6. ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

This chapter summarizes the anticipated or potential environmental effects of the Recommended Route (2002) and identifies mitigation measures for the effects. For each factor area, environmental effects, mitigation measures, and residual effects are identified. A tabular approach has been used for a number of the factor areas where warranted. To set an appropriate context for the discussion of mitigation, environmental protection strategies are discussed at the beginning of the chapter.

6.1 Environmental Protection Strategies

Environmental protection in transportation planning involves different strategies at different stages in the planning and design process. In transportation planning, environmental protection is achieved primarily by trying to avoid, as much as possible, significant environmental features, including natural and socio-economic features. During preliminary design, environmental protection may be achieved through minor alignment shifts, modification of interchange design, and refinement of valley, river, and wetland crossings. During detail design, the emphasis shifts to mitigation of the remaining site-specific impacts that could not be avoided through efforts at earlier stages. During construction, environmental protection and mitigation involves implementation of standard construction practices, conformance with commitments made during the environmental assessment process, and recognition of additional control measures that may be identified through good construction environmental practice.

For Highway 7, Kitchener to Guelph, avoidance of significant environmental features has been a major focus of the MTO Review. A significant effort was made to incorporate the results of additional field work, updated evaluation criteria, and extensive agency/municipal/public consultation to identify the recommended alignment (Recommended Route (2002)). The efforts taken to avoid significant environmental features are presented in Chapter 4, Alternatives and Evaluation, and in Section 5.2, where the Recommended Route (2002) is compared with the Recommended Plan (1997).

This chapter focuses on the environmental protection measures incorporated in the preliminary design, and the commitments to further action during detail design, construction and operation of the highway. For each factor, impact issues and concerns are identified, mitigation strategies are provided, and residual effects are considered. A tabular approach has been utilized where appropriate.

A series of Environmental Protection Plan (EPP) guideline sheets has been prepared. The EPP sheets are provided to illustrate measures that may be employed during subsequent stages of the Highway 7 project. Each EPP sheet provides a description of the project activity, identifies associated environmental concerns, and details protection measures and other responsibilities (including contingency plans). The EPPs will give guidance for the development of mitigation instructions in construction drawings and specifications, but are not intended to replace existing proven construction practices. MTO uses the well-established Ontario Provincial Standards and Specifications (OPSS) documents for its contracts. These standards and specifications may be amended through project specific special provisions. The EPP guideline sheets are provided in Appendix J.

6.2 Socio-Economic Environment

6.2.1 Community Effects and Land Use

This section discusses the mitigation measures for effects on residential, industrial/commercial, and institutional land use. Impacts on agricultural land use and the farm community are discussed in Section 6.4.

In order to construct the Recommended Route (2002), MTO must acquire approximately 190 ha of land, which includes land required for the highway, for interchanges and for storm water management facilities. When property is required, MTO seeks to purchase on a "willing seller-willing buyer basis." If negotiations fail, then MTO will invoke provisions under the Expropriations Act to acquire the necessary property.

MTO will purchase only the amount of land required to build the highway, unless the effects on an individual property are so great that the entire parcel must be purchased. Each property is evaluated on its own merits to determine whether the total property must be purchased, or whether a "partial taking" is sufficient.

In the EA Report 1997, access to the Shirley Avenue industrial area was identified as an issue. During the MTO Review, the Project Team found it necessary to consider business access to the upper tier road system for all businesses, including businesses in Kitchener on both sides of the KWE, businesses in the central rural section of the study area, and businesses in Guelph.

During the MTO Review, the proposed KWE interchange was reviewed in response to concerns identified by business owners on the west side of the KWE. The recommended interchange will provide a 'freeway to freeway' function and a local function. It will address all of the concerns previously raised, but is significantly more complex and expensive than the one included in the Recommended Plan (1997). The recommended interchange will cause impacts to properties that were not affected by the 1997 concept. The additional properties to be impacted are located on the west side of the KWE.

Application of municipal planning policies governs the land uses in the area. Opportunities may exist for development that would complement the existing nurseries along the existing highway. Non-farm uses can be expected in smaller parcels where farm viability is limited and where access is optimal. The Recommended Route (2002) strives to achieve a balance between avoiding inducing development too far to the north and trying to reduce farm impacts while gaining the benefits of a new alignment.

Residual land parcels fragmented by the highway may undergo changes in the nature/extent of agricultural uses based on the conditions noted above.

The community effects and mitigating measures are summarized in Table 6.1

Table 6.1 Community Effects and Mitigating Measures

Indicator	Mitigation	Residual Effects
Community Effects • Walter Bean Grand River Trail	At detail design, make provision for the Walter Bean Grand River Trail at the Grand River crossing.	Recreational trail will be accommodated
Residences displaced (including residences on agricultural properties) • 1 on Bridge Street • 5 at Shantz Station Road • 1 at Townline Road • 3 at Guelph Road 3 • 2 at County Road 86 • 1 at Silver Creek Parkway (house already demolished)	Owners will be compensated for property purchased	Loss of dwellings
Residential properties affected • severance of two properties including the houses at Spitzig Road • Partial frontage requirement from 5 homes, one at Spitzig Road, 3 at Shantz Station Road, one at Silvercreek Parkway. • Partial taking of 7 backlot severances at Silvercreek Parkway	Owners will be compensated for property purchased	Individual residential properties will be reduced in size
Businesses displaced • 2 at KWE interchange • 1 at Woodlawn Road	Owners will be compensated for property purchased	Businesses must relocate to new location
Commercial properties affected • severance of one property at Bruce Street	Owners will be compensated for property purchased	Size of remaining property may not fully accommodate existing business

• severance of 2 properties at Shantz Station Road		
• severance of one property at Bridge Street	Owner will be compensated for property purchased	Loss of existing storage area, opportunity to purchase adjacent remnant parcel(s)
Industrial properties affected Partial takings 7 at KWE interchange 5 at Curtis Drive/Woodlawn Road	Owners will be compensated for property purchased	Remaining property may not be able to support future operations

6.2.2 Special Policy Areas

ESAs and ANSIs

At present there are no municipally designated Environmentally Sensitive Areas (ESA) or Environmentally Sensitive Policy Areas (ESPA) or MNR designated Areas of Natural and Scientific Interest (ANSI) along the Recommended Route (2002). Based on the ecological information collected during the MTO Review, the Ecological and Environmental Advisory Committee (EEAC) of the Regional Municipality of Waterloo has recommended that consideration be given to formal designation of the Townline Wetland. Enacting of any such designations would require landowner cooperation and public review. Effects on and mitigation measures for Provincially Significant Wetlands (PSW) and Locally Significant wetlands (LSW) are discussed in Section 6.3.4.

Agriculture

The recommended alignment crosses agricultural policy areas as identified in the Waterloo Region ROPP and the County of Wellington Official Plan. Except for those areas associated with settlement areas and the floodplains of the Grand River and Hopewell Creek, the alignment crosses lands identified as Agricultural Resource Policy Area A (contain mainly Class 1 and 2 soils) in the Waterloo ROPP. The Wellington County Official Plan recognizes the predominance of Class 1 and 2 lands along the alignment.

Mineral Aggregate

Mineral Aggregate Resource policy areas identified in the Official Plans correspond to those identified by MNR Resource mapping as areas having medium and high mineral aggregate potential.

A large aggregate policy area has been mapped between the City of Kitchener east city limits and the Bloomingdale-Rosendale wetland. This area is not affected by the recommended alignment.

A second aggregate policy area is mapped south of Bridge Street and west of Shantz Station Road. The recommended alignment crosses this area, which is currently used for fill and rubble storage. An opportunity exists to clean up this area and utilize some of the aggregate material in roadway construction.

Grand River Corridor

The Grand River has been designated as a Canadian Heritage River. The requirement to cross the Grand River has been understood throughout the EA process and the crossing location is similar to the Recommended Plan (1997). At the river crossing location the Recommended Route (2002) will physically and visually intrude across the river valley. If a new crossing is to be built, impacts of this type are unavoidable. However, bridge design measures, landscaping, and restoration of disturbed areas may assist in softening the visual and physical intrusion impact. The heritage status of the Grand River is recognized and will be considered in the detail design stage. Aquatic and valley corridor

linkages will be maintained, and the Walter Bean Trail will be incorporated in the structure design.

6.2.3 Noise

In accordance with the MTO Noise Protocol, an increase in noise levels greater than 5 dBA was identified as an Environmentally Significant Issue. A detailed noise analysis was carried out for the Recommended Route to determine the effects of the proposed freeway on existing noise sensitive areas[4] (NSAs) in the vicinity of the Recommended Route.

Noise Model

Noise levels were predicted in decibels in the A-weighted scale (dBA) and averaged over 24 hours (Leq 24) and predictions were generated through the use of the STAMINA 2.0 computer model. STAMINA 2.0 is a complex model which models the study area as a three dimensional image and predicts noise levels from road sources (existing and future roads) as heard from the outdoor activity areas of NSAs adjacent to the alignment. Existing and future traffic conditions that were assumed for the analysis are shown in Appendix M.

Noise Analysis

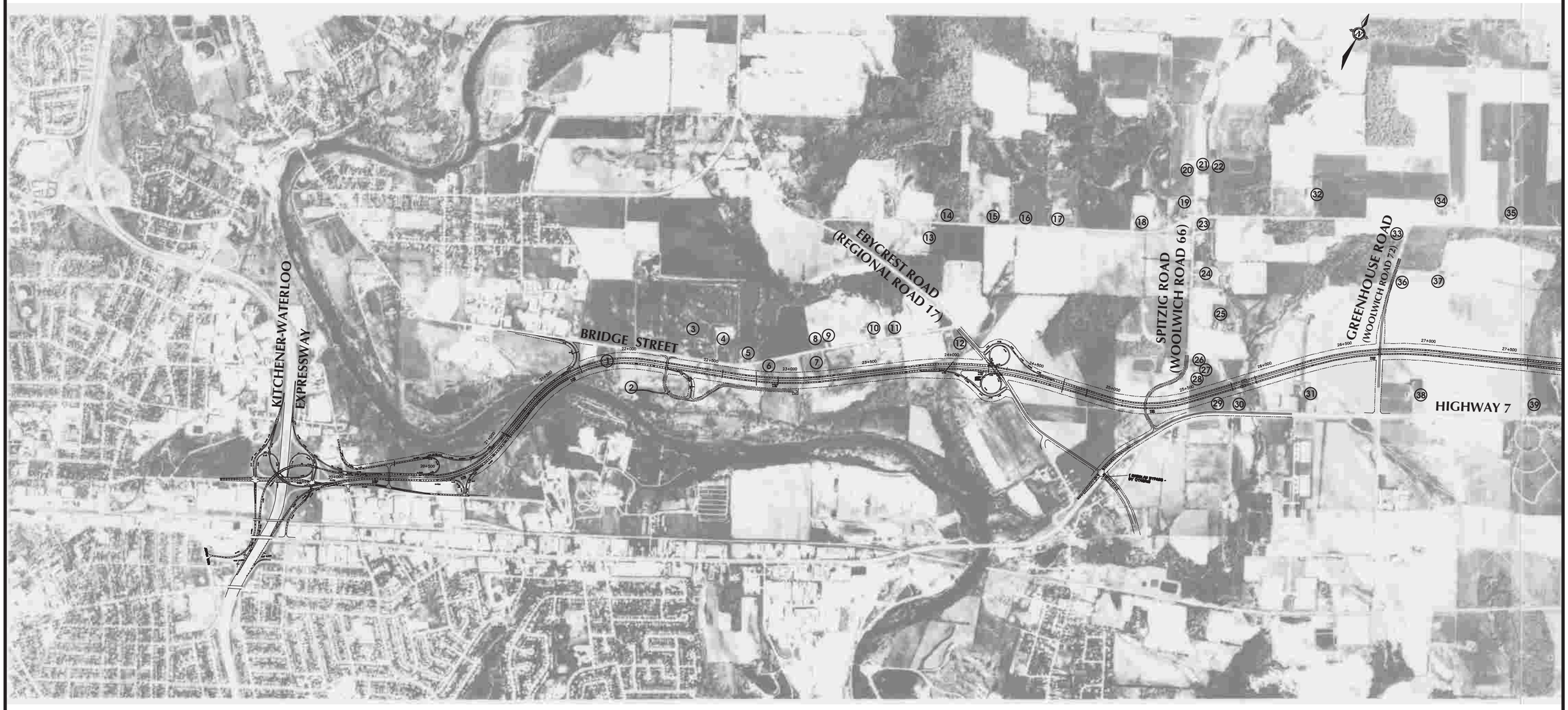
One hundred and sixty eight NSAs were identified in the study area. Noise levels were predicted at receiver locations, which are typically in the outdoor living / recreation area located 3 m from the building, 1.2 m off the ground. Ninety-eight receiver locations were identified to represent the NSAs; sixteen of the receiver locations represented more than one NSA (2 to 14 NSAs). Exhibit 6-1 shows the locations identified for the noise analysis. The analysis for future conditions, 'with new Highway 7', considered fewer locations, as 8 receivers would be removed as part of the new Highway 7 construction.

In accordance with the Noise Protocol, Noise Levels were predicted for the following scenarios:

- Existing noise levels
- Future noise levels without new Highway 7 (Year 2016)
- Future noise levels with new Highway 7 (Year 2016)

A summary of the Stamina 2.0 noise prediction analysis is presented in Exhibit 6-2. It summarizes the number of affected NSAs for different noise level ranges and includes the number of NSAs with an increase in noise levels of 0-5, 5-10 and greater than 10 dBA. The number of NSAs subject to a decrease in noise levels is also summarized in Exhibit 6-2. Thirty-one NSAs were identified to have increases of between 5 and 10 dBA, while seven locations would have increases over 10 dBA.

