts Highway 401 on the north side, 1.3 ha of wide white spruce hedgerow on the south side of Highway 401 running west from Concession Road 7, and a 0.2 ha community of mixed forest growth near station 52+500.

- Old-field and shrub communities, with occasional and small scattered clumps of trees attend much of both sides of Highway 401 involving an additional 8.1 ha of this community type. Agricultural fields are on both sides of Highway 401 east of the Concession Road 7 overpass.

- Features which abut the proposed impact zone along Highway 401 include quarrying activities between station 52+500 and the Concession Road 7 overpass. A berm has been constructed on the south side of Highway 401 in this area with some minor tree plantings, (i.e. two groups, including a total of seven white pines up to 2 m in height, and 33 spruce mostly under 1 m in height). Berms are also on the north side of Highway 401 in the area of McLean Road and Concession Road 7, where they contain quarry ponds, and in these areas mostly old-field and shrub vegetation would be encroached upon.

- The Slovenski Park property abutting the north side of existing Highway 401 immediately west of Concession Road 7 was reviewed with regard to the respective impacts of urban

and rural cross-sections. At the east end of this interface (approximately from Station 20+235 west to Station 20+200), the rural cross-section would involve some removal of an existing berm and concomitant loss of old-field vegetation and scattered planted trees. From a strictly biological perspective this would not be a significant loss. West of this, to Station 19+975, there would be a loss of an additional 13% of woody vegetation comprising mostly white cedars.

- The proposed Hanlon Expressway/County Road 34 interchange and Connection Road encroaches on 1.2 ha of upland woods (Map Site 52), and on 17.6 ha of old-field and shrub vegetation (i.e. 17.0 ha of old-field/shrub on both sides of the highway between Map Sites 33 and 52, and 0.6 ha between Map Site 52 and Concession Road 7).

Commitment to Mitigation

The loss of trees in clearing the highway right-of-way will generally be unavoidable. However, the following practices will be employed in the construction and post-construction periods (refer also to Item iv) Environmentally Sensitive Areas/Wildlife) for general measures related to preservation of vegetation and to Item 6.2.2.2. iii) Visual Aesthetics for measures related to reinstatement of vegetation):

- The construction corridor will be as narrow as possible. Clearing and grubbing operations will include the identification and field marking of significant tree specimens or assemblages bordering the limits of construction. All such trees located outside the limits of construction will be preserved by the placement of snow fencing around the drip line, where deemed necessary, to protect the roots of the trees. In addition, the Contractor will have due regard for exposed roots of trees not scheduled for removal.

- Consideration shall be given to selective clearing for the preservation and protection of flagged specimens marginally or immediately inside the limits of the highway right-of-way (i.e., within the right-of-way but outside of grading limits). Such consideration should also include incorporation of these trees in the landscaping and refurbishing plan. In particular, these considerations shall be applied to the woodlots at Map Sites 40, 41, 43 and 44 in Puslinch Concession VII.

- Trees and brush shall be felled in a direction away from the existing stand, thus avoiding damage to the remainder portion of the woodlot.

- Construction debris (i.e. brush, tree tops and stumps) and other project waste material shall be removed from the site and/or used on-site in a manner which is in keeping with the Ministry's policies pertaining to sustainable development (e.g. tree stumps ground and used as landscape enhancements; composting; light weight fill).

- On border trees, where branches are removed or inadvertently damaged, the trees shall be protected in accordance with current horticultural standards for pruning.

v) Environmentally Sensitive Areas/Wildlife *(Note: All references to Map Sites are related to the Appendix F documentation of late 1992 and early 1993 investigations)*

Potential Condition Changes and Effects

Environmental Technical paper No. 6 (refer to Appendix F) describes in detail supplementary field work conducted by Fenco Engineers between July and October 1987 relative to study area vegetation, including the affected areas within municipally designated ESAs and provincial/regional ANSIs as identified by MNR. This section focuses on the unique or most sensitive terrestrial flora and fauna in each area which will be affected. These are related exclusively to the new route between Maddaugh Road and Highway 401 (Section B) and the Hanlon Expressway/County Road 34 interchange area. A supplementary study was carried out in 1992/93 to update the earlier terrestrial analysis. More detailed descriptions of sensitive areas are found in Appendix F.

Fletcher Creek Swamp Forest (includes Fletcher Creek Swamp Forest Regional ANSI and Fletcher Creek Swamp - Class 1 Provincially Significant Wetland) - The selected alignment encroaches on the easternmost portion of this provincially significant wetland and regionally significant ANSI. The area affected (approximately 5 ha) represents less than 1% of the total ESA. In terms of impacts to wildlife, the alignment encroaches on an identified waterfowl area, reducing it in size by approximately 10%. The route lies east of an identified deer activity area and should not represent any significant hazard since suitable habitat in the small severed area to the east is considered limited. The area near Map Sites 5 and 15 is deemed the most likely

in this segment of the route to have interesting, if not rare, breeding birds (Eagles 1979).

No nationally, provincially or regionally rare plant species have been identified in municipally designated ESAs or provincial/regional ANSIs over the area traversed by the new alignment.

Removal of habitat, alteration of drainage patterns and effects from road salt and automotive emissions are expected to be the main negative impacts on this natural area.

Crieff Old Field Complex - The selected alignment will sever the eastern portion of this municipally designated ESA, requiring about 5% (7 ha) of the total area. This area contains typical old-field vegetation, including various grasses, asters, and golden-rods, and the regionally rare marsh hawk and grasshopper sparrow, threatened Henslow's sparrow, and provincially rare dicksissel are possible breeders here (36). The area affected is currently used for agricultural purposes (cash, forage crops) but is in close proximity to an area to the west (woodlots and old-fields) which provide unique avian habitat. The most significant impacts will result from construction activities (noise, air quality degradation, habitat removal) and, combined with long term noise increases, may affect a permanent or temporary relocation of sensitive bird species from the immediate vicinity, particularly during breeding periods.

Galt Creek and Forest (includes Galt/Mill Creek Wetland Complex - Class 1 Provincially Significant Wetland) -This municipal ESA and provincially significant wetland will be affected by improvements to the Hanlon Expressway, and the proposed Hanlon/County Road 34 interchange (Design Plates 32-38).

The area has regional significance for white-tailed deer, and MNR surveys of winter range areas reveal activity in proximity to the proposed improvements. However, such activity is generally limited to areas outside those directly affected by either the highway widening or the interchange configuration.

The proposed Hanlon/County Road 34 area improvements will result in some impacts to four segments of the wetland created by the current intersection. These impacts would result from placement of fill for grade separation and Concession Road 7 improvements (Plates 34 and 36).

Forested area in the southeast quadrant is dominated by trembling aspen, with some white birch, white elm and a subdominant stratum of speckled alder and occasional black ash, white cedar and balsam fir. Speckled alder and balsam fir have been identified as "infrequent" in the region (33). Showy ladyslipper is in this quadrant and has been identified as "infrequent" (33) and "scare" (36) in the region. No nationally or provincially rare plant species were found in this quadrant during the 1987 supplementary field investigations.

The northwest quadrant of the intersection includes both relatively open and forested (mostly white cedar, white birch, white elm, arch) wetland, wet and dry old-field components with associated diverse herbaceous species. It provides excellent avian habitat. Rough-leaved goldenrod occurs extensively in the area; this species was considered nationally, provincially (32) and regionally "rare". It is no longer considered either nationally or provincially rare (56, 57). Also within or adjacent to the affected area are alder-leaved buckthorn and great blue lobelia which have been identified as regionally "infrequent" (33, 36) and "occasional" (36), respectively.

The northeast quadrant (Wozniak) is a wet forest area dominated by white cedar. Balsam firm, showy ladyslipper, speckled alder, fireweed, and checkerberry are regionally unique species which are found in this area.

The areas attendant to the Hanlon/County Road 34 intersection are deemed the most sensitive in the area due to designation as provincially significant wetland, a number of regionally significant plants, the likelihood of the presence of rare plants, the importance as white-tailed deer habitat, the presence of the regionally rare pickerel frog, and its general value as high quality wildlife habitat. However, as previously indicated, construction impacts would be restricted to placement of fill for the proposed grade separation.

The southwest quadrant contains a conifer plantation with white spruce, and Scot's and white pines. The natural vegetation closer to existing roadways is dominated by white cedar, white birch and trembling aspen. Generally, the natural vegetation in this quadrant is a mixture of that found in the other three quadrants.

Improvements adjacent to the Highway 401 corridor would result in encroachment on 2.7 ha of the Galt/Mill Creek - Class 1 Wetland (2.4 ha at Map Site 47; 0.3 ha at Map Site 28). Potential impacts to vegetation resulting from the introduction of the new Hanlon Expressway/County Road

34 interchange have been identified previously herein. The major impact on wildlife here would be with respect to old-field habitats. The threatened Henslow's sparrow has been observed north of the proposed construction in the southeast corner of the intersection of Concession Road 7 and Puslinch Road 15. However, the proposed construction is not likely to have an impact on Henslow's sparrow should it, in fact, breed here.

Other noteworthy sensitive areas relative to terrestrial flora and fauna, external to the cited ESAs will be affected by the selected design. These include the following:

1. Small area of MNR Wetland 218-1 near the Maddaugh Road and existing Highway 6 intersection.

2. Four Class 1 woodlots between Crieff Road and Highway 401. These woodlots are composed of mature deciduous trees and have a diverse, but typical, herbaceous flora. Removal of woodland would result in a disproportionate loss of wildlife to the area of habitat removed because of the reduction in size of isolated woodlands (ranging from 23% to 52%). Small blocks of woodland are unlikely to maintain the number of species that larger blocks do. Deer use these woodland areas, especially during the warmer seasons, in conjunction with nearby old-field and agricultural areas and the new highway would likely impede east-west movement to some degree. Also of note is that the woodland at Map Site 43 (Lot 30 Concession VII) is a known site for the West Virginia white butterfly (67), previously considered endangered until 1990, then rare/threatened by Cambridge OMNR, but not protected by law. It is quite likely present in all of the mature upland deciduous forest units as its host plants, toothworts, are relatively abundant in these systems.

3. Four small unclassified wetlands are between the woodlots mentioned in Item 2, above. These are low priority wetlands, but as wetlands, per se, some mention is warranted.

4. Construction of the Connection Road between new and existing Highway 6 north of Calfass Road will result in displacement of the 2.3 ha Class 7 Wetland 223-2. Approximately 0.6 ha of woodland and 2.3 ha of old-field and shrubland would be encroached upon in the area immediately southeast of the wetland, and to the northwest of the ramp area (Plate 26). The major concern here is with the loss of a wetland, which has value for waterfowl, reptiles and amphibians, and other attributes associated with wetland function. While the vegetation associated with the wetland is "interesting', no rare or endangered species were observed.