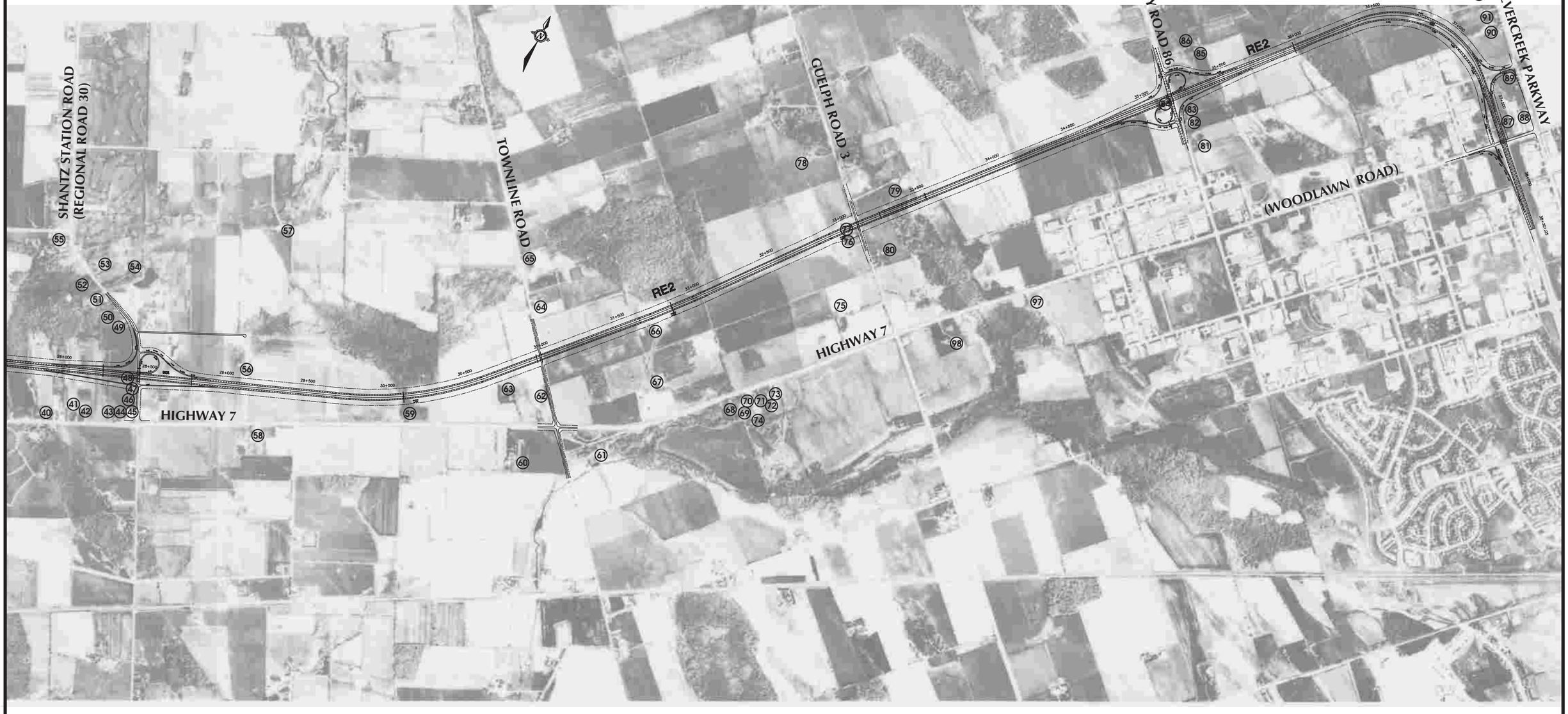
[4] Noise sensitive areas (NSAs) must have an outdoor living area. Qualified NSAs would be: private homes, townhouses, apartment buildings, hospitals.



HIGHWAY 7 PLANNING STUDY
KITCHENER TO GUELPH

RECEIVER LOCATIONS CONSIDERED FOR NOISE ANALYSIS

EXHIBIT
6-1a



HIGHWAY 7 PLANNING STUDY
KITCHENER TO GUELPH

RECEIVER LOCATIONS CONSIDERED FOR NOISE ANALYSIS

EXHIBIT
6-1b

Exhibit 6-2 - Summary of NSAs Affected

Change in Sound Levels	Number of NSA's	Mitigation	Residual Impacts
Increase of > 10 dBA	7	To be reviewed during detailed design	Depends on decision during design
Increase between 5 and 10 dBA	31	To be reviewed during detailed design	Depends on decision during design
Increase between 0 and 5 dBA	84	None required	-
Decrease	38	None required	-

The Noise Protocol requires that mitigation be considered where the increase in noise levels is greater than 5 dBA. A decision to provide noise mitigation must consider the following:

- MTO will investigate noise control measures within the ROW
- Noise control measures, if applied, will be designed to achieve levels as close to 55 dBA, or pre-construction ambient noise levels as is technically or economically feasible
- Noise control measures, where applied, should be cost effective and achieve a minimum attenuation of 5 dBA averaged over the first row receivers

For the thirty-eight receivers which would experience noise increases greater than 5 dBA in 2016, noise mitigation will be considered during the detailed design stage. However, since most of the receivers are isolated rural residences, it is unlikely that noise mitigation will be considered to be cost-effective. Twenty-five of the thirty-eight NSAs would have future noise levels, which meet the provincial objective of 55 dBA. Of the remaining thirteen NSAs, one NSA (Receiver Number 9) will exceed 60 dBA and the remaining twelve NSAs will exceed 64 dBA (Receiver Number 87). The complete noise report is available in Appendix M.

6.2.4 Heritage Resources

6.2.4.1 Archaeology

A total of 187.7 hectares of land within the proposed Highway 7 Recommended Route (2002) right-of-way has been assessed for archaeological resources (Appendix L). The remaining 30.7 hectares of land still requires Stage 2 archaeological assessment on the Highway 7 corridor. This land was not assessed because permission to enter was denied or permission to plough active crops was denied. Table 6.2.4.1 summarizes the property that still requires Stage 2 assessment.

Table 6.2.4.1: Summary of remaining Stage 2 assessment

Property No.	Area (m^2)	Survey Type	Observed Condition
WT-117	4800	Pedestrian Survey	Hay
WT-51	30300	Test pit and Pedestrian Survey	Sheep pasture
WT-64	20700	Pedestrian Survey	Hay
WT-65	4600	Pedestrian Survey	Hay
WT-72a	54300	Pedestrian Survey	Hay
WT-79	16100	Pedestrian Survey	Soybeans
WT-81	62900	Pedestrian Survey	Berries
WT-25	54100	Pedestrian Survey	Winter wheat
WT-26	59500	Pedestrian Survey	Soybeans
	307300 (30.7 Ha)	Total Remaining	

During the Stage 2 assessment in 2003, a total of 53 sites or finds were discovered, containing a total of 186 artifacts. Two sites, Challenger and PS 33A-E (AiHc-294), have had extra Stage 2 surface investigation recommended. Significant archaeological remains were discovered at 16 locations for which Stage 3 site testing has been recommended.

Little is known about the prehistoric occupation of the general Highway 7 area because most of the surrounding land has not been subjected to archaeological study. Most of the archaeological finds on the Highway 7 Recommended Route corridor do not require further work. The discovery of these isolated artifacts represent a broad spectrum of the prehistoric occupation of the Kitchener-Guelph area, including Early Archaic (Nettling), Middle Archaic (Bifurcate Base, Otter Creek, Brewerton), Late Archaic (Small Point) and Early Woodland (Kramer and Meadowood) occupations. Additional isolated tools found include five utilized flakes and two scrapers. Even the isolated flakes provide important information about the area especially the presence of an exotic Sheguiandah quartzite flake from Manitoulin Island.

The 16 sites for which Stage 3 testing has been recommended (Table 6.2.4.2) also have the potential to provide significant contributions to the understanding of the prehistoric occupation of the Highway 7 area. The known time periods represented are: Early Archaic Nettling (7800-6900 B.C.), Late Archaic Small Point (1500-800 B.C.), and Middle Woodland (400-900 A.D.). The cultural affiliation and time period is not yet known for nine of the sites to be tested. Table 6.2.4.2 provides a summary of the sites requiring Stage 3 testing. Note that more sites may be found in the areas that still require assessment.

Table 6.2.4.2: Summary of sites requiring Stage 3 assessment

Find #	Borden #	Site name	Property	Artifacts	Estimated Size
TP 10A-E	AjHc-24		GT-20	5 flakes	45m x 40m
TP 11A-B	AjHc-25		GT-20	2 flakes	20m x 20m
TP 12A-C	AjHc-26		GT-20	3 flakes	20m x 20m
TP 35A-B	AiHc-295		WT-45	8 ceramic sherds, flake	20m x 20m
TP 36A	AiHc-296		WT-45	Flake	5m x 5m
TP 37A-B	AiHc-297		WT-43	Small Point, 1 flake	15m x 15m
TP 38A	AiHc-298		WT-37	Flake	5m x 5m
TP 39A-D	AiHc-299		WT-44	5 flakes	25m x 30m
TP 41A, 43A, 44A, 46A	AiHc-300		K-30	4 flakes	50m x 50m
TP 42A-F	AiHc-301		K-30	19 bone, 1 fish scale, point, netsinker	50m x 50m
TP 45A-M	AiHc-302		K-30	9 flakes, 8 sherds, celt, biface	50m x 50m
TP 47A, 48A, 49A-Q,	AiHc-200	Jonas Bingeman	K-30	30 flakes, 4 sherds, bone	40m x 60m
(SW-MTO)	AiHc-210	Lawrence Bingeman	K-30	7 flakes	25m x 20m
(SW-MTO)		Nicholas H.	K-30	Sherd, flake	10m x 10m
(SW-MTO)	AiHc-202	Goodview	WT-11	7 flakes, Nettling point	20m x 20m
TP 50 A-F	AjHc-30		GT-20	6 flakes	25m x 25m

On the basis of the above information, the following recommendations can be made:

1. The Stage 2 assessment of the property discussed in this section and in Appendix L should be considered complete. Other than the areas containing archaeological sites, the remainder of the corridor can be considered clear of further archaeological concerns. Therefore it is recommended to the Ministry of Culture that these areas can be considered clear of archaeological concerns that construction can proceed as planned.

2. The Stage 2 archaeological assessment of lands noted in Table 6.2.4.1 will have to be completed prior to construction occurring in these areas. This should be completed as soon as possible to allow time for Stage 3 or Stage 4 assessment should it be required. The additional Stage 2 surface inspection of the Challenger site and PS 33A-E (AiHc-294) should also be conducted in time to allow for further work should it be required.

3. Sites PS 1A, 2A 3A-B, 4A, 5A, 6A, 7A, 8A-C, 9A, 13A, 14A, 15A-F, 16A, 17A-C, 18A, 19A-C, 20A, 21A-B, 22A-B, 23A, 24A, 25A-B, 27A-D, 28A-B, 29A, 30A, 31A, 32A, 51A, 52A, 53A-D have all been identified as insignificant.

Therefore it is recommended to the Ministry of Culture that no further work is required on these sites and that construction can proceed as planned.

4. Sites listed on Table 6.2.4.2 will all require Stage 3 text excavation to determine their overall size and significance. The Stage 3 testing must be completed before construction begins.

5. Should deeply buried archaeological remains be found on the property during construction activities, the Ministry of Culture should be notified immediately.

6. In the event that human remains are encountered during construction, the proponent should immediately contact both the Ministry of Culture, and the Registrar or Deputy Registrar of the Cemeteries Regulations Unit of the Ministry of Consumer and Commercial Relations, (416)-326-8392.

6.2.4.2 Built Heritage Features / Cultural Landscapes

Generally new roads, road widening and new bridges have the potential to adversely affect cultural heritage landscape units and built heritage features by displacement and/or disruption during and after construction. Built heritage features and/or cultural heritage landscape units may experience displacement, i.e., removal, if they are located within the rights-of-way of the undertaking and/or they occupy sites or locations that are required for temporary purposes, ancillary services or secondary functions, e.g. temporary site construction offices.

There may also be potential for disruption, or indirect impacts, to cultural heritage resources by the introduction of physical, visual, audible or atmospheric elements that are not in keeping with their character and, or setting. Isolation of a farm complex from its associated agricultural lands may occur due to severance of land for new roads.

Appendix K contains the Cultural Heritage Resource Assessment Report. The potential impacts, mitigation measures as well as residual effects to cultural heritage resources are contained in Tables 6.2.4.3 and 6.2.4.4.

Table 6.2.4.3 Cultural Heritage Resources: Impacts and Mitigation Cultural Heritage Landscapes

Description	Location	Comments and Impacts	Mitigation Strategy	Residual Effects
CLU 1 Farm complex (former) ***Appendix K: Photo 1***	No. 5420 Silvercreek Parkway (Wellington County Road 39), Guelph.	This former farm complex will be disrupted by the alignment.	None required.	Permanent change in site context.
CLU 2 Farm complex ***Appendix K: Photo 2***	No. 5415 Elmira Road (Wellington County Road 86), Guelph.	This farm complex will be displaced by the alignment	Photographic documentation of the site should be completed prior to construction. Historical research and an architectural description to be completed.	Loss of a cultural heritage resource. Change in site context.

Table 6.2.4.3 Cultural Heritage Resources: Impacts and Mitigation Cultural Heritage Landscapes

Description	Location	Comments and Impacts	Mitigation Strategy	Residual Effects
CLU 3 Farm complex ***Appendix K: Photo 3***	No. 5432 Elmira Road (Wellington County Road 86), Guelph.	This farm complex will be displaced by the alignment	Photographic documentation of the site should be completed prior to construction. Historical research and an architectural description to be completed.	Loss of a cultural heritage resource. Change in site context.
CLU 4 Farm complex ***Appendix K: Photo 4***	No. 5441 Elmira Road (Wellington County Road 86), Guelph.	This former farm complex will be disrupted by the alignment.	Photographic documentation of the site should be completed prior to construction. Historical research and an architectural description to be completed.	Permanent change in site context.
CLU 5 Roadscape ***Appendix K: Photo5***	Guelph Township Road 3, Guelph Township.	This roadscape will be disrupted by the alignment	Photographic documentation of the roadscape should be completed prior to construction.	Permanent change in roadscape context.
CLU 6 Farm complex ***Appendix K: Photo 6***	No. 5413 Guelph Township Road 3, Guelph Township.	This former farm complex will be disrupted by the alignment.	Photographic documentation of the site should be completed prior to construction. Historical research and an architectural description to be completed.	Permanent change in site context
CLU 7 Farm complex ***Appendix K: Photo 7***	No. 5395 Townline Road, Guelph Township.	This former farm complex will be disrupted by the alignment.	This former farm complex will be disrupted by the alignment.	Permanent change in site context.
CLU 8 Roadscape ***Appendix K: Photo 8***	Townline Road, Guelph Township/ Woolwich Township.	This roadscape will be disrupted by the alignment	Photographic documentation of the roadscape should be completed prior to construction.	Permanent change in roadscape context.
CLU 9 Farm complex ***Appendix K: Photo 9***	No. 2114 Shantz Station Road (Regional Road 30), Woolwich Township.	This farm complex will be displaced by the alignment	Photographic documentation of the farm complex should be completed prior to construction.	Loss of a cultural heritage resource. Permanent change in site context.
CLU 10 Roadscape ***Appendix K: Photo10***	Greenhouse Road (Woolwich Road 72), Woolwich Township.	This roadscape will be disrupted by the alignment	Photographic documentation of the roadscape should be completed prior to construction.	Permanent change in roadscape context.
CLU 11	Highway 7, west	This roadscape will	Photographic	Permanent change in

Table 6.2.4.3 Cultural Heritage Resources: Impacts and Mitigation Cultural Heritage Landscapes

Description	Location	Comments and Impacts	Mitigation Strategy	Residual Effects
Roadscape (former) ***Appendix K: Photo 11***	of Spitzig Road (Regional Road 66) to Breslau, Woolwich Township.	be disrupted by the alignment	documentation of the roadscape should be completed prior to construction.	roadscape context.
CLU 12 Farm complex ***No Photo***	No. 1000 Bridge Street East at Regional Road 17, Woolwich Township.	This farm complex will be disrupted by the alignment.	Photographic documentation of the farm complex should be completed prior to construction.	Permanent change in site context.
CLU 13 Farm complex ***Appendix K: Photo 12***	No. 858 Bridge Street East, Woolwich Township.	This farm complex will be disrupted by the alignment.	Photographic documentation of the farm complex should be completed prior to construction.	Permanent change in site context.
CLU 14 Farm complex ***Appendix K: Photo 13***	No. 800 Bridge Street East, Woolwich Township.	This farm complex will be displaced by the alignment	Photographic documentation of farm complex should be completed prior to construction	Loss of a cultural heritage resource. Permanent change in site context.
CLU 15 Grand River ***No Photo***	North side of existing Highway 7 crossing of Grand River.	The waterscape will be disrupted by the construction of a new bridge crossing.	Consultation with stakeholders regarding bridge design.	Introduction of a new physical element into the existing landscape.

Table 6.2.4.4 Cultural Heritage Resources: Impacts and Mitigation Built Heritage Features

Description	Location	Comments and Impacts	Mitigation Strategy	Residual Effects
BHF 1 Residence (detached) ***Appendix K: Photo 14***	No. 297 Woodlawn Road (Highway 7) at the north end of Hanlon Parkway (Highway 6), Guelph.	Disruption of the residential setting.	Photographic documentation of the residence should be completed prior to construction	Change in property context.
BHF 2 Farmhouse (former) ***Appendix K: Photo 15***	No. 5390 Guelph Township Road 3, Guelph Township.	Disruption of the residential setting.	Photographic documentation of the residence should be completed prior to construction. Provide screening for residence to the south.	Change in property context.
BHF 3 Silo (ruin) ***No Photo***	No. 3014 Highway 7, north side, Woolwich Township.	Disruption of the setting through isolation.	Photographic documentation should be completed prior to construction	Change in property context.

Where a potential for displacement is known and may affect cultural heritage landscape units comprising built heritage features (i.e., farm complexes, or any identified individual built heritage features) then the following mitigation measures are recommended:

- During the Detail Design the Ministry of Transportation should inform the individual municipal authorities as to which cultural heritage resources will be disrupted or displaced by the undertaking.
- At the end of the Detail Design stage those built heritage features, such as residences and agricultural structures, that will be displaced and which have been deemed to be of local heritage interest, should be documented through photography and a detailed historical report.
- At the end of the Detail Design stage those cultural heritage landscapes, that include built heritage features deemed to be of local heritage interest to be displaced or disrupted should be documented through photography, a site plan and a physical description of the cultural heritage landscape and the individual built features.
- Other cultural heritage landscape features, i.e., roadscapes, should be documented photographically prior to displacement or disruption.
- The Ministry of Transportation shall consider offering for sale and relocation, at no cost to the purchasers, those buildings and structures to be displaced and which have been identified during detail design as being of local or regional interest.
- Prior to demolition, floor plans are to be completed to accompany required documentation report for those buildings of local or regional interest that will be demolished.
- Where cultural heritage resources such as residences, farmhouses, barns and other associated agricultural outbuildings are to be displaced, and relocation is not feasible or possible, a salvage plan for the building should be prepared. Qualified contractors should be selected for the salvage process.

6.3 Natural Environment

6.3.1 Soils

Impact/Issue

The erosion of slopes and exposed soil areas due to construction must be considered in detail design. The recommended alignment crosses a range of soil types, of which six would be moderately to highly erodible. These are:

- St. Clements - high erodibility
- Tuscola - relatively high erodibility
- Woolwich - relatively high erodibility
- Guelph - moderately high erodibility
- London - moderately high erodibility
- Organic - if drained and cleared, wind erosion may present problems

The erodible character of these soils is a concern where the associated topography is steep and where soils would remain exposed during the construction phase. In addition, erosion control is an important issue wherever construction is exposing soils on slope areas and/or is in the vicinity of wetlands/watercourses.

Response

Focal areas of consideration are in the following zones:

- Grand River valley crossing – pockets of erodible soils and steep slopes
- Minor valley crossing near Ebycrest Road (24+000) – minor valley setting with steeper wooded slopes to the south
- Hopewell Creek crossing (26+000) – sensitive watercourse setting
- Hopewell Riparian Woodland/Wetland (27+500 to Shantz Station Road) – pockets of erodible soils
- Shantz Station Road to Townline Road - pockets of Guelph, Woolwich and London loams
- Townline Road to Guelph Road 3 – pockets of erodible soil
- Ellis Creek wetland (33+500) – wetland/watercourse crossing with open slope along west approach
- Erodible soils in vicinity of Marden wetland (36+500)

Mitigation Strategy

Implement OPSS sediment and erosion control measures (OPSS 577) with guidance from the Sediment and Erosion Control EPP. The erosion control measures should be flexible to incorporate current techniques available at the time of construction. Erosion control requirements will be reviewed with agency staff during detail design prior to construction implementation.

Mitigation measures will include, but are not necessarily limited to, the following:

- The extent and duration of exposed soil areas, particularly near sensitive features (such as watercourses, valleys, woodlands and wetlands), should be minimized to the extent possible. Contingency measures should be in place to handle unexpected weather events that could result in extensive sediment transport;
- Erosion and sediment control structures will be designed, installed, maintained and removed according to MTO guidelines and policies in effect at time of design and construction (e.g. OPSS 577 or equivalent);
- Exposed surfaces will be re-stabilized and re-vegetated as soon as possible. Natural vegetation cover will be retained wherever possible (and root grubbing minimized where possible) to provide natural erosion control (ref: OPSS 201, 206, 503, 507, 572);
- Sediment control structures will be routinely inspected as well as checked after storms and repaired as required;
- Organic topsoil will be stripped from working areas where encountered, appropriately stockpiled, and re-cycled wherever feasible;
- Construction inspection will be provided to ensure that measures are in place and working properly prior to and throughout construction.

The EPP sheets for Sediment and Erosion Control, Clearing and Grubbing and Grading will be used for guidance in the development of the mitigation specifications.

Residual Effects

There is always a risk of failure of erosion control measures under unusual/extreme weather conditions. This risk can be managed through careful planning and application of contingency measures. Adverse residual effects are not anticipated with proper implementation and monitoring of erosion control measures prior to and throughout construction.

6.3.2 Water Quality and Quantity

6.3.2.1 Groundwater Resources

Impact/Issue

This section discusses the mitigation measures for effects on groundwater quality and quantity. Groundwater resources (including wells) may be affected through highway construction and facility maintenance. Impacts due to construction may occur in areas where the roadway will be below grade (in cut.) In such locations, there is the potential for interception of groundwater movements that recharge domestic wells or that emerge as seepage zones in wetland and creek valleys. The risk of interception depends on the location and depth of cut, and the characteristics of the aquifer. In the vicinity of wetlands, the water table is high at certain seasons of the year, increasing the risk of impacts from discharge of sediment during construction. Beyond these areas, where ground elevations rise, the water table is generally at depth. The average depth identified in the EA Report 1997was about 30m, with static water levels averaging about 18m.

Fill operations can also cause an interception or redirection of groundwater movement when compacted materials are placed in the path of subsurface flows. Groundwater seepage zones associated with wetland areas and creek valleys along the Recommended Route 2002 are located in areas that will generally require placement of fill to support the roadbed.

Response

Shallow wells (< 15 m depth to shallow aquifer) are typically most at risk from contamination. The majority of shallow wells identified in MOE well records and within 300 m of the alignment are located in the Bridge Street/Ebycrest Road area. The majority of these wells are located north of (upgradient of) the alignment. This is expected to reduce or eliminate the risk of contamination from highway construction or operation to the south (downgradient). During detail design, additional work will be undertaken, to ensure that any shallow wells at risk from construction are identified.

The alignment will sever the Tillich nursery irrigation pond from the nursery operation. During the MTO Review, the owner of the nursery indicated that he was confident that an alternative water source could be found. Water supply for the nursery will be discussed with the owner, during property negotiations.

Preliminary highway profiles have been reviewed. A number of areas of cut will be required for the vertical profile in recognition of site topography, provision of suitable grade elevation for drainage and safety, and where underpasses are required. The anticipated depth of cut ranges from 0.5 to 9 m, with final cut depths to be determined at detail design. Groundwater management will focus on areas within at least 120 m of the watercourses and wetlands where cuts are required and within which influence from intercepted groundwater might occur. Management measures will be implemented to collect and transfer or otherwise maintain groundwater flow gradients in the detail design. In areas where roadway fill is required over or near zones of high water table (or seepage), special measures will be considered (such as granular bedding, French drains) to maintain flow. The design of watercourse and wetland structures will incorporate specific groundwater maintenance measures as required based on site-specific review and additional geotechnical work at detail design.

Groundwater quality protection also translates into proper spills management during construction (and during operation), and maximizing roadway runoff quality prior to release to receiving areas. The former is highlighted further under Surface Water and in the Equipment Maintenance EPPs. The latter is addressed in the SWM drainage review (Section 5.3.4).

Table 6.3.2.1 identifies impact issues, mitigation strategies and residual effects related to groundwater resources. The mitigation measures will be implemented prior to and throughout construction.

Table 6.3.2.1 – Summary of Impacts and Mitigation for Groundwater		
Impact Issue	**Mitigation Strategy**	**Residual Effects**
Potential Groundwater/Seepage Interference	• Groundwater seepage zones associated with wetland areas and creek valleys along the alignment will be further field-checked during the detail design stage. This information will be used in determining the final form of any required mitigation that will be identified during the detailed design stage (such as seepage flow maintenance drains, provision of free-draining granular in fill areas). • The design of watercourse and wetland structures will incorporate specific groundwater maintenance measures as required based on site-specific review and additional geotechnical work at detail design.	• Intercepted groundwater, if properly handled in the design, will continue to follow flow directions. The drainage design will need to consider drainage culvert placement or other measures to ensure that intercepted groundwater is not diverted away from dependant areas.
Decommissioning of Wells	• Any wells that must be closed or removed as part of construction will be decommissioned according to MOE standards. Information on well location and status will be verified and updated during detail design	• No residual effects anticipated with proper mitigation employed.
Well Interference and Impact Resolution	• During detail design, wells will be considered. Those at risk for impact will be investigated and monitored in advance of construction. • Where construction work such as pile driving, ditching results in loss of water or damage to wells, investigation of the potentially affected wells will be carried out. • If a complaint concerning a well problem is identified during highway construction, MTO will review the situation with the landowner in the field. Further response/action will depend on the findings of well water testing, and discussions with the landowner. • MTO will be responsible for provision of appropriate water supply, on either a temporary or permanent basis, if it is determined that highway construction/operation has resulted in a measurable impact to well operation and/or water quality. If, during the course of the investigation other wells in the locale of the complaint are determined to be contaminated, MTO will advise the well owners of any potential health hazards and on the information on which the advice was based. MTO will recommend that the owner contact the local medical officer of health for further advice concerning household well use.	• Implementation of these measures provides a mechanism to assess and respond to well concerns. • Provision of new water supply is a commitment in the event that loss/interference from highway construction/operation is demonstrated. • This approach will help to reduce health related risk from possible well contamination

6.3.2.2 Surface Water Resources

Impact/Issue

This section addresses potential impacts on surface water. The impact review for Aquatic Resources and Fisheries is provided in Section 6.3.3. Both of these sections should be considered along with the discussion of Soils in Section 6.3.1.

The Recommended Route crosses a number of watercourses, including the Grand River, Hopewell and Ellis Creeks and minor tributaries of these features, including ditched drains. These watercourses are currently affected to varying degrees by other road crossings upstream and downstream and by adjacent land uses, including agriculture (for example, runoff from fertilized and chemically treated fields, livestock grazing/trampling).

Issues of concern associated with the Recommended Route are primarily:

- Short term water quality (siltation and chemical contamination, and potential bank erosion associated with the construction phase);
- Long term water quality (contamination from roadway sources such as de-icing chemicals, petroleum products, heavy metals) associated with facility operation and maintenance;
- Spills during construction and operation; and
- Changes in flow patterns and potential for increased highway runoff inflow.

Response

Short Term Water Quality

Water quality may be impaired through increased turbidity levels and suspended solids concentration from uncontrolled runoff or dust generated during construction. In order to reduce the risk of increased silt reaching watercourses, appropriate erosion protection measures will be developed during detail design and implemented during construction.

Removal of existing vegetation cover is unavoidable within the highway footprint during highway construction. Absence of vegetation cover increases the risk of soil erosion. Of particular concern is the vegetation removal required to facilitate construction of the new bridges at the Grand River, Hopewell Creek, and Ellis Creek. At the Grand River, the north bank is steep, and soils are erodible. At Hopewell Creek and Ellis Creek, grades are more gradual. Vegetation removal will also be required for construction at other smaller watercourses. Site-specific protection measures will be developed during detail design, to minimize the risk of sediment material entering watercourses during construction.

Instream construction should be minimized to the extent possible, and where required, should be undertaken only during the timing windows identified by agencies. Sufficient construction equipment should be provided on either side of a watercourse crossing to reduce the need to move equipment across the watercourse. Temporary creek crossings will utilize appropriate structures that can be removed prior to freeze up and spring runoff. Construction-generated sediment will be properly filtered prior to release to a watercourse or natural area.