5. A small (0.5 ha) wetland is on the route alignment north of Highway 401 east of McLean Road.

6. Five or six small functioning but unclassified wetlands totalling 0.2 ha on both sides of Highway 401.

Commitment to Mitigation

The loss of vegetation and associated wildlife habitat due to construction requirements will generally be unavoidable. Where removal of disturbance of significant vegetation is necessary, standard MTO construction practices to minimize adverse impacts will be employed. These include:

- Retain vegetation cover as much as possible;
- Clearing and grubbing operations will include the identification, field marking and avoidance/protection of high quality, unique or otherwise sensitive specimens or assemblages bordering the limits of construction;
- Utilize close-cut clearing rather than grubbing where possible to retain maximum regenerative potential and maintain integrity of root mat;
- Prevent sedimentation and water ponding in areas of retained vegetation; and, in general, introduce effective stormwater arrangement in a manner which maintains pre-existing hydraulic patterns/functions;
- Avoid use of herbicides/pesticides toxic to identified sensitive non-target species;

- Development of and expeditious implementation of post-construction landscaping and refurbishing strategy, particularly vegetative barriers against windthrow, salt spray and other highway generated airborne pollutants;

- Direct highway runoff away from sensitive areas;

- Strategic use of dust control measures (water, CaCl);

- Snowfencing shall be placed to delineate the right-of-way in sensitive areas. The area outside the right-of-way in these areas shall not be used for vehicular movement, parking, storage space or for walking between points within the limits of construction.

6.2.2.2 Social Environment

i) Communities

Potential Condition Changes and Effects

The discussion here is related in terms of impacts to community integrity and individual properties as well as influences on land use development.

The Highway 6 improvements will have no direct impacts to the Village of Freelton since it has previously been by-passed. North of Freelton, the proposed widening will generally improve access to the designated rural industrial lands at the north limit of the Town of Flamborough. Further, the provision for future extension of Campbellville Road westward through this area by the Town could provide additional impetus for development by introducing a continuous east-west arterial through route across Highway 6.

The new Highway 6 route will by-pass both the Hamlet of Puslinch and the Village of Morriston to the west without any direct encroachment on designated rural settlement boundaries. The proximity of the route to the western limits of these two communities may create long term pressure for expansion of the current boundaries towards the new facility which would create a new physical definition of the settlement area. The potential for this effect at Puslinch is limited due to probable restrictions on encroachment into the Fletcher Creek Swamp Forest ESA/ANSI wetland. At Morriston, the new Connection Road will reinforce the designated boundary.

At Aberfoyle, the integrity of the village could be influenced more by local infilling and developments in the Special Policy Areas in the Brock Road corridor than the diversion of traffic to the Hanlon created by the new Highway 6 route.

The other "quasi-community" under consideration with respect to impacts by the new route is the Morriston Park Nursing Home west of the Village of Morriston. The new right-of-way will be located approximately 140 m from the nearest property boundary of the Home and 300 m from the main building. The operators of the Home have expressed concerns over potential hazards to residents who may inadvertently wander away from the property and onto the highway. Other proximity effects, such as noise and visual intrusion, are discussed further on in this section.

In the Hanlon Expressway/County Road 34 area, there is currently pressure for conversion to non-agricultural uses (Petrusa, Reid and Wozniak properties) due to the attractiveness of this location (first intersection north of Highway 401). The highway improvements and resultant diversion of traffic to the Hanlon may accelerate the timeframe for development in the northeast corner of the Reid property. It is expected, however, that GRCA, MNR and the County will continue to reject private development proposals on lands zoned Hazard or in areas where adverse impacts to the Galt Creek and Forest ESA could be introduced.

In terms of property requirements, the highway improvements will require portions of 56 parcels. This includes takings along both sides of the Highway 401 corridor and the Concession Road 7 corridor north of County Road 34. It also includes property required for stormwater management facilities.

On the portion of existing Highway 6 to be widened, this essentially involves strips of frontage where the right-of-way is constricted. On the new route section, property acquisition includes severances which are deemed to be unusable for the existing use or a permitted alternate use due to parcel size/shape or access restrictions. Only one property (Bradley - 1.6 ha), including residence and outbuilding, will require a buyout approach.

Table 6.2 provides a listing of directly affected properties, including existing use (refer to appropriate Design Plates which show extent of requirements). Additional information is provided for the properties between Maddaugh Road and Calfass Road where severances and agricultural property impacts are a major issue. Specific operation-related impacts in this regard are discussed in Section 6.2.2.3 Economic Environment. It should be noted that the cited property requirements and impacts are considered preliminary and are subject to change based on further design deliberations during subsequent phases of the project.

Commitment to Mitigation

Impacts to frontage on the portion of existing Highway 6 to be widened will be unavoidable. Where property requirements are deemed particularly onerous at residential properties north of Mountsberg Road, an urban (curb-and-gutter) section will be employed to minimize requirements and retain existing setbacks and front yard areas to the greatest degree possible. This includes reverse gradients on shoulders to keep highway drainage off front yard areas.

In certain instances throughout the corridor, property exchanges will be considered based on a determination of economic feasibility and discussions with affected owners as to their requirements and desires. Investigations in this regard will typically be conducted 18 - 24 months prior to construction.

Mitigation relative to specific agricultural operations is discussed in Section 6.2.2.3.

The concerns of the Morriston Park Nursing Home relative to the safety of its residents have been addressed with the inclusion of standard 1.8 m security fencing of the proposed Highway 6 right-of-way. This measure has been discussed with the operators of the Home who expressed satisfaction with the proposal.

ii) Noise

Potential Condition Changes and Effects

The methodology used for determining condition changes in the noise environment, and associated agreements with MOEE in this regard, are described in Section 4.2.2.

The existing "Noise Protocol" between MOEE and MTO provides a basis for assessing noise impacts and identifying mitigation. MTO's Directive "A-1" (50) further outlines the procedures for impact assessment and the warrants for appropriate noise mitigation.

These documents indicate that a noise increase attributable to the project, for noise sensitive receivers, of more than 5 decibels (dBA) over the "ambient" level constitutes grounds for considering possible mitigation. If noise mitigation is applied, it should achieve at least a 5 decibel noise reduction. The provincial objective for outdoor noise levels adjacent to new highways is 55 dBA (24 Leq). The objective of noise mitigation is to reduce levels as close as possible to the lower of the provincial objective (55 dBA) or the "ambient" condition.

For classifying noise impacts associated with this undertaking, the following descriptors were used:

- No noise impact (change of less than 3 dBA)
- Low noise impact (change of 3 to 4 dBA)
- Moderate noise impact (change of 5 to 9 dBA)
- Significant noise impact (change of 10 dBA or more)

The detailed results of the noise prediction exercise are included in Appendix I Noise Analysis. Fifty-one residences lying within 600 m of the centreline were assessed (refer to Figure 6.6). A summary of the analysis is provided in Table 6.3.

Between Freelton and Maddaugh Road, where existing Highway 6 is to be widened, without an alignment shift, there is no noise impact anticipated as the traffic volumes are projected to remain unchanged with or without the project in place.

TABLE 6.2
SUMMARY OF PROPERTY REQUIREMENTS

Property Owner (1992)	Zoned Use	Actual Use	A	B	C	D	E	F	G	Plate
Wentworth County Board of Education	P2	V	–	–	–	–	–	–	3	4
I. Turner	A	V	–	–	–	–	–	–	9	5
J. Bell	A	R	–	–	–	–	–	–	2	6
H. Cummins	A	R	–	–	–	–	–	–	3	6
P. Nelson	A	R	–	–	–	–	–	–	6	6
D. Cummins	A	R	–	–	–	–	–	–	17	6
Millgrove Warehousing Ltd.	A	FS	–	–	–	–	–	–	5	6
P. McCarthy	A	V	–	–	–	–	–	–	8	6/7
A. Devereaux	A	V	–	–	–	–	–	–	4	8
A. Pater	A	V	–	–	–	–	–	–	4	8
W. Pulleyblank	A	R	0.30	–	4.45	0.30	0.06	0.20	–	10
G. Wright	A	V/RF	–	–	–	–	–	–	40	11/14/15
D. Reynolds	A	R	–	–	–	–	–	–	40	16
J. Segota	A	R	0.94	–	1.43	0.94	0.08	9:23	–	18
J. Mathies	A	A	0.66	0.66	0.04	0.7	0.02	35.93	–	18
M. Watson	A	R	0.02	–	–	0.02	–	–	–	18
M. Markovinovic	A	R	0.26	–	–	0.26	–	–	–	18
J. Schweden	A	A	1.08	1.08	0.60	1.68	0.21	6.32	–	18
G. Fielding	A/H	A	2.28	–	34.75	2.28	0.05	11.60	–	18
J. Bradley	H	R	1.15	–	–	2.34	1.00	–	–	18
B. Lillycrop (South of CP Rail)*	A/H	V	1.89	–	–	2.43	0.63	–	–	18/20
B. Lillycrop (Noriht of CP Rail)*	A/H	C/A	3.63	3.24	25.14	28.77	0.53	25.08	–	20
H. Stewart	A	V	1.85	–	0.84	2.69	0.56	2.13	–	20
E. Hollenbach	A	A	1.98	0.75	0.40	1.98	0.02	86.22	–	20
G. Sutton	A	A	2.67	2.67	0.34	2.67	0.06	43.79	–	20/22
W. Winer	A	A	4.80	2.80	–	4.80	0.10	43.76	–	22
D. McKinnon (Stormwater Management Area)	A	A	0.70	0.70	–	0.70	–	–	–	22
S. Townsend - McKinnon	A	A	2.96	1.65	27.64	2.96	0.03	62.19	–	22
S. Townsend - McKinnon (Stormwater Management Area)	A	A	0.66	0.66	–	0.66	–	–	–	22
H.B. Stewart	A	A	3.44	1.85	0.29	3.44	0.09	32.69	–	22/24
H. Krusch	A	A	0.30	–	–	0.30	0.08	3.70	–	22/24
848837/848838/838839 Ontario Ltd.	A/H	V	6.59	–	2.43	9.02	0.26	26.24	–	24
848837/848838/838839 Ontario Ltd. (Stormwater Management Area)	A	V	0.54	–	–	0.54	–	–	–	24

TABLE 6.2
SUMMARY OF PROPERTY REQUIREMENTS *(cont'd)*

Property Owner (1992)	Zoned Use	Actual Use	A	B	C	D	E	F	G	Plate
Ontario Hydro (South of 401)	A	HEPC/A	0.26	–	–	0.26	–	–	–	24
Ontario Hydro (North of 401)	C/E	HEPC/A	0.60	–	–	0.60	–	–	–	28
Con-Cast Pipe Ltd.	C/E	V	0.86	–	–	0.86	–	–	–	28
L. Ferraro Inc.	A/E	A	5.29	–	–	5.29	–	–	–	28/30
L. Ferraro Inc. (Stormwater Management Area)	E		0.48	–	–	0.48	–	–	–	28/30
S.J. Addeo	A	A	0.21	–	–	0.21	0.07	2.89	–	30
M. E. Obbard	C/E	E	0.18	–	–	0.18	0.17	0.90	–	30
TCG Materials Ltd.	E	E	2.14	–	–	2.14	–	–	–	30/32
TCG Materials Ltd. (Stormwater Management Area)	E		0.14	–	–	0.14	–	–	–	30/32
Slovenski Park	P	P	0.72	–	–	0.72	0.08	8.43	–	30/32
University of Guelph	H/E	H	1.98	–	–	1.98	–	–	–	32
Reids Heritage Homes	H	H	4.72	–	–	4.72	0.05	86.0	–	32/34
F. Farkas	H	H	0.24	–	–	0.24	0.03	7.89	4	34
L.E. Brown	A/H	R	0.22	–	–	0.22	0.01	33.18	4	34
G. Crow	A	R	0.02	–	–	0.02	–	43.98	2	34
J. Petrusa	A/C	A	9.94	–	13.18	23.12	0.53	20.88	11	34/36
E. Wozniak	A/H	A	5.81	–	–	5.81	0.10	54.4	4	34/36
A. Mohender (in Trust)	C	C	2.38	–	0.20	2.38	0.24	7.52	20	36
M. McDonald	C	R	0.87	–	–	0.87	0.02	34.7	–	36
J. Johnson (ultimate)	C	R	0.56	–	–	0.56	–	–	16	36
Baulkham	C	R	0.20	–	–	0.20	–	–	14	36
Gardner	C	R	0.14	–	–	0.14	–	–	4	36
Coburn	C	R	0.35	–	–	0.35	–	–	6	36

NOTES

Property Requirements (All Areas in Hectares)

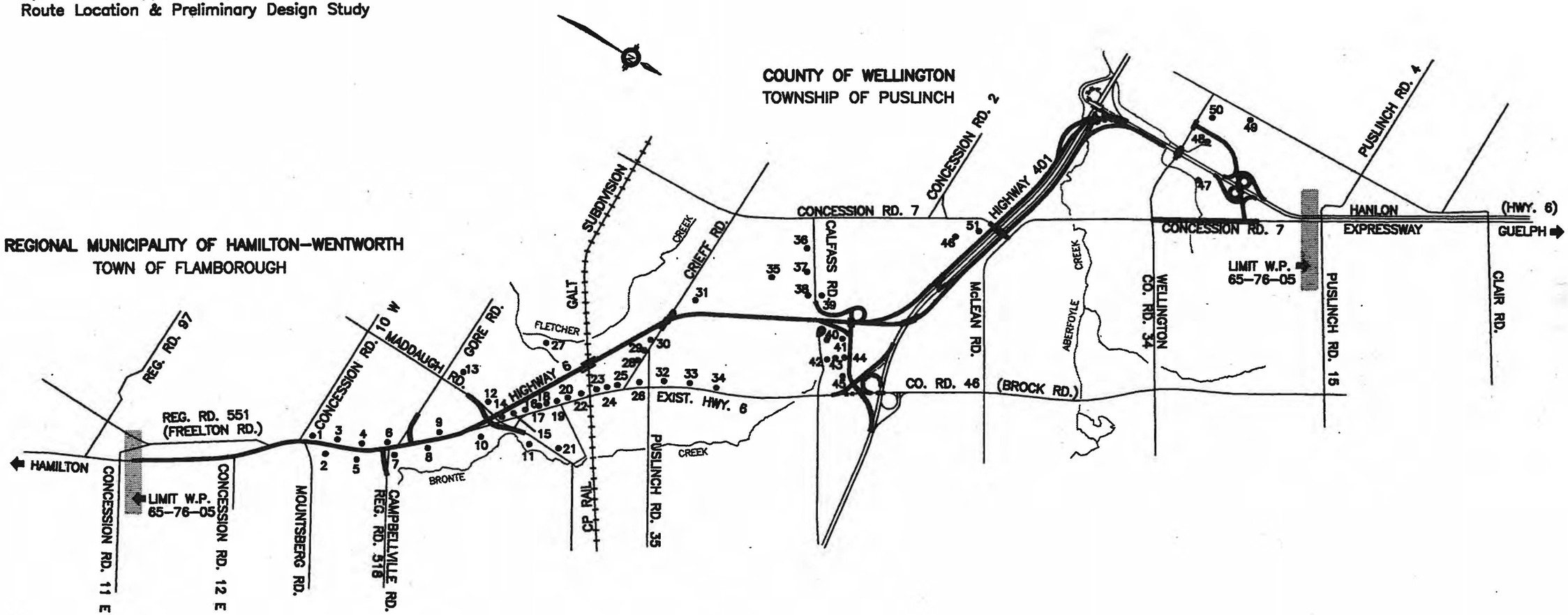
A - Area required for right-of-way
B - Active agricultural land required for right-of-way
C - Area of severance created
D - Total area to be acquired by MTO
E - Total area to be acquired as proportion of total holding
F - Area of remainder parcel
G - Maximum depth of frontage required
* Pending further investigation regarding access to landlocked parcels

Land Use

A - Agricultural/Rural
R - Residential
C - Commercial
H - Hazard/Conservation
FS - Fuel Storage
V - Vacant
RF - Reforestation
P - Recreational/Public
E - Extractive

PROPERTY REQUIREMENTS AND IMPACTS ARE CONSIDERED PRELIMINARY AND ARE SUBJECT TO CHANGE BASED ON FURTHER DESIGN DELIBERATIONS DURING SUBSEQUENT PROJECT PHASES

Highway 6 – Freelton to Guelph
Update and Supplementary Investigations for
Route Location & Preliminary Design Study



HIGHWAY 6
FREELTON TO GUELPH
Environmental Assessment
& Preliminary Design Report

LEGEND
- 1993 Technically Preferred Route
- Receiver Locations

Figure 6.6
NOISE RECEIVER LOCATIONS ANALYSED

TABLE 6.3

SUMMARY OF POTENTIAL NOISE IMPACTS

Receiver Sites	Ambient Noise Level 2011 (w/o proposal)	A	B
12 - Segota	56.8	62.7	+5.9
18 - MacDonald	71.4	66.4	-5.0
19 - Marks	77.3	72.0	-5.3
20 - Nochol	73.5	68.4	-5.1
22 - Brown	64.6	61.0	-3.6
27 - Godfree	45.0	52.9	+7.9
28 - Patterson	47.7	53.1	+5.4
29 - Stewart	46.2	55.0	+8.8
30 - Hilborn	46.0	55.1	+9.1
31 - Stewart	45.0	50.6	+10.6
35 - Townsend	45.0	50.5	+5.5
36 - Bill	45.0	50.0	+5.0
37 - MPNH	45.0	51.7	+6.7
38 - Krusch	45.0	55.9	+10.9
39 - Descary	45.0	54.5	+9.5
40 - Telfer Glen	45.9	51.8	+5.9
41 - Telfer Glen	49.0	54.9	+5.9
42 - Telfer Glen	45.7	49.3	+3.6
43 - Telfer Glen	48.0	51.3	+3.3
44 - Telfer Glen	51.2	54.0	+2.8
45 - Telfer Glen	55.1	55.3	+0.2
46 - Addeo	65.6	65.7	+0.1
47 - Wozniak	47.1	47.2	+0.1
48 - J. Petrusa	52.3	53.9	+1.6
49 - M. Petrusa	46.6	46.8	+0.2
50 - Rafuse	52.1	53.8	+1.7
51 - Obbard	66.7	65.7	+0.2

Notes : **A - Noise Level in 2011, with proposed improvements in place**
B - Overall noise level increase

This table based on Update and Supplementary Investigations assessment which excluded Receivers 1-11 and 13-17 since they were outside the study area for this phase. Refer to Appendix I for Initial preliminary design phase assessment of these receivers.

North of Maddaugh Road, where the new route diverges from existing Highway 6, 16 homes adjacent to existing Highway 6 will experience long term decreases in noise levels ranging from slight (0.2 dBA) to very significant (13 dBA) reductions (as determined by 1988 MTO assessment). This will occur as some traffic is redirected from existing Highway 6 to the new alignment. More homes in Morriston will experience decreases but have not been included in the assessment because they are outside the 600 m study area.

Adjacent to the new route section, 14 homes will experience a perceptible but low noise impact; 20 homes will experience a moderate noise impact (including a number of registered but undeveloped single family dwelling lots in the Telfer Glen Subdivision); and 2 homes will experience a significant noise impact.

Adjacent to Highway 401, where the Highway 6 parallel lanes will be introduced, the projected traffic volumes will be similar with and without the project in place and the net increase in sound levels will be acoustically insignificant (0.2 dBA; refer to Receivers 46 and 51). Similarly, the noise increases attributable to the new Hanlon Expressway/Country Road 34 interchange are considered acoustically insignificant (0.1 to 1.7 dBA).

In addition, there may be short term annoyance due to construction related noise experienced by sensitive receivers adjacent to work areas.

Commitment to Mitigation

The MTO/MOEE Protocol stipulates that noise mitigation should be considered where the incremental sound level increase attributable to the project may be 5 dBA or greater. MTO will consider installing noise mitigation where it is administratively, economically and technically feasible. Barriers (any combination of berm and acoustic fence is acceptable) are normally considered for areas where there will be a number of properties benefitting from the installation by an average of at least 5 dBA.

In the case where only two or three properties are involved (such as R12, R27, R28 to R31 or R36 to R39), and because of the size (both height and length) of any serious mitigation attempt (i.e. achieving at least 5 dBA insertion loss), installation of a noise attenuation barrier on this project is not considered economically justified. To achieve 5 dBA of reduction, the barriers must typically be 3-4 m in height and usually at least twice the length of the distance between the road and the receiver. As an example, the barriers for each of Receivers 12 and 27 would

have to be 4 m high and 600 m long and would incur a cost to the project of $480,000 - $600,000. Usually, this type of mitigation only becomes viable when there is a higher density of residential use, such as a subdivision, exposed to the sound.

In this case, the one area where this condition might apply is the Telfer Glen Subdivision (11 properties at R40 and R41). The noise barrier would extend approximately 650 m in length along MTO's right-of-way, wrapping along Calfass Road and the Connection Road. The general location of the proposed noise barrier is shown in Appendix I, Figure 2. As there would already be some barrier effect due to the existing topography and the low grades in the area where the barrier might be erected, attaining an additional 5 dBA insertion loss will require barriers 10 m above existing grades. As Highway 6 is in a cut at the Connection Road, additional barriers will provide diminishing acoustic benefits. The sound levels from all roadways are just above 55 $dBAL_{eq}$ for the properties (R40 and R41) adjacent to the Highway 6 eastern right-of-way.