Long Term Water Quality

After construction has been completed, there is still a risk of water quality impairment through operation of the highway. Sources of impairment may include contaminants such as de-icing salt in stormwater runoff, salt spray, heavy metals, vegetation maintenance (herbicides), and spills.

Road salt is among the most effective snow and ice control material available for winter road safety. Its effects on vegetation, water quality and soils are also recognized. Environment Canada has recently (2001) added road salt to the list of priority substances requiring management. MTO employs and recognizes the importance of best salt management practices. MTO will continue to investigate ways to control and reduce salt usage while ensuring highway safety.

Direct runoff from the highway pavement will contain contaminants and sediments. The stormwater management plan outlined in Section 5.3.4 will be implemented.

Highway runoff will be directed to enhanced ditches and water quality swales as well as to strategically located Storm Water Management (SWM) facilities providing Level 1 (highest) quality control. The guiding principle of the stormwater strategy is that no untreated runoff will be directed to the watercourses. In this regard, bridge structures will be designed, to the greatest extent possible, so that runoff is directed off the bridge surface to a water quality swale or SWM facility. No bridge deck drains allowing direct runoff to the watercourses will be permitted. The SWM drainage design is intended to maximize removal of sediments and associated metals and other contaminants and therefore maximize the quality of runoff eventually released to a receiving area.

MTO currently uses herbicides in limited applications for the control of noxious weeds as required by the Noxious Weeds Act. The spraying of herbicides is limited to agricultural areas where a concentration of noxious weeds is noted, and /or in response to complaints. The handling and application of herbicides are controlled by the Pesticides Act.

Spills During Construction and Operation

Spills during construction and operation also have the potential to adversely affect surface water quality. The Environmental Protection Act (R.S.O. 1990), Occupational Health and Safety Act (R.S.O. 1990), Ontario Water Resources Act (R.S.O. 1990), Gasoline Handling Act, Province of Ontario Spill Contingency Plan, and the Transportation of Dangerous Goods Act (R.S.C. 1985, Chapter T-19) all impose responsibilities and constraints regarding notification, containment, clean-up, restoration, storage, transportation, disposal and staff safety in the event of a spill. The primary responsibility for containment, clean-up and disposal of spilled material rests with the owner and/or person having control of the pollutant.

Changes in Flow Patterns

Changes in watercourse channel morphology can occur if there is impediment in lateral flow, changes in stream gradient, and/or increase in runoff inflow. Impediment in lateral flow can occur if flow is constricted by inadequate number/sizing of crossing structures. Changes in stream gradient might occur if channel re-location is required, and existing

gradients are not maintained. Increased inflow from highway runoff can result in higher stream flows, scouring, and changes in stream gradient. These physical process changes can impact aquatic life and functions.

Impediment to lateral flow of water at defined watercourses and the major valleys (such as Grand River) will be addressed since structure design will be developed in consultation with the reviewing agencies during detail design. In areas such as Ellis Creek and Marden wetland, potential flow impediment is a concern because the crossings include wetland and drainage features (Ellis Creek, network of Marden drains) with relatively flat gradients. Evidence of lateral flow impoundment is present immediately upstream of existing Highway 7 at Ellis Creek. Consequently, crossing structure design at these locations will need to carefully consider drainage conditions.

Changes in stream gradient are not anticipated through channel re-location. However, if any channel alteration is required based on detail design review, any reconstructed channel will be re-instated with a matching gradient to the original section.

Increased inflow from highway runoff occurs due to the impervious nature of the highway surface relative to natural ground. Proper control of such runoff is important, particularly near Hopewell Creek and smaller defined watercourses with moderate gradients that could exhibit the effects of increased runoff more quickly. Control of the runoff will be addressed through storm water management design.

Table 6.3.2.2 identifies impact issues, mitigation strategies and residual effects related to Surface water resources. The mitigation measures will be developed during detail design and implemented prior to and throughout construction.

Table 6.3.2.2 – Summary of Impacts and Mitigation for Surface Water		
Impact Issue	**Mitigation Strategy**	**Residual Effects**
Short Term Water Quality	• At detail design, mitigation measures will be developed, based on the information available at that time. Mitigation measures will be developed to meet the principles identified below. • Exposed construction areas in the vicinity of any watercourse should be kept to a minimum at all times to minimize the potential for erosion (ref OPSS 182). • Erosion and sediment control structures will be designed, installed, maintained and removed according to MTO guidelines and OPSS 577. • Exposed surfaces will be re-stabilized and re-vegetated as soon as possible. Natural vegetation cover will be retained wherever possible (and root grubbing minimized where possible) to provide natural erosion control (OPSS 206, 503, 507, 572). • Sediment control structures will be routinely inspected as well as checked after storms and repaired as required. • In dust sensitive areas, dust will be controlled through the use of water or calcium chloride (OPSS 506). • Dewatering of construction areas will ensure that the water is properly filtered prior to release to a receiving area (ref OPSS 518). • The guidelines provided in the EPPs for Erosion and Sediment Control, Dewatering, and Grading provide supplementary guidance on environmental protection.	• There is a risk of escape of construction-generated sediment from any construction site. The risk can be effectively managed if mitigation measures are properly identified, diligently implemented and monitored throughout construction.
Erosion Risk from Vegetation Removal	• Mitigation measures dealing with vegetation removal are detailed in Section 6.3.5. These measures have direct relevance to the control of sediment release from areas where vegetation removal is required. • The appended EPPs for Clearing and Grubbing, Erosion and Sediment Control, and Grading provide a checklist of protection measures pertinent to vegetation removal and sediment control.	• No adverse residual effects are anticipated if the mitigation strategy is carefully implemented. • The erosion risk can be effectively managed if the mitigation measures identified are diligently implemented and monitored prior to and throughout construction
Potential Impediment to Lateral Flow	• At detail design, creek/drain flow and dispersed wetland flow in areas including the Ellis Creek and Marden wetland crossings will be considered in development of drainage and structure design.	• No adverse residual effects are anticipated if the mitigation strategy is carefully implemented.

Table 6.3.2.2 – Summary of Impacts and Mitigation for Surface Water		
Impact Issue	**Mitigation Strategy**	**Residual Effects**
Potential Changes in Channel Morphology	• If channel relocation is required, then detail design process will take account of existing stream gradients • In order to reduce the frequency and extent of excessive flows from highway ditches, drainage will incorporate the SWM principles discussed in Section 5.3.4. Runoff will be directed to enhanced ditches and water quality swales, and SWM facilities will be designed and located to provide appropriate control of runoff. • The preliminary SWM drainage design provided in Section 5.3.4 outlines a drainage strategy for the alignment that addresses water quality, runoff controls, and protection of watercourses and wetlands. This drainage design will be developed in more detail at detail design. Consultation with regulatory agencies will be undertaken during development of the drainage design.	• Matching gradients (if required) will address this concern. • Adverse changes in channel morphology will not occur if structures are properly designed and sized, and appropriate SWM measures are installed and properly maintained.
Salt Spray and Runoff and Other Contaminants	• With the Environment Canada 2001 designation of road salt as a priority substance, improved use and management of road salt may be required. MTO employs and recognizes the importance of best salt management practices. MTO will continue to investigate ways to control and reduce salt usage while ensuring highway safety. • Buffer plantings using salt-tolerant species have also been identified as a possible mitigation measure. At detail design, the need and feasibility of such plantings will be considered as part of the landscape plan. • Highway runoff will be directed to enhanced ditches and water quality swales as well as to strategically located SWM facilities providing Level 1 (highest) quality control. The SWM drainage design is intended to maximize removal of sediments and associated metals and other contaminants and therefore maximize the quality of runoff eventually released to a receiving area.	• Salt use and impacts will not be eliminated. However, continued improvements in salt management will reduce effects by reducing the amount of salt escaping to the environment. • The risk of water quality impairment will be greatly reduced with the implementation of the proposed SWM drainage design.
Highway Roadside Maintenance	• Herbicides are applied in the ROW to address site-specific concerns regarding noxious weeds adjacent to agricultural land and/or in response to complaints. The handling and application of herbicides are regulated under the Pesticides Act.	• Reduced risk of damage to native vegetation associated with wetlands, watercourses, and woodlands.
Spills During Construction and Operation	• All spills will be immediately controlled and reported as stipulated in the regulations. • Vehicle maintenance and fuelling should be carried out in maintenance areas in the works yards or at commercial garages whenever possible. • In the field, refuelling of vehicles should be carried out at designated areas where conditions will allow the containment of any accidentally spilled fuel. • Refuelling should not occur within 30 m of any watercourse or wetland or within 100 m of a private residence (or private residence well). • Construction vehicles should be maintained to minimize leaks. When detected, leaks will be repaired immediately.	• Implementation of these measures provides a mechanism to deal with spills and hazardous products should they occur during Construction or operation. • While spill risk is not eliminated, residual effects can be reduced/managed with prompt containment and proper cleanup.

6.3.3 Aquatic Resources and Fisheries

This section addresses potential impacts on aquatic resources and fisheries. This section should be read in conjunction with Section 6.3.1 (Soils) and Section 6.3.2.2 (Surface Water Resources).

Aquatic habitat and fishery assessments within the study corridor were documented in the EA Report 1997, and were further updated during the current MTO Review (see Section 3.2.4).

Table 6.3.3 (located at end of this section) provides a summary review of watercourse conditions along the Recommended Route (2002) (west to east), identifies potential issues/impacts, mitigation strategies, and anticipated residual effects. For the more significant watercourses (Grand River, Hopewell Creek, Ellis Creek), further discussion is provided concerning the following topics: introduction of sediments, barriers to movement, and effects on vulnerable, threatened or endangered species.

During detail design, consultation with regulatory agencies will be undertaken to ensure that the requirements of the Fisheries Act are addressed. All necessary approvals will be obtained. Where loss of fisheries habitat is unavoidable, compensation strategies will be developed in order to obtain the required authorizations from the Department of Fisheries and Oceans.

Introduction of Sediments

Impact/Issue

While the risk of contamination by sediments during construction and after the highway is built is an issue at all watercourse crossings, the Grand River, Hopewell Creek, and Ellis Creek systems are considered priority areas. Sediments and the contaminants that can adhere to them have the potential to adversely affect aquatic habitat quality and aquatic life. While sediment deposition is a natural event in watercourses as bed load is carried during storm events, the addition of sediment from highway construction and operation would increase the adverse effect on sensitive features, such as fish spawning areas by filling in interstices among rocks.

Sediments which are not retained on site will be transported downstream. In the Grand River, sediment would be dispersed within this a large river system. Sediment introduction into Hopewell Creek could be deposited at various locations, including the Breslau Wetland (PSW) associated with the creek. A high proportion of sediments would likely be deposited in the downstream Breslau pond. At Ellis Creek, sediment would likely be dispersed and deposited in the wetland downstream of the crossing. In all cases, this type of sediment release is undesirable for both wetland and aquatic habitat considerations.

Response

Mitigation strategies for sediment control are described in Section 6.3.1 (Soils) and Section 6.3.2.2 (Surface Water Resources). Implementation of these measures when

working in or near watercourses during construction will reduce the risk of uncontrolled sediment release to aquatic features. Construction supervision and environmental inspection will be important components in implementing the mitigation program.

Barriers to Fish Movement

All watercourse structures will be designed and installed to maintain flows and opportunities for fish movement. All three main watercourses will be spanned by bridge structures. Culverts at the other crossings will be designed to maintain positive flow gradients, to maintain existing stream gradients, and to avoid barriers to fish movement. All watercourse crossing structures (bridges and culverts) will be reviewed with agencies during detail design to ensure that fish passage requirements are met.

Effect on Vulnerable, Threatened or Endangered Species

As noted in Section 3.2.4 (Aquatic Resources and Fisheries), the Greenside Darter (*Etheostoma blennioides*) was documented in Hopewell Creek downstream of existing Highway 7 during a study of the Breslau Bypass (1996) carried out for the Regional Municipality of Waterloo. This species is identified as Vulnerable by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). During the MTO Review, large numbers of Greenside Darter were captured in the Grand River. This species was in fact one of the predominant species captured during the 1999 survey work at this location and it is likely present throughout the Grand River system. The Greenside Darter feeds on filamentous algae, which are most abundant in unshaded stream areas. Riparian cover along the Grand River is quite variable in extent, and unshaded areas providing suitable feeding habitat are present throughout the system upstream and downstream of the proposed crossing.

The implementation of the mitigation measures reviewed in detail above for Water Quality as well as Aquatic Resources and Fisheries are compatible with protection of this feature. Unshaded shoreline habitat is not limited on or off site along the Grand River.

No Greenside Darters were captured during the 1999 survey work at Hopewell Creek north of existing Highway 7. Stream conditions in this area are more heavily shaded, and may not be optimal feeding habitat for this species. Nevertheless, it is potentially in the area. The high level of creek protection and proactive mitigation identified for the Hopewell Creek crossing and reviewed earlier is compatible with protection of this fish species, as well as other baitfish species inhabiting the creek.