Due to the varying topography between the Highway 6 alignment and the Telfer Glen Subdivision, significant earth filling at any point where the barrier might be placed would be necessary to achieve the required barrier insertion losses with a reasonable height of acoustic fence. It may become possible to install such a barrier if enough excess material is generated during construction to raise the grades. While such an outcome is not probable, this section of roadway will be reviewed more fully once detail design has been carried far enough along to permit accurate assessment of the vertical alignment and cut and fill conditions. There is a small possibility that an effective noise barrier might be made to be practical. At this time, the costs appear prohibitive. However, if there were a large surplus of fill material available at low cost, in addition to agreement on regrading the lots, a barrier might be practical.

Shifts in the horizontal alignment of the pavement as a form of mitigation have been ruled out since the horizontal alignment is fixed due to other environmental and engineering concerns. The degree of cut in the Crieff Road/Highway 6 New vicinity has been optimized (approximately 9 m) to provide relief from noise impacts. This will reduce noise levels in the area by 3 to 4 dBA.

The use of open friction course (OFC) pavement instead of asphalt pavement to reduce noise levels (generally 1-2 dBA reduction can be achieved) will be based on recommendations from MTO's Geotechnical Section (for pavement design) and subsequent discussions between MTO Geotechnical and Environmental staff regarding relative benefit/cost of OFC pavement for this project.

Besides the ongoing potential noise impact from the new project, the MOEE/MTO Protocol also reflects the concern that undue noise impacts from the construction of the project may be created. A preliminary review of the type of construction required indicates that one would not anticipate unusual needs or concerns along the preferred corridor (e.g. no rock blasting). The standard MTO requirements are that contractors' equipment be in good repair with activities and noise control elements such as engine mufflers consistent with "good practice". Off-road equipment will be required to meet NPC-115 of the Model Municipal Noise Control Bylaw (85 dBA maximum at 15 m). In addition, the Township of Puslinch and Town of Flamborough currently These regulations will be adhered to except where the construction is more than 400 m from residential areas or where extended hours of operation are required, in which case the appropriate approval for non-compliance will be obtained from the municipality.

iii) Visual Aesthetics

Potential Condition Changes and Effects

With respect to views from and of the road, the new highway facility was judged to have the following qualities with respect to the attributes under consideration:

View from the Road

- Good variety and frequency of spatial enclosure due to transition from wetland fringe to agricultural landscape and movement from open to enclosed sections created by cut sections and extensive wooded areas.
- Good diversity of landscape types traversed relative to what is available in the study area.
- The number of positive and negative features available for viewing are few and generally balance each other.

View of the Road

- Moderate relationship (fit) between alignment and landscape character. The horizontal alignment does not fully respect such elements as field and woodlot configurations and requires cut sections through hummocky areas in order not to compromise geometric standards.

- Does not create visual intrusion outside existing roadway corridors due to cut sections employed and variation in local topography.

However, four areas of potential significance and concern have been identified:

1) Rear yard areas of the Watson and Markovinovic properties fronting on existing Highway 6 (refer to Design Plate 18).

2) Residences on the cul-de-sac created at the divergence point of Highway 6 New at Maddaugh Road may be subjected to headlight glare from vehicles travelling southbound on the new facility.

3) The existing CP Rail Galt Subdivision line is already located on 3 m of embankment. To obtain the required clearances, Highway 6 New must be placed on up to 14 m of fill in passing over the rail line. This may be visually obtrusive to residences on Fielding Lane and on Highway 6 in the Hamlet of Puslinch.

4) The Connection Road between Highway 6 New and existing Highway 6 will be placed on up to 7 m of fill and may create intrusive effects on some of the rear yards of existing and future residences situated on the north side of Calfass road in Morriston (Telfer Glen Subdivision).

5) Dufferin Aggregates has identified the need to screen their Mill Creek operation from Highway 401 and Highway 6 because of their sensitivity to public criticism and because of potential liabilities from public desires to access their operations (particularly lake areas). The proposed Hanlon Expressway N - Highway 6/Highway 401 E Ramp will be carried across Highway 401 adjacent to the pit approximately 7 m above grade and will encroach on the pit's Highway 401 buffer strip which has been landscaped to provide screening.

6) Similar concerns exist along the TCG Highway 401 (south) frontage where the Highway 6 parallel lanes and stormwater management facility will encroach on the landscaped buffer area/berm and displace existing screening.

Changes in views from and of the road are not expected to be significant on portions of the existing highway to be widened.

Dust will be an unavoidable short term impact of construction activities. Typical effects include degradation of visual amenities and air quality. Specific areas of concern include construction sites adjacent to residences and Highway 401 where reduced visibility due to dust could present a safety hazard.

Commitment to Mitigation

Aesthetic consideration will generally be addressed through the formulation of a post-construction landscaping and refurbishing plan. Specific constraints and opportunities relative to such a strategy will be identified during detail design and these will reflect the potential condition changes identified in this report. In a more general sense, the strategy will be sensitive to existing residential, institutional and industrial land uses, unique landforms and views and vistas (e.g., wetlands, creek crossings and interchanges).

The following design principles will be adhered to in ensuring that landscaping is an integral part of the design process:

a) Existing vegetation will be preserved on the highway right-of-way wherever practical.

b) Alignment, profile and structures will be treated sensitively to respect existing landscapes (view of the road) and retain/replace existing screening where practical (e.g. view from the road to Dufferin Aggregates and TCG).

c) Contour grading of earthworks will be undertaken as a step towards minimizing visual intrusion (e.g. berms).

d) Natural regeneration areas will be promoted within the highway right-of-way wherever practical.

e) Selected planting will be undertaken on the highway right-of-way for:

i) visual screening;

ii) aesthetic enhancement of the right-of-way including naturalization of stormwater management facilities;

iii) structure accentuation;

iv) nodal planting for locational clarity;

v) enhancement planting of adjacent landscapes;

vi) reinforcement planting of natural growth;

vii) replacement planting of removed growth;

viii) improved efficiency in right-of-way maintenance.

Normal means of dust control, such as calcium chloride and water, will be employed. To minimize adverse impacts to water quality resulting from the use of calcium chloride and storage, runoff control measures specified in Section 6.1.1.1 will be enforced.

6.2.2.3 Economic Environment

i) Agricultural Activities

Potential Environmental Condition Changes and Effects

The most significant impacts on agricultural operations are associated with the new section of Highway 6 between the CP Rail line and Highway 401. In total, 7 operations would be directly affected. The new right-of-way would require approximately 14.7 ha of active agricultural land which represents in the order of 48% of the total property requirement for this section. None of the active agricultural lands required for the right-of-way have been classified as having high capability for agricultural production (Class 1 and 2); 82% has been classified as Class 3 and 4.

Other properties currently supporting either owner-occupied or leasehold active agricultural operations for which land would be required are those with minor frontage impacts in Section A (South Project Limit to Maddaugh Road) and lands designated for commercial-industrial uses in the northwest quadrant of the Highway 401/Brock Road interchange (Section C).

Other concerns expressed by operators and OMAF related to potential adverse impacts include runoff of highway stormwater and associated windblown salt spray onto adjacent agricultural properties.

There are two major operators in one area (Hollenbach, Sutton) whose equipment routes off the home farm will be affected. The selected design will have the advantageous effect of reducing traffic flows on existing Highway 6, thus reducing vehicular conflicts and accident potential during the movement of machinery, livestock and produce. Further, the grade separation at Crieff Road will eliminate potential conflicts between the crossroad and the new route in this regard.

No farm buildings or other structures will be displaced by the selected design.

Due to the high profile of agriculture as an economic activity in the study area it is deemed appropriate to examine the impacts to specific major holdings and the associated concerns of their operators. (Refer also Minutes of Meetings with owners in Appendix C). The respective Design Plates are cited for detailed reference.

Hollenbach (Design Plate 20) - The primary concern on this holding is related to the "outdoor barn" of the Long Lane Farm Hereford and Simmental cattle operation, a relatively small but intensively used portion of the farm which provides a natural sheltered area for feedlot, grazing and calving. The area is also used for grain handling due to its flatness and proximity to Crieff Road. The selected design essentially runs along the protective ridge on the northeast periphery of the area in question. This would sever a small portion of the area which is not currently used by the cattle due to its relative inaccessibility and undulating relief. However, Mr. Hollenbach's primary concerns are as follows:

- reduction of the feedlot area by approximately 24% and effects on intensity of use;
- loss of primary sheltered calving area in the lee of the ridge;
- reduction in height of the protective windbreak formed by the ridge;
- requirement for relocation of the Crieff Road access to the area to a point with less desirable vertical alignment creating a longer access road requiring additional winter maintenance.

Detailed documentation of Mr. Hollenbach's operation, his concerns and the manner in which the Project Team addressed these concerns are included in Appendix K Special Considerations.

Sutton (Design Plates 20 and 22) - The Sutton 48 ha, 75-head dairy heard operation relies on the rear portion of the property, on a rotational basis, for the production of cash and forage crops and for pastureland.

The area affected is classified as Class 3/5 and Class 6/4 agricultural land. The selected design would require acquisition of approximately 4% of the farm land and would create a small (0.34 ha) severance not particularly suitable for farming purposes, thereby creating pressure for conversion to a non-agricultural use (e.g. residential building lot).

Winer (Design Plate 22) - The Winer home farm is close to 50 ha in size. It has been utilized for dairy purposes and has been assessed by OMAF as having capability for supporting a beef operation. A portion of the affected area is leased to Mr. Sutton as it appears that Mr. Winer is in the process of reducing his participation in farming activities. However, Mr. Winer has indicated that a family member may be interested in continuing farming operations on the land. The selected design will take 2.8 ha of land out of production and require acquisition of about 10% of the farm, comprising a parcel on the rear lot line, including a portion of the woodlot.

McKinnon (Design Plate 22) - The 93 ha McKinnon holding includes a large leasehold cash crop operation which will be severed to create two viable agricultural parcels. Access across the new route to the severed (eastern) parcel will not be provided or permitted but alternative access is available via existing Highway 6 frontage. The new route would require acquisition of approximately 3% of the holding.

Stewart (Design Plates 22 and 24) - The Stewarts run an 85 head cow-calf operation on approximately 36 ha immediately south of Calfass Road. They intend to continue farming into the foreseeable future. The highway proposal would create a small (0.29 ha) severance to the west of the route, creating pressure for conversion to a non-agricultural use, and reduce the size of the operation to approximately 32.7 ha. In addition, the severance would not be accessible from Calfass Road east of the new route.

Commitment to the Mitigation Measures

In general terms, the selected design will minimize the flow of stormwater onto adjacent agricultural lands by retaining, to the greatest degree possible, highway runoff within the right-of-way and directing it via existing natural drainage patterns to dedicated stormwater management areas. Further, the profile of the new route in these areas has been depressed to the greatest extent practical in order to retain salt spray and other proximity effects (noise, visual intrusion). These measures, in conjunction with the final modifications in the horizontal alignment, were deemed to have satisfied the concerns of Messrs. Sutton and Winer, and those of OMAF and Puslinch Council related to these properties, at the preliminary design level of detail.

With respect to the Hollenbach operation, the Project Team met with the operator on several occasions to tour the farm, gather information, confirm concerns, and discuss potential means of resolving identified issues (refer to Appendix K Special Considerations). Discussions became most intensive on two occasions near the conclusion of the preliminary design exercise. By this time OMAF had determined that an alternative similar outdoor barn site was not available on either the Hollenbach farm or on the portion of the adjacent Lillycrop holding that could be acquired by MTO. Further, it was concluded that the loss of the grain handling area was unavoidable and that this operation could be conducted elsewhere on the farm (refer to OMAF correspondence in Appendix B).

At the first of the two cited meetings (June 1987) the Project Team presented a plan illustrating an alternative feedlot access from Crieff Road and determined that this issue appears resolvable. As a result of discussions at this site meeting, a further session with Mr. Hollenbach was held on site (July 1987) at which time the Project Team presented 1:1,000 scale plans showing the highway design proposal, a reconfigured northeast corner (severance) for use as a sheltered area with access from the main feedlot via an oval CSP cattle pass (subsequent plans showing access also from Crieff Road were prepared), elimination of the undesirable low area south of the feedlot where standing water accumulates, removal of the gravel pile to afford additional sheltered area for calving, conceptual access road relocation and associated grading and drainage. In addition, cross-sections were prepared showing the cattle pass, a 5 m berm on the west side of the highway to provide a windbreak effect in addition to the windbreak effect of the Crieff Road overpass.

Mr. Hollenbach still has major concerns over the loss of the prime (sheltered) cattle area and reduction in the overall area of the outdoor barn, in addition to concern over the use of such a long (65 m) cattlepass by his animals and the means of the retrieving down cattle in the severed area, particularly in winter. Mr. Hollenbach has not offered any reasonable alternative solutions to the cited issues and, to date, none of the Project Team proposals have been incorporated in the selected design. Additional action in this regard is outlined in Section 6.3 Commitment to Further Work.

ii) Mineral Aggregate Extraction Operations

Introduction of the Highway 6 parallel lanes adjacent to Highway 401, and the design modifications to the Highway 401/Hanlon Expressway interchange, will result in direct and indirect impacts to sand and gravel operations adjacent to the project. The Dufferin Aggregates operation on the University of Guelph lands and the TCG operation will experience the most direct effects. Concerns related to visual aesthetics have been addressed in Section 6.2.2.2. iii).

Dufferin Aggregates (Design Plate 32) - The proposed Hanlon Expressway N - Highway 401/Highway 6 E directional ramp will encroach on approximately 2 ha of the pit's Highway 401 frontage. This will displace much of the proposed 60 m buffer area. If the required setback from Highway 401 must be maintained, portions of the proposed working area of the pit (settling ponds) and future after use wetland fringe of Lake 2 may be displaced. In addition, Dufferin's proposed ground water monitoring station in this area may have to be relocated. Given the probable timeframe for the highway improvements, it is unlikely that any sterilization of mineral aggregate resources will occur since the affected portion of the pit is included in the first area to be worked (work is currently proceeding from the Concession Road 2 frontage towards Highway 401).

TCG (Design Plates 30 and 32) - approximately 2.4 ha of property would be required along TCG's Highway 401 (south) frontage to accommodate the Highway 6 parallel lanes and stormwater management area. This will displace a portion of the existing buffer area/berm, with effects similar to those experienced on the Dufferin Aggregate site to the west. In addition, a small taking of unworkable area will be required for the proposed realignment of Concession Road 7 over Highway 401; TCG indicated they have no major concerns in this latter regard.

Indirect effects are related to the proposed reconstruction of Concession Road 7 over Highway 401 to accommodate the new bridge. A localized westerly realignment of the roadway is proposed to avoid long term closure to traffic. Short disruptions in traffic flow over the bridge will be required to allow tie-in of the new alignment to existing Concession Road 7 and McLean Road and this will affect pit operations since the bridge is the only access in the immediate area to operations on the north side of Highway 401 and to haul routes.

Commitment to Mitigation

Encroachment on the pit buffer areas and loss of landscaping/screening will be unavoidable. MTO has made a commitment to investigate means of addressing the setback requirements of the affected operations (refer to Section 6.3 Commitment to Further Work).

With respect to sand and gravel traffic across the Highway 401 corridor, the proposed design incorporates measures to minimize such interruptions (offset alignment of new Concession Road 7 versus reconstruction on existing alignment which would require long term closure). However, the cited short term disruptions for tie-in construction will be unavoidable.

iii) Other Business Operations

Potential Condition Changes and Effects

Other than agricultural and mineral aggregate extraction operations, affected businesses include those highway oriented establishments, primarily in the Morriston-Aberfoyle corridor, which perceive a loss of clientele as a result of reductions in passing traffic. Reductions in baseline traffic volumes on existing Highway 6 will range from 51% through Morriston to 72% immediately north of Maddaugh Road. On Brock Road the reduction will be in the order of 54% between Highway 401 and Aberfoyle and 40 - 45% between Aberfoyle and the City of Guelph.

A quantification of potential business loss or reduction in municipal revenue associated with business taxation would be, at best, speculative and has not been attempted. However, it is suggested that the following establishments may be most adversely affected by loss of induced business from passing traffic.

- Pergola Inn
- Teds Restaurant/Shell Gas Station
- Petrocan Service Station/Grand River Motors
- Swampman Antiques
- Heuther's Garage
- Morriston General Store/Esso Gas Station
- Bryan Farm Equipment Sales

Others, such as Envers Restaurant in Morriston and the Village Bake Shoppe and General Store in Aberfoyle, perceive beneficial effects associated with the diversion of traffic in terms of an improved environment for site access and parking by motoring and pedestrian clientele.

Concerns related to B. Lillycrop's farm implement dealership (Bryan's Farm Equipment Sales at Crieff Road and existing Highway 6) were discussed with him in July 1987. These include loss of highway exposure, lack of access from the new route to Crieff Road and loss of use/amenities on the landlocked parcel west of the new route (used equipment storage, aggregate source for lot and lane maintenance). With respect to the Lillycrop operation, the design remains flexible enough to accommodate an underpass of the new route to provide access to the western parcel; alternatively, the CP Rail structure could be used for access (refer to Section 6.3 for further action in this regard).

With respect to lost exposure, the dealership is close enough to the new route that the following observations can be made:

- Although distance between Highway 6 traffic and the main dealership buildings and display frontage will be greater, inventory can be re-oriented to capture the exposure factor of the new alignment which is visible from the dealership.

- Additional traffic will be attracted to the new route (18,900 AADT in year 2011) thereby increasing current exposure.

- A significant volume of traffic will be retained on existing Highway 6 (7,540 AADT).

- A location sign would be permitted adjacent to new highway right-of-way subject to MTO standards with respect to proximity of signage to on-site buildings.

Commitment to Mitigation

Business loss resulting from reduced highway traffic exposure will generally be unavoidable. Existing businesses in the Morriston - Aberfoyle corridor are currently signed (Food-Fuel) on Highway 401 and such signage would be retained. Additional similar signage for Morriston businesses may be considered in the vicinity of the Connection Road/Highway 6 intersection.

6.2.2.4 Cultural Environment

i) Heritage Resources

Potential Environmental Condition Changes and Effects

The effect of the new highway facility on heritage resources has been considered with respect to historical cultural landscapes and built environment features.

Cultural Landscapes

Generally the new highway facility will cause only minor impacts to identified cultural landscapes.

Impacts to the original field and survey pattern are relatively minimal. The recommended route cuts diagonally across several farm lots as it diverges from the existing highway just south of Maddaugh Road, but in doing so creates a new visual border to the Fletcher Creek Swamp area. The new route then swings northwards, parallel to and reinforcing the orientation of the original survey pattern as it follows the east side of the fence line at mid-concession VII.

The preferred alignment avoids direct impacts to the historical communities of Crieff, Puslinch and Morriston. Local access to Crieff will be maintained. Puslinch and Morriston will be effectively screened from the new highway by the study area's rolling landscape, although the new structure over the CP Rail line will be visible from Puslinch. The highest level of impact occurs in Morriston, where changes to local access roads will result in further loss of the village's historic role as a four-corner community which was initially affected by the introduction of Highway 401. In this respect, the new highway's alignment from Maddaugh Road to Highway 401 will significantly reduce Morriston's historic service function along a major thoroughfare. This effect is outweighed by benefits related to increased safety levels in the village.

The local road pattern, reflective of the area's varied survey orientations, intersects the recommended alignment at various angles. Impacts to this pattern are relatively minor, involving the realignment of several local roads at their intersection with the new highway and the creation of cul-de-sacs on Calfass Road and Maddaugh Road.

Built Environment Features

None of the historically or architecturally significant built environment features identified in the study area will be directly affected by the recommended alignment.

However, Site #60, a stone schoolhouse- cum-residence of exceptional historical significance located on the southeast corner of the Mountsberg Road/Highway 6 intersection, will be indirectly affected by the widening of existing Highway 6. Property requirements and proposed vegetation removals will alter somewhat the physical setting of the site, reducing its screening from the highway. A number of the larger specimen trees providing screening for this site are currently on MTO property (Highway 6 right-of-way) and have previously been assessed as constituting a driving hazard by the Town of Flamborough. Sections of stone and rubble fences will also be displaced by the recommended alignment where it crosses existing field patterns.

Commitment to Mitigation

Although no direct impacts to historic structures will result from the recommended alignment, the indirect impact to the setting of Site #60 will be addressed through landscape mitigation in the post-construction landscaping and refurbishing plan.

ii) Archaeological Resources

Potential Condition Changes and Effects

An archaeological survey of the previously undisturbed areas to be affected by widening of existing Highway 6 and introduction of the new Highway 6 right-of-way was conducted by MTO's archaeologist. The results of the investigation are included in Appendix H of this report.

Only one site of historical significance was identified during the survey. The Segota Site, an early to mid-19th century domestic site, is registered under the Borden System as AiHa-24. It is located immediately northwest of the Maddaugh Road and existing Highway 6 intersection, on Lot 39 Gore Concession. This site lies immediately east of the new Highway 6 right-of-way north of Maddaugh Road and as such should remain intact.

Commitment to Mitigation

The Segota Site will remain beyond the limits of the proposed right-of-way and should not be directly affected by construction. However, given the site's close proximity to the right-of-way and the fact that it will remain a small island of ground between new Highway 6, old Highway 6, and Maddaugh Road, the site will be actively protected from disturbance during the construction phase. Protection of the site will initially be afforded by a notation in the construction contract as to the site's location and significance as an Environmentally Sensitive Area. Should this small severance of the Segota property be purchased during negotiations, the site area will be actively protected during construction by the erection of a snow fence around its perimeter. The detail design stage of the project will identify and supplement any deficient areas of information on the site, as well as allow for additional strategies related to protection of the site during construction. This will include consultation with the Ministry of Culture, Tourism and Recreation.