Table 6.3.3 - Highway 7 – Summary of Impacts, Mitigation and Residual Effects for Aquatic Features

Watercourse	Summary Conditions	Potential Issues/Impacts	Comment/Mitigation	Residual Effects
Grand River	• Large river with resident warmwater sportfishery • Moderate instream cover including some rubble and boulders • Flow morphology – flats with low overhead shading • No defined seepage noted	• Large river crossing at slight skew • Resident warmwater sportfishery – temporary construction disturbance in riparian zone – potentially some in stream work • Valley slope and floodplain disturbance – generation of sediment	• Implement timing constraints – no instream work between April 30 and July 15 – for protection of critical spawning and incubation periods for warmwater fishery • Steep north bank – isolate abutments during construction • Implement surface water protection mitigation measures • Direct any construction runoff to vegetative filtering/detention prior to release to river • Structural design will include geotechnical and hydraulic analysis to ensure structure design does not cause unacceptable backwater scouring, flood flow constriction or upstream/downstream erosion problems • At detail design, review with agencies to confirm design and mitigation and need for any fish habitat compensation work • Minimize the footprint of the working area after construction of the bridge supports	• Temporary disturbance during construction • Permanent removal of vegetation under bridge structure – will require stabilization • Opportunity for fish habitat improvements – design and agency review • Can expect some incremental loading from road runoff even with mitigation
Rosendale Creek	• Alignment crosses creek south of Bridge Street • At this location, creek is a small open channel – riparian cover mainly grasses with scattered shrub and tree regeneration – very tolerant system • Instream cover mainly overhanging vegetation • Mix of riffles with some flats and pooling • Baitfish habitat (potential coldwater – receives discharge from upstream wetland)	• Temporary construction disturbance – potentially some instream work • Possible disruption – baitfish spawning • Possible groundwater encounter – construction area • Channel enclosure with structure	• Implement timing constraints – no instream work between April 1 and June 30 for protection of baitfish community • Design structure to maintain low flow, flood flow and any groundwater discharge that may be apparent during pre-design field investigation. Provide some additional room for streamside wildlife movement • Implement surface water protection mitigation measures • Direct any construction runoff to vegetative filtering/detention prior to release to creek • At detail design, review with agencies to confirm design and mitigation and need for any fish habitat compensation work	• Temporary disturbance during construction • Permanent enclosure of common riparian cover • No temperature effects anticipated – structure shading and upstream discharge • Can expect some incremental loading from road runoff even with mitigation • Opportunity for fish habitat improvements – design and agency review

Table 6.3.3 - Highway 7 – Summary of Impacts, Mitigation and Residual Effects for Aquatic Features

Watercourse	Summary Conditions	Potential Issues/Impacts	Comment/Mitigation	Residual Effects
Reg Rd 17 Tributary (near Bridge St)	• Grassed swale with some groundwater discharge from upstream cattail pond and possibly through wooded valley on approach to Grand River • Gradient steepens south of Reg Rd 17 • Open grass/thicket riparian cover in part, then wooded cover south of the alignment • Mix of flats, riffles and runs, depending on gradient • Stickleback present in the cattail pond	• Temporary construction disturbance – potentially some in stream work • Possible disruption – baitfish spawning • Possible groundwater encounter – construction area • Channel enclosure with structure • Steep gradient and wooded valley to immediate south – erosion and vegetation impact concerns	• Implement timing constraints – no instream work between April 1 and June 30 for protection of baitfish community • Implement sediment control and vegetation protection measures • Implement surface water protection mitigation measures • Direct any construction runoff to vegetative filtering/detention prior to release to creek • Design structure to maintain low flow, flood flow and any groundwater discharge that may be apparent during pre-design field investigation. Provide some additional room for streamside wildlife movement (see Section 6.3.7) • At detail design, review with agencies to confirm design and mitigation and need for any fish habitat compensation work • Roadway SWM design – maximize runoff filtering/quality	• Temporary disturbance during construction • Permanent enclosure of common riparian cover • No temperature effects anticipated – structure shading and upstream discharge • Opportunity for fish habitat improvements – design and agency review
Small tributary to Hopewell Creek	• Small grassed swale with limited flow - no flow in September 2001 • No riparian cover near crossing – heavily altered – grassed/earth bottom • Within sheep pasture area • Very limited baitfish potential	• Possible conduit for sediment runoff from construction to Hopewell Creek	• Implement sediment control and vegetation protection measures • Direct any construction runoff to vegetative filtering/detention prior to release to creek • Incorporate seasonal swale flow in Hopewell Creek structure design	• Possible temporary disturbance during construction • Very tolerant swale feature – already very disturbed
Hopewell Creek – main branch	• Good quality baitfish stream with coldwater potential • Largemouth Bass captured upstream in Sept 1999 • Gravel, rubble, silt substrates • Low instream cover (woody debris and boulders) • Flat with occasional riffle areas • Moderate overhead cover – willow, cedar, Manitoba Maple • Existing disturbance at crossing site - rock berm /ponding for sheep drinking, west bank vegetation removal	• Temporary construction disturbance – potentially some in stream work • Possible disruption – baitfish spawning • Possible groundwater encounter – construction area • Floodplain disturbance	• Bridge to be provided • Implement timing constraints – no instream work between April 1 and July 15 for protection of baitfish community and possible bass spawning (subject to review with MNR) • Implement surface water and vegetation protection measures • Ensure construction runoff detention and filtering • Design bridge to maintain low flow, flood flow and any groundwater discharge that may be apparent during pre-design field investigation). Provide some additional room for streamside wildlife movement. (See Section 6.3.7.) • At detail design, review with agencies to confirm design and mitigation and need for any fish habitat compensation work • Roadway SWM design – maximize runoff filtering/quality and infiltration (where feasible)	• Temporary disturbance during construction • Removal of riparian vegetation under bridge – stabilization required • No temperature effects anticipated – structure shading and upstream discharge • Can expect some incremental loading from road runoff even with mitigation • High restoration potential - Opportunity for fish habitat improvements – design and agency review

Table 6.3.3 - Highway 7 – Summary of Impacts, Mitigation and Residual Effects for Aquatic Features

Watercourse	Summary Conditions	Potential Issues/Impacts	Comment/Mitigation	Residual Effects
Tillich Drain	• Agricultural drain in deep soft muck • Riparian grasses and thicket • Slow flow (flats) – dense instream vegetation – seasonal baitfish potential • Drain enclosure already altered system	• Deep soft muck, probable dewatering requirement • Structure/culvert design and installation in soft muck • Possible baitfish presence	• At detail design, review need for timing constraints with agencies • Implement surface water and vegetation protection measures • Ensure construction runoff detention and filtering • Muck replacement with granular may be appropriate for structure stability	• Temporary disturbance during construction • Drain enclosure – already altered system • Seasonal baitfish passage to be maintained
Townline West – Swale	• Buckthorn thicket meadow marsh swale • Seasonal overland flow – no permanent character – channel poorly defined – no flow in Sept 2001 • Snowmelt flow and downstream ponding noted in 1999 • No fish noted	• Localized ponding at certain seasons of the year • Flow gradient is toward Townline wetland - possible conduit for construction-generated sediment	• No potential fishery or sediment flow issue if construction takes place in dry season • Implement surface water and vegetation protection measures • Ensure construction runoff detention and filtering • Design structure to maintain maximum seasonal flow and movement for smaller terrestrial wildlife (see section 6.3.7) • At detail design, refine SWM design to maximize runoff quality	• Temporary disturbance during construction • Enclosure of tolerant seasonal flow swale – heavy buckthorn invasion • No temperature effects anticipated – seasonal flow into groundwater sustained wetland
Ellis Creek tributary (from Townline East)	• Small creek flowing through abandoned agricultural field from Townline Wetland to Ellis Creek • Intermittent flow with localized groundwater discharge – no flow in Sept 2001 • Riparian grass/shrub cover • Possible seasonal baitfish use • Flow connection to Ellis Creek PSW	• Temporary construction disturbance – potentially some in stream work • Possible groundwater encounter – construction area • Channel enclosure with structure • Possible baitfish presence	• At detail design, review need for timing constraints with agencies • Implement surface water and vegetation protection measures • Ensure construction runoff detention and filtering • Maintain low flow and flood flow and movement for smaller terrestrial wildlife. (See Section 6.3.7.) • At detail design, refine SWM design to maximize runoff quality • Ensure any groundwater flow is maintained in structure design	• Temporary disturbance during construction • Enclosure with structure – tolerant riparian system • No temperature effects anticipated – structure shading and upstream/downstream discharge

Table 6.3.3 - Highway 7 – Summary of Impacts, Mitigation and Residual Effects for Aquatic Features

Watercourse	Summary Conditions	Potential Issues/Impacts	Comment/Mitigation	Residual Effects
Ellis Creek	• Headwater tributary through Ellis Creek wetland – diffused spreading flow pattern through swamp • Organic/muck substrates • High water table – local discharge • Baitfish captured at Guelph Rd 3	• Alignment crosses north tip of wooded swamp – pastured floodplain to immediate north • Wetland related disturbance • Blowdown, seepage obstruction, organics, dewatering • Potential flow constriction	• Implement timing constraints – no instream work between April 1 and June 30 for protection of baitfish community • Implement sediment control and vegetation protection measures • Implement surface water protection mitigation measures • Direct any construction runoff to vegetative filtering/detention prior to release to wetland • Bridge structure to be provided that will provide wildlife movement opportunities • Design structure to maintain low flow, flood flow and any groundwater discharge that may be apparent during pre-design field investigation). • Replace organics with granular footing for structural stability and to maintain shallow groundwater movement • Review any wetland vegetation edge management requirements (if applicable) at detail design • At detail design, refine SWM design to maximize runoff quality • At detail design, review with agencies to confirm design and mitigation and need for any fish habitat compensation work	• Temporary construction disturbance • Permanent removal of riparian wetland cover within structure and roadway footprint – stabilization under bridge required • Proper structure design should reduce risk of upstream ponding and downstream erosion – drainage system is already dispersed and wetland currently provides erosion protection • No temperature effects anticipated – structure shading and upstream/downstream discharge • Can expect some incremental loading from road runoff even with mitigation • Opportunity for fish habitat improvements – design and agency review
Marden Drain	• Agricultural drain system in deep soft muck • Slow flow (flats) – no flow in Sept 2001 (flow noted in 1994) • Limited instream cover • Grasses, shrub and swamp woodland cover (variable) • Baitfish noted in 1994 – assume seasonal baitfish use	• Wetland related disturbance – blowdown potential, seepage, flow obstruction, dewatering, organics • Structure/culvert design and installation in soft muck (2 structures) • Possible baitfish presence	• At detail design, review need for timing constraints with agencies • Implement surface water and vegetation protection measures • Ensure construction runoff detention and filtering • Muck replacement with granular may be appropriate for structure stability • Ensure structures maintain low flow and flood flow to prevent upstream ponding and downstream erosion, and facilitate movement of smaller wildlife species • At detail design, refine SWM design to maximize runoff quality	• Two enclosed drain crossings • Permanent wetland removal – construction zone • Proper design should reduce hydraulic change risk • Some incremental loading from road runoff

6.3.4 Vegetation and Wetlands

This section of the report discusses the impacts that are expected on vegetation and wetland resources associated with the construction and operation of the Recommended Route (2002).

The impact on wetlands was one of the key issues identified for the MTO Review. The efforts taken to avoid wetlands are documented in Chapter 4. A comparison of the wetland impacts anticipated for the Recommended Plan (1997) and the Recommended Route (2002) is provided in Section 5.2. Significant shifts were made to avoid or reduce impact at the locally significant (LSW) Bloomingdale-Rosendale Wetland, the LSW Hopewell Riparian Woodland/Wetland, and the provincially significant (PSW) Townline and Ellis Creek Wetlands

At the Provincially Significant Marden wetland, the alignment was shifted moderately (about 65 m) to the north. This shift was achieved in conjunction with the more significant alignment shift out of the core Ellis Creek wetland to the west. The recommended alignment location across the Marden wetland reflects a tradeoff between competing factors. A further shift to the north would have incurred more significant agricultural and property impacts. In addition, the geometry for a future Hanlon Expressway (north) interchange would be constrained with substandard ramp lengths. Several additional wetland blocks that are part of the Marden wetland PSW are also located to the north. A shift to the south would not avoid the wetland (wetland block extends south to the edge of industrial development), would place the alignment into relatively better quality wetland, and would result in an undesirable highway curvature for the connection to the Hanlon Expressway.

Highway 7 will not cause any direct impacts on the other portions of the Marden wetland complex located to the north of the Recommended Route (2002).

6.3.4.1 Significant Flora

No nationally or provincially significant plant species have been recorded along the Recommended Route (2002).

Table 6.3.4.1 provides an impact evaluation on specific flora species (Regionally significant or de-listed) that have been recorded in the study area. Based on that review, no special mitigation efforts are considered warranted.

Table 6.3.4.1 - Highway 7 – Regionally Significant Flora Impact and Mitigation Review				
Species	**Location**	**Comments and Impacts**	**Mitigation Strategy**	**Residual Effects**
Carex stricta (Tussock Sedge)	Hopewell Creek floodplain north of the Recommended Route (2002).	As of (1999) this species is no longer considered rare in Waterloo Region. The areas where this sedge was recorded are north of the Recommended Route (2002).	No special strategy required. See general discussion of mitigation for vegetation and wetlands.	None anticipated as suitable floodplain habitat persists throughout Hopewell Creek system and this species has been de-listed.
Carex alopecoida (Foxtail Sedge)	Noted throughout Ellis Creek floodplain woods and wetland north of existing Highway 7. Occurs in moist, open or lightly wooded areas.	This species is probably more overlooked than rare (and therefore under collected) because of its similarity to *Carex stipata*. Status of "rare" in Waterloo Region is under review, as additional records are noted. Floodplain habitat is crossed by the alignment.	No special strategy required. Habitat for this species is retained within the core Ellis Creek Wetland that is avoided by the alignment. See general discussion of mitigation for vegetation and wetlands.	Floodplain habitat is removed, but suitable habitat is present throughout the Ellis Creek system.
Carex tuckermanii (Tuckerman's Sedge)	Scattered throughout the lowland floodplain woods at the Grand River, west of the alignment crossing. Typically occurs in swampy woods.	Main floodplain zone is located west of the Recommended Route (2002) and avoided by the alignment. The alignment does cross (elevated above) some floodplain wetland on the south side of the river that provides potential habitat.	See general discussion of mitigation for vegetation and wetlands. Strategy will be to reduce footprint impacts on floodplain wetland to the extent possible, and to maximize protection of off- ROW vegetation.	Some wetland removal/disturbance within footprint unavoidable. However, suitable floodplain woodland for this species occurs throughout the Grand River system.
Pilea fontana (Spring Clearweed) *Carex scabrata*	Both species noted in Bloomingdale-Rosendale wetland north of Bridge Street, in conifer swamp habitat with groundwater discharge.	The Recommended Route (2002) is to the south of Bridge Street and therefore avoids the core wetland area and groundwater discharge supporting these species.	None required.	None.
Polystichum lonchitis (Northern Holly Fern) *Polymnia canadensis* (Small-flowered Leaf cup)	Both species reported in, and confirmed by Ecoplans Limited in, the Bloomingdale-Rosendale wetland block north of Bridge Street. Required habitat conditions are forested groundwater seeps.	The Recommended Route (2002) is to the south of Bridge Street and therefore avoids the core wetland area and groundwater discharge supporting these species.	Ecoplans Limited also reviewed the lands south of Bridge Street crossed by the Recommended Route (2002) for the presence of these species – neither species was found along or in the vicinity of the alignment during the September 2001 field review.	None.

6.3.4.2 Vegetation and Wetland Resources – General Strategies

The construction of the Recommended Route (2002) will require permanent vegetation removal (a long term impact) within the highway footprint. Management and mitigation measures are recommended to reduce direct and indirect effects associated with vegetation removal. Short-term and long-term mitigation strategies are discussed below, and are reviewed in further detail in Table 6.3.4.2.