As indicated earlier in this report, MTO staff were unable to complete the preliminary design level archaeological assessment. Appropriate mitigation strategies for any sites discovered as a result of outstanding assessment completion can only be determined if and when any sites of archaeological significance are identified. Section 6.3 Commitment to Further Work outlines action to be taken in this regard.

6.3 Commitment to Further Work

This section describes commitments by MTO to further investigation, documentation, liaison and/or monitoring required to address outstanding issues to date and those which may be identified in subsequent phases of the project.

6.3.1 Further Investigation, Liaison and Documentation

i) Geotechnical/Soils

- Conduct appropriate geotechnical/foundation investigations relative to confirming erosion/sedimentation potential and refining mitigation measures (e.g. benching),

particularly in high fill areas (CP Rail overpass; 401/Hanlon interchange) and areas of deep cut (north of Crieff Road).

- Conduct more detailed land use and site characteristics assessment relative to the potential for encountering property waste and contamination.

- In co-operation with MOEE Municipal Abatement staff, develop soils management strategy, as required, based on geotechnical investigation and soils quality testing program.

ii) <u>Hydrology and Hydrogeology</u>

- Conduct appropriate pre- and post-construction hydrogeological investigations, including ground water and private well monitoring, relative to establishing ground water conditions and determining potential effects and mitigation measures.

- Formulate detailed drainage strategy. Critical areas include Highway 6/Flamborough Concession Road 12 area, Fletcher Creek wetland and CP Rail crossing, Connection Road area and the Hanlon Expressway/County Road 34 interchange (i.e. potential soil compaction in wetland area associated with fill placement for County Road 34 grade separation).

- Develop co-operative approach to retaining Dufferin Aggregates affected ground water monitoring station.

- Maintain contact, as required, with MOEE, Halton Region, Hamilton Region and Grand River Conservation Authorities, CP Rail and municipal technical representatives relative to concerns identified during Preliminary Design (e.g. fill in flood plain areas) and their prospective roles as review agencies during Detail Design.

- Engage in co-operative effort with Conservation Authorities, MNR and MOEE with respect to development and implementation of subwatershed management strategies.

iii) <u>Aquatic Resources and Designated Environmentally Sensitive Areas</u>

- Contact will be maintained, as necessary, with the Ministry of the Environment and Energy, relative to its mandate regarding water quality, and the Federal Department of Fisheries and Oceans, the Ministry of Natural Resources, the participating Conservation Authorities and affected municipalities relative to elements within their areas of responsibility. Reciprocal liaison will be particularly useful with respect to proposals for further investigations or improvements in the Fletcher Creek and Galt/Mill Creek wetland/ESA areas.

iv) <u>Noise</u>

- Investigate warrants for use of Open Friction Course pavement in consultation with MTO Geotechnical Section (re pavement recommendations).

- Continue liaison with MOEE in keeping with Noise Protocol relative to possible introduction of mitigation measures.

- Ensure compatibility between Highway 6 proposal and any residential subdivisions in the Morriston area receiving approval prior to the route designation (corridor control).

v) <u>Aesthetics</u>

Visual considerations, especially at points where intrusive effects or the need to introduce or reinstate screening has been identified, will be incorporated in a post-construction landscaping and refurbishing strategy.

vi) <u>Direct Property Impacts/Agricultural Operations</u>

- Maintain contact with affected property owners and confirm feasibility of possible mitigation measures during detail design.

- Need for issue resolution is particularly acute with respect to the Hollenbach and Lillycrop properties. Investigation of access to large landlocked parcels will be conducted for the Lillycrop operation.

- Liaise with/involve Ministry of Agriculture and Food as required.

vii) <u>Mineral Aggregate Extraction and Other Business Operations</u>

- Investigate means of addressing possible reduction in pit setback requirements with MTO and MNR staff.

- Develop strategic post-construction landscaping and refurbishing plan to reduce visual exposure of pits.

- Investigation of possible signage for Morriston businesses in the Connection Road/Highway 6 vicinity.

- Continue discussions with B. Lillycrop regarding signage for farm implement dealership on Highway 6 New.

viii) <u>Heritage Features</u>

- Relandscaping schemes to be implemented where vegetative removals have adversely affected the physical setting of Site #60.

- Removal of stone and rubble fence lines shall be kept to a minimum where possible.

xi) <u>Archaeological Resources</u>

- Complete detailed investigation of proposed alignment on properties where permission-to-enter was initially refused (B. Lillycrop, Townsend-McKinnon, D. Stewart) and in woodlot areas where conditions did not previously permit investigation to required level of detail (J. Bradley, W. Winer, H. Krusch, N. Stewart, 848837 Ontario Ltd. <u>et al</u>, MTO, L. Ferraro).

- Determine detailed strategy for preservation of Segota Site (AiHa-24) during construction for two scenarios - acquisition or non-acquisition of Segota severance.

- Maintain liaison with Ministry of Culture, Tourism and Recreation (Regional Archaeologist).

x) Engineering and Design Work

- Emergency Access to the new Highway 6/Highway 401 S-W ramp should be provided to avoid emergency vehicles having to go south to Maddaugh Road and return north to Highway 401 to access the subject ramp. It has been suggested that the S-E/W ramp left shoulder could be overbuilt to a width which would allow emergency vehicles to go in the opposite direction of the ramp flow to access Highway 6 northbound.

- The present design for Concession Road 7 is to reconstruct it on the existing centre line to a 2-lane paved road with an improved profile. This will require four (4) small Ontario Hydro towers to be relocated. An alternative to this would be to shift Concession Road 7 a few metres to the east in order to avoid moving the towers. This shift could take place north of the house 450m north of County Road 34. In the absence of detailed cross-sections, the alternative of shifting the centreline could not be meaningfully reviewed during the preliminary design.

- Ontario Hydro has noted that they would prefer a minimum of 15m vertical clearance from the S-W ramp at Highway 401. We are presently providing 13m.

6.3.2 Design and Construction Reports

Design and Construction Reports will be prepared for individual contracts on the Highway 6 Project during detail design and submitted to MOEE and the appropriate ministries or agencies for information purposes.

In addition, relevant contract information will be made available to contact ministries and agencies, where appropriate or required.

Should conditions alter significantly between the present (or when Design and Construction Reports are submitted) and the time when construction is to be undertaken, the ensuing potential environmental impacts, adverse effects and possible mitigation measures will be assessed and a

review by the appropriate ministry or agency will be requested. This procedure will provide the basis for determining adherence to environmental assessment document details and resolution of on-site construction problems.

6.3.3 Monitoring

6.3.3.1 Contract Compliance

During construction, MTO ensures that implementation of mitigating measures and key design features are consistent with the contract and external commitments. In addition, MTO assesses the effectiveness of its environmental mitigating measures to ensure the following:

1. Individual mitigating measures are providing the expected control and/or protection;
2. Composite control and/or protection provided by mitigating measures is adequate;
3. Additional mitigating measures are provided, as required, for unanticipated environmental problems which may develop during construction;
4. Information is available for the overview assessment of environmental mitigating measure effectiveness (Section 6.3.3.2).

6.3.3.2 Environmental Measure Effectiveness

On-Going Environmental Mitigating Measures Performance Evaluation

As part of the technical assessment of its environmental monitoring programs, MTO undertakes ongoing multi-project and multi-year composite evaluation of individual mitigating measures. The purpose of this evaluation is to determine overall effectiveness, conditions that affect performance, potential for technical improvements and warrants for their use. The end result is a constantly evolving knowledge base for improving the type and application of environmental mitigation used by MTO.

Scientific Environment Monitoring

From time to time, scientific monitoring may be required to address new technologies, specific mitigating measures and/or significant concerns (e.g. water quality monitoring).

6.3.3.3 Condition of Approval Compliance

During planning and design, MTO ensures compliance with environmental policies, legislation and regulations before issuing environmental clearance for project implementation.

During construction, MTO ensures that external notifications and consultations are consistent with any commitments which may have been made earlier. Following construction, monitoring will ensure that any follow-up information is provided to external agencies as per any outstanding environmental commitments.

6.3.3.4 Post-Construction Monitoring of Stormwater Quality Control Measures

The water quality sensitivities identified on this project suggest that a special program for monitoring the performance of the proposed stormwater quality management facilities may be warranted.

The results of such a program will aid the Ministry in the further development of stormwater quality policy and technology.

The specific monitoring for the facilities on this project will be tailored to the unique conditions of each site. Monitoring may include quantity and quality measurements of sediments and water samples. The monitoring needs for each site will be determined upon completion of the planning of the overall monitoring program.

6.3.3.5 Responsibility for Monitoring

Inspection by MTO Construction Staff

All MTO construction projects are subject daily to general on-site inspection to ensure the execution of the environmental component of the work and to deal with environmental problems that develop during construction. This is the primary method for compliance monitoring.

Site Visits by MTO Environmental Staff

MTO construction projects with significant mitigating measures/concerns are subject to periodic site visits by MTO Environmental staff. The timing and frequency of such visits are determined by the schedule of construction operations, the sensitivity of environmental concerns and the development of any unforeseen environmental problems during construction.

Post-construction monitoring responsibilities, specifically for Stormwater Quality Control measures, will be limited to planning the monitoring program.

6.4 Summary of Concerns, Identified Impacts, Associated Mitigation Measures and Commitments to Further Work

Table 6.4 provides a summary of the concerns of provincial ministries, agencies and the public relative to environmentally significant issues, the manner in which these have been addressed, whether through commitment to mitigation measures or further work, and reference to contacts for further liaison.

TABLE 6.4

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Geotechnical/Soils	4.1.2 5.4.3 5.4.4 5.4.5 6.2.2.1 (i) Appendix B	Exposure of erodible soils in deep cut section and on high fill slopes.	MTO	Use of benching/berms on 2:1 slopes. Use of 3:1 slopes. Expeditious revegetation of newly graded slopes.	Optimal slope stability. Reduced soil erosion potential.	Conduct systematic geotechnical /foundations investigations. Use appropriate erosion control measures in contract documents.	MTO Remote Sensing MTO Geotechnical
		Acquisition/encounter of soils with high potential for property waste/contamination.	MOEE	Early implementation of soils management strategy, as required, to control/monitor excavation, dust, waste handling/stockpiling/transport. Conform to MOEE Soil Cleanup Criteria or similar guidelines.	Maintain maximum flexibility for potential solutions/ mitigation. Reduced potential for dispersion of/ exposure to hazardous materials.	More detailed land use/site characteristics assessment. Soil quality classification to identify excavated material as hazardous waste, as required.	Property Owners MOEE Municipal Abatement
Forestry Resources	4.1.6 5.4.2 5.4.3 5.5 6.2.2.1 (ii) Appendix F	Encroachment on or severance of four Class 1 woodlots. Total removal of 11.3 ha.	Property Owners MNR	Restrict extent of construction corridor. Use of marketable timber (no waste of resources).	Loss of nature specimens unavoidable. Areal extent of lost vegetation replaced to a large degree.	Develop post-construction landscaping and refurbishing plan to replace removals.	Property Owners Ministry of Natural Resources (Cambridge District) MTO Environmental Section
		Encroachment on two plantation areas (private WIA area and MNR Morriston Tract).	MNR	Mark and protect specimen trees outside construction zone; repair damaged trees.	Trees outside grading area but inside right-of-way may be retained.	Further investigation of retention of existing trees within right-of-way.	
		Indirect impacts to remainder portions of affected woodland areas due to fragmentation into smaller units.	MNR	Selective/close-cut clearing and cutting of trees so they fall away from sensitive areas. Restrict disposal outside right-of-way.	Impacts to trees outside construction envelope are minimized.	Incorporation of Special Provisions and Operational Constraints in Detail Design and contract documents.	
		Loss of some habitat of West Virginia White Butterfly.	MNR	Restrict extent of construction envelope as much as possible.		Construction site monitoring/ enforcement. Post-construction planting to protect newly created edge as much as possible.	
Hydrogeology and Hydrology	4.1.3 4.1.4 5.4.2 5.5 6.2.2.1 (iii) 6.3.1 Appendix F	Alteration of groundwater flows in Fletcher Creek, Galt/Mill Creek headwater areas.	GRCA, Halton RCA, MNR	Restrict extent of construction zone. In particular, retain existing alignment of Wellington Road 34 at Hanlon Expressway (recommended scheme avoids detour requirement; minimizes encroachment on adjacent wetland).	Groundwater flow rates and directions are expected to be unaffected.	Conduct additional pre- and post-construction geotechnical and on-site field hydrogeological investigations, including groundwater and private well monitoring.	GRCA, Halton RCA, Hamilton RCA Ministry of Natural Resources Ministry of Environment and Energy (Science and Technology Branch)

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Hydrogeology and Hydrology (cont'd)		Adverse of effects to quality/quantity of private wells/ponds.	MOEE Property Owners	Replace organic material with granular material which will not impede groundwater flows. Use of BMP's to promote infiltration and minimize groundwater contamination.	Present groundwater quality expected to be maintained.		CP Rail Property Owners
		Displacement of kettle pond areas on Galt Moraine near Morriston.	Halton RCA Recreational Users	Unavoidable.	Drainage strategy maximizes retention of existing natural surface drainage patterns. Alteration of surface water hydrology is not expected to be significant.	Co-operative liaison with Conservation Authorities, MNR, MOEE in development/ implementation of subwatershed management strategies.	Municipalities MTO Geotechnical Section MTO Structural Office
		Localized alteration of surface water hydrology/hydraulics of Fletcher Creek, Galt/Mill Creek, Bronte Creek and hydrologic function of headwater wetlands. Increased peak flows.	Property Owners GRCA Halton RCA Hamilton RCA MNR MOEE	Drainage strategy/construction staging to minimize reduction in stream flows.			MTO Environmental Section, Environmental Engineering Unit
		Watershed management strategies.	MOEE Conservation Authorities	Strategic placement of crossing culverts sized and located to maintain surface flows, flood plain contours.			
		Localized drainage problems at Freelton, Mountsberg Road, Morriston.	Property Owners MTO Halton RCA	Design drainage system to reduce direct discharge of runoff to receiving watercourse (flow dissipation, where possible). Reverse shoulders, urban (curb-and-gutter) section at Mountsberg Road.	Drainage system utilizes roadside ditches to eliminate direct runoff to sensitive discharge areas and alleviate local drainage problems. SWM measures counteract the effects of incurred peak flows and incorporate watershed management strategies.	Consultation with affected parties. Formulate detailed drainage strategy.	Property owners Conservation Authorities
		Placement of fill in Galt/Mill Creek ESA in conjunction with reconstruction of Concession Road 7.	GRCA MNR	Profile revised so there will be no change to existing profile through the subject area.	In a Regional Storm flood waters will flow over Concession Road 7. Increasing the potential flood backwater level is avoided.	Co-operative liaison with GRCA, MNR, MOEE in development/ implementation of subwatershed management strategies.	GRCA MNR MOEE MTO Environmental Section

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Hydrogeology and Hydrology (cont'd)		Placement of fill in Galt/Mill Creek ESA in conjunction with constructing a grade separation for County Road 34 over the Hanlon Expressway.	GRCA MNR	The culvert carrying Galt/Mill Creek has been sized to retain hydraulic characteristics north and south of Country Road 34 during a Regional Storm.	Upstream and downstream hydraulic effects minimized.	Co-operative liaison with GRCA, MNR, MOEE in development/ implementation of subwatershed management strategies.	MNR MOEE GRCA MTO Environmental Section
		Effects of constructing the new N-E and W-N ramps (at the Highway 401/Hanlon Expressway interchange) on the Regional and 1:100 year water levels on Aberfoyle Creek	GRCA MNR	Ensure that highway construction does not raise the Regional and 1:100 year flood levels.	A hydraulic impact study was carried out and concluded the proposed W-N and N-E ramps will not have an impact on the Aberfoyle Creek flood level.	Co-operative liaison with GRCA, MNR, MOEE in development/ implementation of subwatershed management strategies.	GRCA MNR MTO Environmental Section
Aquatic Biology and Surface Water Quality	4.1.4 4.1.5 5.4.2 5.4.3 5.5 6.2.2.1 (iv) 6.3.1 Appendix F	Increased sediment loadings during construction as a result of earthworks and instream work (soil exposure, compaction, erosion; siltation; turbidity).	Halton RCA, GRCA MNR	Timing constraints. Instream work on Galt/Mill Creek tributaries restricted to June 1 - September 1. Protection of watercourses through conventional sedimentation and erosion control measures and construction practices. Expedite re-establishment of ground cover.	Some short-term increase in sediment loadings. However, net effects to aquatic organisms and habitats expected to be low.	Incorporate Special Site-Specific Provisions and Operational Constraints in Detail Design and contract documents. Construction site monitoring/ enforcement.	Ministry of the Environment and Energy (Central, West Central Regions, Land Use Planning Branch). Ministry of Natural Resources (Cambridge District). GRCA. Halton RCA. Hamilton RCA MTO Environmental Section
		Effects on fisheries habitat.	MNR, DFO, GRCA, HRCA	Develop a fish compensation package acceptable to DFO, MNR, GRCA and HRCA. Construction only during approved "window" defined by MNR.	"No net loss - net gain" of fish habitat achieved. No spills of toxic substances anticipated therefore net impact expected to be minimal.	Consultation with affected parties. Obtain authorization from Federal Department of Fisheries and Oceans and MNR.	Department of Fisheries and Oceans (Burlington). MNR GRCA HRCA

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Aquatic Biology and Surface Water Quality (cont'd)		Elevated water temperatures from removal of riparian vegetation. Acute exposure to toxics from accidental spills on construction site (fuels, herbicides, lubricants, etc.)	MNR MNR	Retain riparian vegetation to greatest extent possible. Refuel and maintain construction equipment in designated locations removed from study area watercourses. Maintain supply of suitable absorbent material on-site as a contingency measure for immediate clean-up of any inadvertent waste or fuel spill. Drainage strategy/construction staging to minimize reduction in stream flow during construction.			MTO Environmental Section MNR MOEE
Environmentally Sensitive Areas/Wildlife	4.1.7 5.4.2 5.4.3 5.5 6.2.2.1 (v) 6.3.1 Appendix F	Long term accumulation of salts, metals, hydrocarbons and other toxics in flora and fauna from highway operation and maintenance. Encroachment on Fletcher Creek Swamp Forest (loss of wetland waterflow/terrestrial habitat). Impacts to segments of Galt Creek and Forest with placement of fill for County Road 34 grade separation. Severance of Crieff Old Field Complex (proximity to sensitive avian habitat)	MNR MNR Hamilton RCA GRCA	Introduce roadside barrier plantings to reduce impact on natural vegetation. Restrict extent of construction zone. Investigate the minimization of the application of current sand/salt mix while maintaining desirable road safety levels. Design to maximize use of natural drainage patterns; effective stormwater management; environmentally acceptable fill disposal/distribution. Retain vegetation cover to greatest extent possible. Restriction of construction activities during spawning and breeding periods. (construction window for cold water fisheries is from June 1 to September 1)	Reduced transport of contaminants. Encroachment limited to fringe area. Wetland hydrologic functions maintained. Loss of habitat unavoidable. Impacts during breeding season minimized.	Incorporate Special Provisions and Operational Constraints in Detail Design and contract documents. Consultation with affected parties.	MTO Maintenance Branch MTO Environmental Section MNR MOEE Ministry of Natural Resources (Cambridge District) GRCA, Halton RCA, Hamilton RCA Municipalities (Puslinch/Wellington)

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Communities/Property Impacts	4.2.1 4.3.1 5.4.2 5.4.3 6.2.2.2 (i) 6.3.1	Improved access to rural settlement areas and enhanced area wide accessibility creating development pressures. Long term pressure for expansion of western boundaries of Hamlet of Puslinch and Village of Morriston; pressure for rezoning at strategic locations.	Township of Puslinch	Development control by municipal/ provincial agencies.	Possible urbanization of corridor	MTO corridor control sensitive to highway proposal.	Property owners Municipalities MTO Property Section MTO Environmental Section
		Potential safety hazard to residents of Morriston Nursing Home.	Morriston Nursing Home	Standard highway right-of-way security fencing.	Restricted access reduces potential pedestrian/ vehicular conflicts.	Consultation/negotiation with affected owners.	Property owners
		Property frontage requirements create reduced front yard setbacks on existing Highway 6.	Property Owners	Use of urban cross-section in affected right-of-way areas.	Depth of property taking reduced/minimized.	Post-construction landscaping and refurbishing plan for affected frontage.	Property owners
		One residence displaced; severances; landlocked parcels.	Property Owners	Appropriate compensation including buyout, property exchange and purchase of landlocked parcel.	Provision of alternate areas for use/enjoyment, or funds to acquire other property.	Investigate access provisions to landlocked property owner (Lillycrop) parcels.	Property owner
		Major reconstruction of driveway required for property in southwest quadrant of the Hanlon Expressway County Road 34 due to raised profile of County Road 34.	Property Owner (Farkas)	Two alternative schemes for reconstructing the driveway have been presented to the property owner. Minimize driveway grade and tree removal as much as possible.	Removal of trees which act as a visual/noise screen from County Road 34. Increase in driveway grade to between 5.5% and 8%.	Consultation/negotiation with affected owner. Post-construction landscaping and refurbishing plan.	Property Owner (Farkas)
		Reduction in property value due to severance by County Road 34 Connection Road.	Property Owner (J. Petrusa)	Connection Road adjacent to property boundary where possible.	New interchange and improved access will increase development opportunities which should increase property values.	Consultation/negotiation with affected owner.	Property Owner (J. Petrusa)
		Change in wetland and water table level and resulting effects on vegetation.	Property Owner (Wozniak)				