Short-term Impacts and Mitigation Strategies

Short-term impacts are those which may occur during the construction period. Examples of such impacts can include:

- Release of construction-generated sediment to vegetation areas;
- Vegetation clearing/damage beyond the working area;
- Damage to off-ROW vegetation from tree felling and/or grubbing; and
- Spills of contaminants, fuels, other materials that may reach natural areas.

The mitigation strategies for dealing with these types of impacts are as follows:

- Proper containment and filtering of all construction-generated sediment (whether from dewatering or soil exposure from clearing and grubbing);
- Clear delineation of ROW vegetation clearing zones and vegetation retention zones on both construction specifications and in the field to minimize the risk of off-ROW vegetation impacts;
- Implementation of proper tree felling and grubbing procedures to minimize risk of off-ROW vegetation damage;
- Proper handling of potentially toxic construction materials and proper spills management; and
- Environmental inspection during construction to ensure that protection measures are implemented, maintained and repaired and remedial measures are instigated where warranted.

Long-Term Impacts and Mitigation Strategies

Long term impacts on vegetation areas (particularly woodlands and forested wetlands) are those that occur after the highway facility is constructed and is in operation. Examples of these effects can include the following:

- Canopy opening and new edge creation resulting in increased sunlight, wind, drying (microclimate changes), spread of invasive vegetation (to detriment of native vegetation), and greater risk of tree blowdown from wind exposure (especially shallow-rooted trees).
- Edge effects can extend well into a wooded area depending on several factors. Exposure of west and south edges has greater impact potential in terms of increased wind and sunlight. Younger successional woodland/wetland areas will generally have greater tolerance of opening and disturbance than mature forests and forested wetlands with well-developed edges and canopies, limited disturbance, and good native species flora communities;
- Salt runoff and salt spray into vegetated areas causing loss of vegetation vigour and in extreme cases, vegetation dieback, and spread of salt tolerant flora (halophytes);
- Damage from excessive or improper application of herbicides and pesticides for ROW maintenance requirements; and
- Changes in drainage patterns (groundwater and/or surface runoff flow) that can impact dependant vegetation/wetland areas located either upgradient or downgradient of the ROW. Blocking of existing surface/subsurface drainage patterns can result in upstream and downstream vegetation dieback/condition changes. Increase in downstream runoff can result in erosion impacts on receiving vegetation.

There will be an opportunity at detail design to consider opportunities for any further alignment refinements or footprint reduction to further reduce the impact on affected forests and wetlands. For example, depending on specific site conditions, it may be possible to consider measures such as retaining walls, benching, use of 2:1 embankment slopes, adjustment of curve radii (subject to meeting minimum safety requirements) or other approaches. These measures must be considered in conjunction with other requirements. Steeper embankment slopes may be in conflict with the need to introduce slope flattening to reduce the risk of erosion. Conditions at each vegetation feature will be considered on a case-by-case basis, considering local conditions at the time of design.

In addition to alignment refinements at the detail design, the following mitigation strategies will be considered as possible techniques for dealing with long term impacts:

- Provision of edge plantings along the newly created edges of woodlots will be considered during detail design. The ability to provide plantings may be restricted by availability of property and/or specific site conditions;
- Edge planting strategies will consider the characteristics of the woodland/wetland where intrusion occurs, risk of secondary effects without mitigation, nature of anticipated effects (salt spray, wind and solar exposure), and tolerance of affected

areas. Planting strategies may focus on salt spray buffering in some areas, native species edge plantings/management in other locations, and a combination of both strategies at other sites;

- Priority areas for consideration are the Grand River valley, the slope forest bordered by the alignment just to the west of Ebycrest Road, the Hopewell Riparian Woodland/Wetland, Townline Wetland, Ellis Creek Wetland, and Marden Wetland.

Changes in water quality/quantity, surface flow patterns, and impediments to lateral flow can not only affect aquatic environments, but can impact dependant vegetation/wetland areas as well. The mitigation measures reviewed under Water Quality and Quantity, and Aquatic Resources and Fisheries, will address this concern if properly implemented. The Marden Wetland will pose the greatest challenge because of the width of wetland crossed and the high water table conditions (although influenced by an artificial drainage network). Special attention will need to be placed in the structure and drainage design in this area;

The overall water quality mitigation strategy is to implement the storm water management drainage design as described in Section 5.3.4. The proposed drainage design maximizes the quality of highway runoff and provides some peak flow control for the benefit of adjacent natural areas.

Table 6.3.4.2 details the various general impact issues and mitigation strategies associated with vegetation and wetland resources.

Table 6.3.4.2 – Highway 7 – General Strategies for Mitigation of Impacts on Vegetation and Wetlands			
Issue	**Impact**	**Mitigation Strategy**	**Residual Effects**
Short term impacts on vegetation including wetlands	• Release of construction-generated sediment to vegetation areas. • Vegetation clearing/damage beyond the working area. • Damage to off-ROW vegetation from tree felling and/or grubbing. • Spills of contaminants, fuels, other materials that may reach natural areas.	• Temporary erosion and sediment control measures will be installed prior to construction, and maintained throughout construction (See OPSS 577 and Guidelines in Sediment and Erosion Control EPP). • ROW vegetation clearing zones and vegetation retention zones will be clearly delineated on both construction drawings and in the field and will be field confirmed with the contractor prior to clearing and grading. • Vegetation removal and protection measures will be conducted in accordance with OPSS 201(tree clearing) and OPSS 565-1 (tree protection) supplemented by guidelines provided in the Clearing and Grubbing EPP. Vegetation that does not require removal for purposes of the construction will be protected through the installation and maintenance of temporary vegetation protection measures. • Trees to be removed will be felled into the ROW (and away from watercourses) to avoid disturbance to off-ROW vegetation as well as aquatic areas. • Edges of cleared areas will be reviewed. Damaged trees will be checked and treated, or removed. Hazard and windthrow susceptible trees will be identified and removed. • The contractor will be required to have appropriate product handling and spills management procedures and equipment in place prior to construction. • Inspection will be undertaken during key construction periods and at key locations to ensure environmental protection measures are implemented and working and any required remedial action is undertaken.	• Expected to be manageable with diligent implementation of the recommended measures and verification through on site inspection.

Table 6.3.4.2 – Highway 7 – General Strategies for Mitigation of Impacts on Vegetation and Wetlands

Issue	Impact	Mitigation Strategy	Residual Effects
Long-term impacts on vegetation including wetlands	• Canopy opening and new edge creation (facilitates blowdown of susceptible trees, increased sunlight, invasion and spread of aggressive plant species). • Salt runoff and salt spray – damage to vegetation, spread of salt-tolerant plant species, possible condition changes in receiving wetland if high salt concentrations experienced. • Damage from herbicide/pesticide applications during ROW management if excessive or improperly applied. • Changes in drainage patterns for dependant off-ROW vegetation through flow blockage and/or erosion/scouring effects. • Water quality effects from road runoff during the operation phase.	• Review opportunities for alignment shift refinements and footprint reduction at detail design in order to further reduce canopy removal. Consider measures such as retaining walls, 2:1 embankment slopes, benching, and adjustment of curve radii to achieve these objectives. The final selection of appropriate measures will need to consider local site conditions, environmental protection objectives and site-specific road design requirements. • Consider provision of edge plantings[1] along the perimeter of forest/wetland edges that would benefit from new edge protection/screening. Dense edge plantings with suitable conifer species can help buffer exposed ("see-through") forest interiors from drying winds, sun exposure (desiccation and spread of invasive sun-tolerant plant species), and salt spray. The focus of this strategy is to protect new edges and improve interior habitat conditions (indirect restoration) for woodland plant seed germination and seedling development. This strategy can be combined with plantings of native species to infill gaps in natural areas and to provide replacement plantings in consideration of vegetation removal. • Final planting approaches will be developed and reviewed with the agencies during detail design. • Tree management activities will be undertaken as required for both driver safety and health of the balance of the woodland unit (See guidelines in Clearing and Grubbing EPP). • Herbicides are applied in the ROW only to address site-specific concerns regarding noxious weeds adjacent to agricultural land and/or in response to complaints. The handling and application of herbicides are regulated under the Pesticides Act. • The final drainage design will assess upstream and downstream drainage patterns and requirements to ensure that flood risk and erosion risk is properly managed, and that appropriate cross drainage is provided where required. • The preliminary SWM drainage strategy provided in Section 5.3.4 maximizes the quality of highway runoff and provides some peak flow control for the benefit of adjacent natural areas. This strategy will be developed further at detail design and reviewed with agencies prior to implementation.	• Removal of least possible amount of canopy. • Improved buffering of natural areas where plantings are to be implemented. • Reduced risk of damage to native vegetation associated with wetlands, watercourses, and woodlands with a strategy of as-needed chemical ROW treatment • Reduced risk of upstream or downstream drainage effects with implementation of detail design SWM and Drainage Plan • Reduced risk of off-ROW impact from highway runoff through implementation of SWM and drainage design using best available technology.

1. Ability to provide plantings may be restricted by availability of property and/or specific site conditions and will be assessed further, in consultation with external agencies at detail design.

Enhancement Opportunities

During the MTO Review, questions were raised by the GRCA about the possibility of creating additional wetland habitat to offset some of the losses of wetlands that will occur as a result of highway construction.

There are some locations adjacent to wetlands, where it appears that the Recommended Route (2002) will create property severances. If these severances create landlocked parcels, with no public road access, then these parcels could be considered for natural area restoration. In all cases, the ability to create additional natural habitat would depend on a range of factors, including the ownership of the property in question, and the ability to identify a suitable agency to take responsibility for the future management of the property.

Wetland Management Implications

Linear facilities can have an impact on wetland conservation, management, or other initiatives that may be practiced currently or in the future. These may include passive recreational uses, fuelwood cutting, wetland restoration, research or other uses.

The Recommended Route (2002) is evaluated below in terms of existing and future wetland management opportunities. Note: The new highway is a controlled access facility. There will be no access to any property from the new highway.

Wetland Area	Alignment – Conservation/Management Implications
Bloomingdale-Rosendale LSW	Avoids the core swamp wetland block north of Bridge Street. No effect on continued access to Grand Valley Trail.
Hopewell Riparian Woodland/Wetland LSW	Edge intrusion – south lobe. Maintains the core woodland/wetland block. Access still available from Regional Road 30 (subject to landowner permission). Access severed from existing Highway 7. Landlocked parcel between wetland and recommended alignment affords opportunity for a variety of compatible land uses including wetland/woodland restoration.
Townline Wetland PSW	Alignment avoids core wetland areas – minor edge intrusion. Access to wetlands available from Townline Road (subject to landowner permission).
Ellis Creek PSW	Significant shift north (300 m) out of core wetland. Maintains the core area for future passive initiatives. Access to wetland available from existing Highway 7 and Guelph Road 3 (subject to landowner permission).
Marden PSW	Alignment was shifted about 65 m to the north. The shift was made in conjunction with the major alignment shift at the Ellis Creek Wetland PSW to the west. The shift reduces the amount of wetland fragmentation in this block. The final Marden Wetland alignment is a tradeoff between various factors. A further north shift resulted in increased agricultural property effects and problems with the geometry of the future Hanlon Expressway (north) interchange. In addition, several other Marden Wetland blocks are located to the north. A more major shift to the south would fragment the wetland more substantially and would result in an undesirable highway curvature for the connection to the Hanlon Expressway.

The Marden Wetland sustains the greater relative impact as discussed in the previous review of trade-offs. Existing fuelwood sources for one of the landowners is eliminated. The integrity and function of this wetland block (1 of 9 in the Marden South Wetland complex) will be affected by the highway fragmentation. Wetland management

initiatives would be problematic in the severed north section, but could be considered in the larger south section. Access to the wetland would be subject to landowner permission.

6.3.4.3 Site-Specific Impact Mitigation Review

Table 6.3.4.3 provides a detailed summary of vegetation/wetland impacts, mitigation strategies, and residual effects, from west to east along the Recommended Route (2002).

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Grand River Valley and Tableland – Bloomingdale Rosendale (B-R) Wetland (LSW) Chainage 20+000 to Reg. Rd. 17 (refer to Plates 1, 4 and 6 in Chapter 5)	• Alignment crosses cultural meadow, shrub thicket (dense buckthorn), deciduous floodplain hardwoods and about 2 ha of floodplain wetland (soft maple and willow) on south approach. Crosses wooded deciduous slope on north side of river – mixed maple, oak, basswood, cherry. • Localized seepage on wooded slopes to east and west of alignment – south approach. Localized seepage on valley slope – north side of river. • Alignment parallels south side of Bridge Street – open and disturbed area dominated by cultural meadow and occasional small shallow marsh depressions. Portions of the area have been modified by site scraping, debris storage, and berm creation (dominated by buckthorn). White Cedar stand, spring fed pond, lowland floodplain, and deciduous slope forest are located to the south of the alignment. • Minor B-R tolerant riparian marsh crossing south of Bridge St. – about 0.4 ha. Part of locally significant wetland complex (LSW). • East of chainage 23+000 alignment crosses agricultural land. • Crosses shrub thicket tributary valley near Reg.Rd. 17. • No significant flora noted in this area.	• Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • Implement short-term mitigation measures for edge protection. • At detail design, review opportunities for ROW buffer/edge management plantings in the Grand River valley crossing area. • Large bridge structure will be provided for river crossing. Bridge footprint to be minimized to extent possible. • At detail design, consider techniques that will maintain seepage flow wherever potentially affected by the roadway and/or bridge structure. • Review need for vegetation screening planting north of the river crossing. • SWM facilities to be provided for runoff quality treatment prior to release to floodplain and river.	• Vegetation removal within ROW. • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation. • Some decline in vegetation quality is inevitable within the influence zone of the highway, which may vary depending on solar aspect, changes in micro-climate, nature and condition of existing vegetation, and degree of existing disturbance. Any proposed ROW buffer plantings will be tailored to susceptible areas based on review at detail design. • Small landlocked parcels of tableland near Ebycrest Road bordering valley slope could be considered for restoration subject to enhancement caveats noted above.

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Weiland Forest Tract Chainage 25+000	• Crosses south lobe (about 2.4 ha) of the forest tract. Affected area is deciduous woodland (mix of maple, beech, ash, cherry) with typical mix of woodland groundflora species. • Alignment located about 200 m south of core woodland zone containing deciduous swamp habitat.	• Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • Implement short-term mitigation measures for edge protection. • Undertake edge management review at detail design to determine edge management requirements (if any) • At detail design, review opportunities for planting a protective buffer within the ROW adjacent to the forest section.	• No impact to the core woodland and wetland area located about 200 m to the north. Impact is confined to narrow woodland lobe at south end. • Some secondary effects may be experienced in wooded linear strip north of the alignment (but outside the core area). These effects can be softened by implementation of edge protection measures as well as any plantings that may be identified at detail design. • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation.

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Hopewell Creek Chainage 26+900	• Single crossing of main branch. West side has been disturbed by farm activity. • Removal of about 0.9 ha of willow, cedar, Manitoba Maple, but some vegetation already removed on west side. Included in affected area on east side of floodplain are some young plantings of White Pine, Black Walnut, and White Spruce. • Vegetation associations typical for site conditions.	• Bridge structure to be provided across creek. There is existing riparian disturbance at this location. • Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • At detail design, explore opportunities for vegetation restoration. Maintain seepage flow wherever potentially affected by the roadway and/or bridge structure.	• Vegetation removal within ROW (Note – crossing area has sustained previous land use disturbance). • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation. • SWM facilities to be provided for runoff quality treatment prior to release to floodplain and river. This will reduce residual water quality effects on creek.

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Hopewell Riparian Woodland/Wetland (LSW) Chainage 27+700	• Crosses south tip of mixed swamp lobe containing mix of White Cedar, Black Ash, Yellow Birch, Soft Maple and Trembling Aspen. Lobe has sustained drainage alteration (agricultural drain along west edge), canopy openings from dieback. About 0.6 ha of wetland affected. Shallow organics, very dry in Sept 2001 (water table about 2 m below ground), experiences seasonal water table fluctuation. • Alignment avoids core, less disturbed wetland area located about 150 m to north. • Typical wetland flora noted during surveys.	• Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • Implement short-term mitigation measures for edge protection. • Undertake edge management review at detail design to determine edge management requirements (if any) • At detail design, review opportunities for planting a protective buffer within the ROW adjacent to the wetland section. • Salvage any excavated organic material for subsequent landscaping or restoration work.	• Vegetation removal required within ROW. • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation. • Some decline in vegetation quality is inevitable within the influence zone of the highway (balance of the south lobe). • Landlocked parcel between wetland and alignment provides opportunity for a variety of compatible land uses including wetland/woodland restoration. This depends on availability of property and ability to arrange future management of parcel.

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Townline West Wetland (PSW) Chainage 30+000	• Evaluated as provincially significant (PSW) by MNR (including Townline East wetland) based on information provided during MTO Review. • Crosses narrow wetland neck 100 m north of existing Highway 7. • Removes about 0.2 ha of wetland (edge). Mosaic of seasonally wet meadow marsh and shrub thicket with heavy Common Buckthorn invasion. No discharge observed. Groundwater discharge prevalent in core wetland area to north. • Also removes about 0.2 ha of the north edge of small moist-fresh deciduous woodland – uneven age hardwood component of Green Ash, White Elm and Trembling Aspen. • Typical and expected vegetation association and flora in affected zone. • Alignment avoids but borders deciduous hardwood swamp (north side of alignment).	• Avoids core, less disturbed wetland area to north. • Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • Implement short-term mitigation measures for edge protection. • Undertake edge management review at detail design to determine edge management requirements (if any) • At detail design, review opportunities for planting a protective buffer within the ROW bordering the forest block. • Careful consideration of drainage design at the narrow lobe crossing to avoid adverse wetland hydrology changes (to be assessed at detail design). • SWM facilities to be provided for highway runoff quality treatment prior to release to wetland.	• Vegetation removal within ROW. (Note: affected area is narrow and already disturbed). • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation. • Some decline in vegetation quality may occur within the influence zone of the highway, depending on ability to retain existing edge vegetation. If additional protection planting buffer is warranted, secondary effects may be softened. • Proposed SWM facility runoff quality treatment will provide water quality benefits for the receiving wetland.

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Townline East Wetland Chainage 32+000	• Crosses southeast edge of Townline East block (about 1 ha – revised from previous 3 ha intrusion noted in evaluation with further alignment refinement). • Affected area is mixed hardwood and shrub thicket with Trembling Aspen. • Typical and expected vegetation association and flora in affected zone. • Also crosses tributary drainage from the wetland. The tributary carries flow south and under existing Highway 7 to Ellis Creek.	• Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • Implement short-term mitigation measures for edge protection. • Undertake edge management review at detail design to determine edge management requirements (if any) • At detail design, review opportunities for planting a protective buffer within the ROW bordering the forest block. • Careful consideration of tributary crossing design to avoid adverse wetland hydrology changes or downstream erosion concerns.	• Vegetation removal within ROW. (currently provides some wetland buffering). Possibility may exist to further shift ROW to reduce or avoid the edge removal. • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation and extent of secondary effects beyond ROW influence zone. • Scheduling of clearing through consultation with MNR will reduce risk of disturbance to nesting herons (nesting concentration zone about 350 m north of the alignment).

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Ellis Creek Wetland PSW Chainage 33+300	• Removal of about 2 ha of wetland at north end of forest wetland block beyond which is pastured floodplain. • Affected vegetation is floodplain swamp, somewhat open, with scattered Crack/White Willow, Silver/Red Maple, Green Ash and White Elm. Seasonally high water table conditions and occasional seepage – flat/hummock topography with organics. East side of swamp is transitional moist-fresh conifer forest with occasional seepage present. Grades into pastured floodplain to immediate north. • Typical and expected vegetation associations and flora noted. • Possible blowdown, seepage obstruction, exposure of organics and dewatering are impact concerns	• Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • Implement short-term mitigation measures for edge protection. • Undertake edge management review at detail design to determine edge management requirements (if any) • At detail design, review opportunities for planting a protective buffer within the ROW bordering the wetland block. • Bridge proposed at wetland crossing. • Implement mitigation strategies for sediment control and management of surface water. • SWM facilities to be provided for runoff quality treatment prior to release to the Ellis Creek wetland.	• Vegetation removal within ROW. • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation and extent of secondary effects beyond ROW influence zone. • Some decline in vegetation quality is inevitable within the influence zone of the highway, but alignment location allows retention of considerable buffer for core area to south. • Proposed SWM facility runoff quality treatment will provide water quality benefits for the receiving wetland.

Table 6.3.4.3 – Highway 7 - Site Specific Impact and Mitigation Evaluation for Upland Forests and Wetlands

Vegetation/Wetland Area	Comments and Impacts	Mitigation Strategy	Residual Effects
Marden Wetland PSW Chainage 36+000	• Removal of about 3.5 ha, retains slightly larger portion of wetland block to south (about 9.5 ha remaining). • Fragments about 5 ha of wetland on north side of alignment – portion of this block is criss-crossed by agricultural drains and has sustained a history of fuelwood cutting. • Area crossed by alignment – deciduous swamp with Silver/Red Maple, Yellow Birch, Green/Black Ash, Trembling Aspen, White Cedar, Balsam Fir. Topography flat to hummocky, with organics. • Possible blowdown, seepage obstruction, exposure of organics and dewatering are impact concerns. • No significant flora noted during site review. Good representation of wetland and upland adapted flora species present in the wetland block.	• Maximize protection of off ROW vegetation by implementing construction protection measures discussed in General Mitigation Strategy (above). • Implement short-term mitigation measures for edge protection. • Undertake edge management review at detail design to determine edge management requirements (if any) • At detail design, review opportunities for planting a protective buffer within the ROW bordering the wetland. • Careful consideration of drainage design to avoid adverse wetland hydrology changes. • Design crossing structures to maintain cross flows and facilitate terrestrial wildlife movement opportunities. • Implement mitigation strategies for sediment control and management of surface water.	• Vegetation removal within ROW. • Diligent implementation of these measures will reduce the risk of damage to off-ROW vegetation. • Elimination of fuelwood source for one landowner. • Integrity and function of this wetland block will be reduced – no impact to the remaining 8 wetland blocks in the complex (located to the north). • Some decline in vegetation quality is inevitable within the influence zone of the highway.

6.3.5 Wildlife and Linkages

Wildlife habitat features along the Recommended Route (2002) include areas of cultural meadow, shrub thicket, and woodland/wetland blocks. The key wildlife habitat and corridor features are associated with the following areas:

- Grand River valley
- Bloomingdale-Rosendale Wetland Complex
- Hopewell Creek valley
- Hopewell Riparian Woodland/Wetland
- Townline Wetland Complex
- Ellis Creek Wetland Complex
- Marden South Wetland Complex

Most of the wetlands in the vicinity of the Recommended Route (2002) are part of much larger wetland complexes that extend in some cases well north or well south of the study corridor, and that include a number of wetland parcels with varying degrees of connection/isolation.

During the MTO Review, additional wildlife information (mainly breeding birds) was collected during breeding surveys in the above areas. The findings of the surveys have been highlighted in Section 3.0 and are provided in Appendix C. The surveys documented a good quality bird community utilizing these habitat areas that included upland and wetland dependant species including regionally significant species.

These natural areas also provide habitat for a typical variety of mammal species, ranging in size from small mammals to White-tailed Deer. The river and creek corridors also provide habitat and movement areas for an expected variety of reptile and amphibian species, and common amphibians have been noted, or are expected in the various wetland areas (for example, Spring Peeper, Chorus Frog, Wood Frog, Gray Tree Frog). These liner habitat areas also provide movement opportunities for other wildlife species.

The findings of these surveys, coupled with previous wildlife information, clarified the importance of the wetland areas. Selection of the Recommended Route (2002) provides for retention of the wetland core areas, thereby protecting the wildlife habitat that they support.

At the Grand River valley crossing there will be impacts associated with the highway approaches and the high level bridge. The bridge structure will be designed to maintain aquatic, flood flow, and valley wildlife movements, as well as the integration of the Walter Bean trail. Due to lower light levels under the bridge, vegetation growth will be inhibited, and other erosion stabilization measures will be required. Specific measures will be identified during detail design. In selecting bank stabilization measures, consideration should be given to the movement of smaller terrestrial species.

Table 6.3.5.1 provides a review of various wildlife-related impact issues, mitigation strategies and anticipated residual effects.

Table 6.3.5.1 – Highway 7 – Summary of Impact and Mitigation for Wildlife			
Issue	**Comment and Impacts**	**Mitigation Strategy**	**Residual Effects**
Implication for Forest Dependant/ Wetland Birds	• Fragmentation of core habitat areas supporting forest dependant/wetland birds is a potential concern, through direct habitat loss and creation of conditions favouring nest predator and nest parasite species. • The Recommended Route (2002) for the most part avoids fragmentation of core wetland/forest blocks. Core habitats in the B-R wetland, Weiland Forest, Hopewell Riparian Woodland/Wetland, Townline Wetland and Ellis Creek wetland have been maintained. • There is habitat removal at the Grand River crossing. There is removal of the south tip of the Weiland Forest tract – the alignment is about 200 m from the central core woodland/wetland in the Weiland Tract. Fragmentation impact occurs at the Marden Wetland, one of 9 wetland blocks in the Marden complex. •	• The alignment shifts and avoidance of core wetland and forest areas are key mitigation measures. • Additional mitigation measures have been identified for water quality and vegetation and wetland protection. Implementation of these measures will have wildlife habitat benefits.	• Wildlife habitat removal cannot be avoided in some locations, such as the Marden Wetland and the Grand River crossing. The Grand River approach (south side) removes successional hawthorn and buckthorn thicket as well as some floodplain forest and wetland, but avoids higher quality forest habitat to the east. Some reduction in breeding habitat quality can be expected in this area. • Secondary effects from wetland intrusion elsewhere along the alignment are expected to be softened because intrusion has been reduced to areas where edge effects are already present. Where edge management and buffer plantings are warranted (subject to further review at detail design), these will also help to soften effects.
Implications for Heronry – Townline Wetland	• The Recommended Route (2002) borders the south edge of Townline wetland east of Townline Road. A colony of nesting Great Blue Herons is located in the wetland. The impact concern is potential disturbance to nesting birds during construction (short-term) and during operation (long term). • Forest edge intrusion (if any) will be limited and may be avoidable through further alignment refinement at detail design. • In Ontario, Agro and Naylor (1994) found that distance from a colony to the nearest road was not significantly different for colonies that became inactive or remained active. They commented that herons may be more tolerant of the continuous, yet predictable disturbance along roadways.	• The concentration of nests is located anywhere from 200 to 400 m from the alignment. The location of the Recommended Route (2002) reflects the shifts that avoided the Townline West Wetland core as well as the Ellis Creek wetland core, both shifts that were strongly supported by agencies. • For Ontario, Agro and Naylor (1994) have recommended that no timber harvest be undertaken within 500 m of large colonies (> 50 nests) during the breeding season (April to August). Forest edge intrusion may be avoidable in any event in this area with minor route refinements. The need (if any) for construction timing restrictions in this regard will be reviewed with MNR during detail design.	• Short term impacts may be avoidable by construction scheduling (outside breeding season) and/or alignment refinements to avoid any tree clearing. • Operational impacts are not anticipated with the roadway distance from the nests and the apparent tolerance to predicable roadway noises (see Agro and Naylor, 1994). • Heronry use of the site is not long term. Heronries eventually exceed the carrying capacity of a particular wetland because of nest tree decline (weight of nests, extensive faecal deposition). In Ontario, a colony survives an average of 9 years (Agro and Naylor, 1994).