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Noise	4.2.2 5.4.2 5.4.3 5.5 6.2.2.2 (ii) 6.3.1 Appendix I	16 homes in the vicinity of existing Highway 6 will experience a slight long term decrease in noise level.	NA	NA	Net benefit.	NA	NA
		14 homes adjacent to new route section will experience a perceptible (3-4 dBA) increase in noise level.	NA	None required	Use of Open Friction Course (OFC) pavement could reduce noise increase to an imperceptible level (< 3 dBA).	Investigate warrants for use of Open Friction Course (OFC) pavement (possible 1-2 dBA reduction).	MTO Geotechnical Section (pavement design)
		20 homes adjacent to new route section will experience a moderate (5-9 dBA) increase in noise levels[1].	Property Owners MOEE	Highway profile in cut adjacent to many sensitive areas reduces impacts by 3-4 dBA. Noise attenuation adjacent to Telfer Glen Subdivision may be warranted/ effective but could require 10 m high barrier depending on availability of excess material to fill low areas.	Potential increases of 3-7 dBA (with OFC). Potential increases reduced to 1-4 dBA if barrier installed at Telfer Glen.	Corridor control (new residential development). Investigate feasibility of noise barrier/berm further in Detail Design phase based on earthwork strategy and more accurate assessment of vertical alignment. Investigate warrants for use of Open Friction Course pavement (possible 1-2 dBA reduction).	Ministry of Environment and Energy (Land Use Planning Unit) Property Owners Ministry of Municipal Affairs Municipalities MTO Geotechnical Section (pavement design)
		2 homes adjacent to new route section will experience a significant (10+ dBA) increase in noise level.	Property Owners MOEE	Not economically viable due to isolated nature of individual residences.	Potential increases reduced to moderate levels (5-9 dBA) with OFC.	Investigate warrants for use of Open Friction Course pavement (possible 1-2 dBA reduction).	
		Short term annoyance due to construction related noise.	Property Owners MOEE	Enforce Model Municipal Noise Control Bylaw (NPC 115-85 dBA maximum at 15 m). Hours of operation limited to 0700-1900 except in emergencies (exception permit required) unless work area is greater than 400 m from residential areas. Adherence to standard contract provisions for construction equipment operation and maintenance.	Reasonable hours and conditions of operation minimize annoyance.	Incorporate in Detail Design and Operational Constraints in Detail Design and contract documents. Consultation with affected owners, agencies. Construction site monitoring/ enforcement.	Municipalities Property Owners

1 Includes registered but undeveloped single family dwelling lots in Telfer Glen Subdivision

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Visual Aesthetics	4.2.3 5.4.2 5.4.3 5.5 6.2.2.2 (iii) 6.3.1	Displacement of existing visual screening and introduction of potentially intrusive visual component. Particularly sensitive areas include: · rear yards in close proximity to the new route · TCG pit at Concession Road 7/401 · Dufferin Aggregates pit at Hanlon/401 interchange · Fielding Lane properties near the CP Rail overpass · properties on existing Highway 6 at Maddaugh Road (headlight glare) · Calfass Road residences adjacent to new Connection Road · properties at the County Road 34 grade separation · properties adjacent to County Road 34 Connection Road	Property Owners	Develop landscaping and refurbishing plan which is sensitive to existing residential and institutional uses, unique landforms and views/vistas. Retain and/or reinstate vegetative screening/cover to greatest extent possible.	Maintain required aggregate extraction operation screening. Reduced intrusiveness of views of the highway facility.	Post-construction landscaping and refurbishing plan. Consultation with affected parties.	MTO Environmental Section Property Owners MNR (re aggregate extraction pit buffers)
Agricultural Operations	4.3.2 5.4.2 5.4.3 5.5 6.2.2.2 (i) 6.3.1 Appendix J Appendix K	Loss of active agricultural land (14.2 ha). Loss of Class 1 and 2 land (3.2 ha). 7 farm severances. Highway runoff/spray to agricultural land adjacent to new route section.	OMAF Agricultural Operators/ Owners, Wellington Federation of Agriculture OMAF, Agricultural Operators	Alignment balances property requirements and severance effects to the greatest possible extent. Concerned parties have expressed satisfaction with tradeoffs. Maintain access to viable severances. Highway profile in cut and New Jersey median barrier to reduce spray. Highway drainage retained in right-of-way adjacent to agricultural operations (ROW includes new stormwater infiltration basins).	Unavoidable. Unavoidable. Continuance of agricultural activities in severances at operators' discretion. Effects on adjacent active/ cultivated areas minimized.	Incorporate in Detail Design. Refine drainage strategy during detail design.	Affected operators/owners Ministry of Agriculture and Food (Land Use Planning Branch and Area Land Specialist) Wellington Federation of Agriculture MTO Property Section Municipalities

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Agricultural Operations (cont'd)		Impacts to Hollenbach outdoor barn (reduced feedlot area, loss of primary sheltered calving area, reduced height of windbreak, relocated Crieff Road access).	Property Owner (F. Hollenbach) OMAF	Develop measures to replace/ minimize loss of Hollenbach amenities (relocated feedlot access, reconfiguration of outdoor barn area, introduce windbreak and cattle pass).	Loss of grain handling area unavoidable. Other measures appear feasible.	Continue negotiations with affected operator/owner. Monitor changes in existing activities and plans for future use of land.	
		Loss of access to field on south side of property west of Highway 6 New	Property Owner (Fielding)	Construct a 4 m wide access from Fielding Lane southward adjacent to Highway 6 to subject field.	Revised access.	Continue negotiations with affected operator/owner.	
Mineral Aggregate Extraction Operations	4.1.1 4.3.2 (i) 5.4.2 5.4.3 5.4.5 5.5 6.2.2.3 (ii) 6.3.1 Appendix B Appendix C	Encroachment on buffer areas/berms which may result in sterilization of mineral aggregate resources. Displacement of site screening; visual exposure. Impacts to proposed after use areas. Sterilization of resources. Impact to on-site environmental monitoring systems. Maintenance of access across Highway 401 via Concession Road 7 bridge.	Dufferin Aggregates TCG MNR	Encroachment is unavoidable. Attempt to avoid resource sterilization through strategic construction timing (i.e. highway improvements introduced after resource extraction). Replacement of vegetative screening where practical. Sensitive landscaping/ refurbishing. Groundwater monitoring can likely be reinstated in immediate vicinity. Design incorporates offset alignment for bridge reconstruction to allow existing bridge to remain in operation until the new bridge is constructed.	Existing berms and plantings will be displaced or reconfigured. Visual exposure minimized but not eliminated. Limited disruption of monitoring program. Traffic disruption limited to periods for tie-into existing roads.	Investigate means of addressing possible reduction of setback (buffer) requirements to address sterilization resource issue. Liaison with operator re construction timing strategy. Develop post-construction landscaping and refurbishing plan. Develop co-operative approach to retaining affected monitoring station with Dufferin Aggregates.	Dufferin Aggregates TCG MNR MTO Geotechnical Aggregate Resources
Other Business Operations	4.3.2 5.4.2 5.4.3 5.5 6.2.2.3 (iii) 6.3.1 Appendix B	Some loss of exposure due to traffic diversion to new route.	Business Operators on section of existing Highway 6 to be bypassed.	Maintain access to existing business for Highway 6. New traffic (i.e. connections between existing and new routes). Possibly new signage for businesses in interchange area.	Re-establishment of commercial presence through signage and provision of access to existing businesses.	Investigate possibility of signage for Morriston businesses at Connection Road/Highway 6 to enhance exposures. Continue discussions with property owner (B. Lillycrop) with respect to exposure (signage) for farm implement dealership.	Affected operators Municipalities MTO Traffic Section (Central Region)

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Heritage Features	4.4.1 5.4.2 5.4.3 5.5 6.2.2.4 (i) Appendix H	Indirect impacts to site #60 (northwest corner Highway 6/ Mountsberg Road) - removal of some vegetative screening and other landscaping. Displacement of rubble and stone fences where new alignment crosses field lines.	Property Owners Ministry of Culture Tourism and Recreation	Retain vegetation cover to greatest extent possible. Landscaping sensitive to screening requirements. Retain fence lines to greatest degree possible.	Integrity of heritage feature maintained. Disruption of cultural landscape minimized.	Post-construction landscaping and refurbishing plan.	MCTR Property Owners MTO Environmental Section
Archaeological Resources	4.4.2 5.4.2 5.4.3 6.2.2.4 (ii) 6.3.1 Appendix H	Proximity to registered archaeological site (Segota Site AiHa-24).	Ministry of Culture Tourism and Recreation	Ensure a real extent of site. Mark and protect during construction.	Integrity of registered site maintained.	Complete detailed assessment of properties not covered during Preliminary Design and mitigation of significant archaeological remains discovered. Determine strategy for protection of Segota site (possible acquisition) and incorporate in Detail Design. Construction site monitoring/ enforcement of protection measures. Consultation with affected agencies.	Ministry of Culture Tourism and Recreation (Southwest Region) MTO Central Region Archaeologist MTO Property Section Property Owners
Structural Planning	6.1.5	Highway 6 structure over CPR Connection Road to County Road 34 structure over the Hanlon Expressway Concession Road 7 over Highway 401	CP Rail	Design Concession Road 7 structure to keep north abutment as far south as possible to avoid relocation of McLean Road.	Reconstruct McLean Road locally to provide intersection with relocated Concession Road 7.	Further discussions required to determine number of tracks to be spanned and cost sharing arrangement. Determine if 2-lane or 4-lane structure will be constructed initially. Further refinement of structural design at next design phase.	CP Rail MTO Structural Section County of Wellington MTO Structural Section Township of Puslinch MTO Structural Section

TABLE 6.4 *(cont'd)*

SUMMARY OF CONCERNS, IDENTIFIED IMPACTS AND COMMITMENTS TO MITIGATION AND FURTHER WORK

ENVIRONMENTALLY SIGNIFICANT ISSUE	REPORT SECTION REFERENCES	POTENTIAL ENVIRONMENTAL CONDITION CHANGES/EFFECTS	CONCERN EXPRESSED BY	PROPOSED MITIGATION	NET EFFECTS	COMMITMENT TO FURTHER WORK	RECOMMENDED LIAISON/CONTACT
Utilities	4.5.3	Clearance from 500kV line with Highway 6 northbound (S-W ramp) at Highway 401.	Ontario Hydro	Design profile to maximize clearance.	Clearance of 13m provided. Absolute minimum allowable clearance is 12.2m but desirable is 15m.	Further consultation with Ontario Hydro to secure agreement for clearance provided.	Ontario Hydro
		Relocation of 125 kV Tower adjacent to Concession Road 7.		Determine if relocation of towers or shift of Concession Road 7 to the east is the least disruptive/most cost effective.	Relocation of hydro towers or shift of Concession Road 7 alignment.	Further consultation with Ontario Hydro to determine optimal solution.	