Table 6.3.5.1 – Highway 7 – Summary of Impact and Mitigation for Wildlife			
Issue	**Comment and Impacts**	**Mitigation Strategy**	**Residual Effects**
Implications for Waterfowl/Water bird Habitat	• Portions of the Ellis Creek wetland have been identified by MNR as providing habitat for waterfowl use. The ponded area immediately upstream of existing Highway 7 provides this function. • The Grand River provides habitat for waterbird/waterfowl staging, nesting and foraging. This function occurs throughout the river system and is not unique to the crossing area.	• The alignment has been shifted north out of the Ellis Creek core wetland area, and therefore further away from the ponded areas used by waterfowl. Potential waterfowl nesting habitat (for example, Mallard) is removed at the wetland crossing, but such habitat is not limited throughout the Ellis Creek system. • The Grand River crossing will utilize a high level bridge structure that will span the river and shoreline areas.	• Ponded areas where waterfowl and waterbirds may gather (such as Ellis Creek wetland adjacent to existing Highway 7) are avoided by the Recommended Route 2002. Waterbird and waterfowl use of the area will continue. • Localized habitat providing some potential waterfowl nesting (for eg. Mallard) will be removed/altered due to construction. • The Grand River bridge will span the river. Some river valley potential nesting habitat will be removed, or its characteristics will change, as a result of the construction of the bridge. River valley habitat will continue to exist upstream or downstream of the new crossing location. Opportunities for waterbird and waterfowl staging and foraging along the river will continue, as is observed at other bridges in the Region.
Implications for White-tailed Deer Winter Concentration Use	• The Marden South Wetland complex has been identified by MNR as providing winter deer concentration habitat. • The alignment fragments one of the 9 wetland blocks that comprise the complex. Winter deer use of that block will be limited. Winter use of the wetland blocks to the north will not be affected by the Recommended Route (2002).	• The Recommended Route 2002 has been selected to balance agricultural and wetland impacts/issues as well as in consideration of the geometry for a future Hanlon Expressway (north) interchange.	• Winter deer use of the block fragmented by the alignment will be limited, and possibly eliminated. This area is proximate to the City of Guelph urban limit – providing further pressure on potential future deer use of this southerly wetland block. • The remaining wetland blocks to the north will not be affected by the Recommended Route 2002.

Table 6.3.5.1 – Highway 7 – Summary of Impact and Mitigation for Wildlife			
Issue	**Comment and Impacts**	**Mitigation Strategy**	**Residual Effects**
• Implications for Amphibian Breeding	• Suitable seasonal pool areas conducive to amphibian breeding are present in the Weiland Forest tract (central section with swamp habitat), the Townline Wetland, and the Ellis Creek Wetland. • The impact concern is either direct removal of breeding habitat or secondary effects on breeding habitat (for example, addition of contaminated road runoff).	• The Recommended Route (2002) avoids most known or potential amphibian breeding areas. The alignment swings south and is at least 200 m away from amphibian breeding habitat in the Weiland Forest tract. • In addition, the southerly alignment shift that resulted in the Recommended Route (2002) places the alignment out of the Townline Wetland core and out of soft maple swamp habitat that is seasonally ponded. • Finally, the northern alignment shift that resulted in the Recommended route (2002) places the alignment out of the core portion of the Ellis Creek wetland and has reduced the impact risk on amphibian breeding considerably. • Mitigation measures have been identified for runoff quality control, protection of surface water resources, and vegetation/wetland protection. Implementation of these measures will have direct benefit to amphibian (and reptile) habitat.	• Any wetland intrusion potentially affects amphibian and reptile habitat. Wetland removal by the alignment is recognized. Key areas where amphibian breeding is expected to occur are not affected by the Recommended Route (2002). • Introduction of contaminants during and following construction is a quality risk that requires careful attention.

Table 6.3.5.1 – Highway 7 – Summary of Impact and Mitigation for Wildlife			
Issue	**Comment and Impacts**	**Mitigation Strategy**	**Residual Effects**
Wildlife Road Mortality Risk	• Transportation facilities impose a risk to wildlife crossing a road. The level of risk is a function of the habitat setting, wildlife species involved, and traffic volumes. • Wildlife road mortality will occur on the new road. Terrestrial-based species crossing the road will be most at risk. The mammals that occur in the area are typically those found in agricultural and rural areas. Species most likely to be at risk are Eastern Woodchucks, Eastern Cottontail, Grey Squirrel, Eastern Chipmunk, Raccoon, and Striped Skunk. Virginia Opossum are also periodically observed as road kill in the area. These species are currently at risk on existing Highway 7. • The effect of the new highway will be to transfer some of the risk from the existing roadway (which will become a more local use road) to the new highway. White-tailed deer are also at risk crossing any roadway. They will use bridge structures and suitably sized culverts, but also tend to cross roadways in a dispersed manner. • Slow moving species such as amphibians and reptiles that cross roads or nest in gravel road margins are also at risk from road mortality. Higher risk areas are expected to be in the vicinity of watercourses and wetlands where seasonal dispersal movements may be occurring.	• Bridge structures will be provided at the Grand River, Hopewell Creek, and Ellis Creek locations. These structures will maintain movement opportunities for both aquatic and terrestrial wildlife species and will therefore reduce risk of road mortality at these locations. • Culverts will be provided at Rosendale Creek as well as the other small tributaries/drains along the alignment and where cross-drainage is required. These structures will provide additional opportunities for wildlife to cross beneath the highway. Modifications to culvert size and configuration will be considered during detail design in an effort to improve opportunities for safe wildlife passage • Deer crossing signs and good driver visibility can assist in deer crossing awareness to help reduce road mortality risk.	• There will be road-related wildlife mortality. The risk cannot be eliminated, but can be alleviated somewhat with provision of bridge structures where indicated, provision of numerous culvert structures, and review of structure design elements at detail design that will benefit wildlife movement.

6.3.6 Air Quality

Overview

Transportation is a significant contributor to air pollution. It is, however, not the only contributor. Industrial, commercial, residential, agricultural and other activities also contribute to air pollution. Hence, it is not easy to discern, with a high degree of accuracy, the local air quality impact of a specific highway in the presence of all other contributing sources of pollution. This task is further complicated by the variability of meteorological and traffic conditions, which have a strong influence on local air quality impacts.

The primary pollutants from road vehicles (automobiles, trucks, etc.) are carbon monoxide (CO), oxides of nitrogen (NO_x), and volatile organic compounds (VOC).

A second group of transportation related pollutants, secondary pollutants, are not directly emitted by vehicles and affect regional as well local air quality. The principal members of this group are ozone (O_3) and particulate matter (PM). Ozone is one of the products of photochemical atmospheric reactions in which NO_x and VOC play key roles. These reactions occur over large regions and take considerable time for completion. Hence, local ambient concentrations of ozone are not directly related to emission rates of NO_x and VOC of specific sources, such as local road traffic. Particulate matter (PM) is also considered a regional pollutant. Particulates emanate from a large number of sources, including motor vehicles, and also from secondary reactions in the atmosphere, involving pollutants such as NO_x and SO_x (oxides of sulphur).

Road transportation's share of these pollutants varies widely with location and time. Typically, this share is larger in urban centres and during rush hours.

Pollutants can cause adverse effects on human health and the environment. The federal government regulates emissions from new motor vehicles. This practice started in the 1960s. Recent emission standards represent a better than 90% reduction of emission rates since the pre-control era. In January 2003, Canada adopted more stringent emission standards for the 2004 and later model year vehicles. Emission rates of in-use vehicles are subject to provincial guidelines, which are enforced primarily through the Drive Clean program in Ontario.

The emission rates of particulate matter, NO_x and SO_x, are influenced by the composition of fuel used in the vehicle. Fuel quality is now regulated, and the sulphur content in diesel fuel and gasoline is being reduced dramatically. This development alone is expected to produce major air quality benefits, especially lower particulate emissions.

In conclusion, stricter standards for vehicles and fuels along with provincial inspection and maintenance programs help protect air quality, particularly in the vicinity of heavily travelled roads.

Over the last decade, greenhouse gas (GHG) emissions of transportation and other anthropogenic sources of pollution have also become a matter of concern, since evidence for their effects on the global climate has been mounting. The principal anthropogenic

greenhouse gases are carbon dioxide, nitrous oxide and methane. These compounds have no known deleterious effects on human health at ambient concentration levels and are not listed as criteria air contaminants. Therefore, they are normally not taken into account in project-specific air quality impact assessments. Rather, they constitute a global environmental concern, since their impacts are not localized and may extend across the globe. Hence, efforts to limit GHG emissions need to be addressed through international agreements, such as the Kyoto Protocol, and are best handled through broader transportation measures.

Impacts

The potential local air quality impacts of the proposed new Highway 7 along with the existing Highway 7 were assessed for a credible worst-case scenario in 2011 and 2016. The complete Air Quality report is included in Appendix N. This scenario assumed the coincidence of peak traffic volumes with poor meteorological conditions (low wind speeds in a direction almost parallel to the highway, and a high degree of atmospheric stability). The analysis methodology builds on MTO's extensive measurement and modelling study for Highway 404 in Toronto and US EPA (United States Environmental Protection Agency) and Environment Canada emission factor models.

The scope of the analysis encompasses potential increases in the ambient concentrations of CO, NO_2, VOC and PM in the vicinity of the Recommended Route (2002). This vicinity is largely rural, with most residences located at approximately 100 m and farther from the edge of the planned highway.

The results of the analysis indicate that, even under the credible worst-case scenario and conservative assumptions, the ambient concentrations of CO, NO_2 and toxic VOCs in the vicinity of the highway will not exceed provincial ambient air quality criteria. In fact, they will remain much below these criteria. The concentrations of fine particulate matter, on the other hand, may approach or even exceed the provincial / federal criteria for PM_{10} (inhalable particulate matter smaller than 10 micron in diameter) and $PM_{2.5}$ (respirable particulate matter smaller than 2.5 micron in diameter) under credible worst-case conditions.

The primary cause for anticipated particulate values is the background level for PM_{10} and $PM_{2.5}$ at the site and across the province. Highway traffic, through re-entrained dust, vehicle exhaust, and brake and tire wear, is only a small contributor.

Given the small contribution of the highway to the local air quality, it is not feasible to provide any project-specific mitigation measures.

6.4 Agriculture

6.4.1 Agricultural Land Use and Farm Community

This section of the report discusses the impacts that are expected on agricultural Land Use and the Farm Community, upon construction of the Recommended Route (2002).

Throughout the EA process agriculture was a major consideration in the process leading to selection of the Recommended Route 2002. As noted in Chapter 4, when alignment alternatives were evaluated during the MTO Review, all or portions of the alternatives had some level of effect on agriculture.

It was recognized in the EA Report (1997), and reiterated in this document, that route selection has in many cases been a tradeoff between agriculture and wetlands. Shifts in the alignment to better protect one resource inevitably increase impact on the other resource due to the east-west nature of the alignment in relation to the distribution of agricultural lands and natural areas.

The Recommended Route (2002) that has been developed as the outcome of the MTO Review has achieved a balance between agricultural and wetland effects while considering socio-economic implications. In providing increased protection of key wetlands along the route, the alignment shifts have moved further from farm property lines – normally an optimal location – thereby increasing severance effects in a number of areas. However, some shifts, such as at the west end, avoided livestock operations that were affected by the Recommended Plan (1997). The Recommended Route (2002) remains in an agricultural setting that is similar to the Recommended Plan (1997) in that the agricultural properties are predominately leased lands as opposed to being in a setting with large owner/operated properties.

The majority of the soils within the study area are rated Class 1 to Class 4 for the production of field crops, and are considered to be prime agricultural land. Each of the alternatives evaluated resulted in impacts on prime agricultural land.

Table 6.4.1 reviews agricultural effects along the alignment, referenced by chainage location. The review highlights the nature of agricultural activity affected, including anticipated building removals and access impacts/changes.

Table 6.4.1 – Summary of Recommended Route (2002) - Agriculture		
Chainage	**Agricultural Activity**	**Nature of Effect**
21+855 to 22+800 (RT)	Idle agricultural land (>10 years) – cultural meadow and disturbed	Removal along ROW, ramp and service road.
22+800 to 23+055 (RT and LT)	Leased – idle agricultural land	Removal along ROW. Access to south provided by new service road.
23+055 to 23+700 (RT and LT)	Field and forage crop lands – owner operated	Removal along ROW and fragmented into two 10 ha parcels to south with access provided by new service road.
23+700 to 24+285 (RT and LT)	Field crop – owner operated	Removal along ROW and at interchange with Ebycrest Road. No access to remnant parcel on south side.
24+285 to 24+400 (LT)	Field crop – owner operated	Edge removal of parcel along ROW and interchange.
24+350 to 25+015 (LT and RT)	Field crop - leased	Property edge effects – removal along ROW. Access changes and creation of smaller parcels.
25+480 to 25+600 (LT)	Livestock - horses	Removal along ROW (south half of property). Access maintained to north half. Operation affected. About 3 ha size property with 1.5 ha portion remaining to north.
25+795 to 25+920 (RT and LT)	Livestock - sheep	Removal along ROW. Access to rear parcel removed and property fragmented (about 7 ha in size, fragmented in two).
25+920 to 26+700 (RT and LT)	Cash crop and field crop, leased	Removal along ROW. About 60 ha in area, fragmented into 20 and 30 ha parcels..
26+715 to 27+600 (RT)	Beef cattle - leased	Removal along ROW, along north property edge. About 45 ha parcel, with about 8 ha fragmented (loss of access to northeast corner).
27+600 to 27+930 (RT)	Specialty crop (organics, vegetables). Sheep pen under construction (Sept 2001). Owner operated	Removal along ROW with parcel fragmentation. Loss of access to north parcel cut off.
27+930 to 28+080 (RT and LT)	Specialty crop – nursery. Owner operated	Removal along ROW. About 7.5 ha property, with 2.5 ha severed at north end. Irrigation water supply may require attention.

Table 6.4.1 – Summary of Recommended Route (2002) - Agriculture		
Chainage	**Agricultural Activity**	**Nature of Effect**
28+275 to 28+450 (LT)	Forage crop	Removal along ROW and access ramp to Shantz Station Road. Property fragmented, buildings removed or isolated. Majority of 3 ha parcel removed.
28+970 to 29+130 (RT and LT)	Cash crop, owner operated	Removal along ROW. ROW severs about 8 ha parcel to north, 2 ha parcel to south. Access to north portion via proposed laneway from Shantz Station Road.
29+130 to 30+075 (RT and LT)	Specialty crops (Pick your own berries, pumpkins) – leased	Removal along ROW. Parcel about 48 ha – ROW leaves about 24 ha to north, 9.5 ha to south. Fragments parcel, access to north portion via proposed laneway from Shantz Station Road..
30+075 to 31+960 (RT and LT)	Field crops - leased	Removal along ROW. Severance of leased 60 ha property into two parcels – 20 ha and 30 ha. Access available from existing Highway 7 and Townline Road.
30+985 to 32+040 (RT and LT)	Field crops – leased	Removal along ROW. Field centrally fragmented into two 10 ha parcels. Existing driveway removed, barn building removed.
32+040 to 32+980 (RT and LT)	Dairy cattle – owner operated	Removal along ROW. Parcel fragmentation, some buildings affected. About 60 ha size parcel, fragmented into two 25 ha parcels.
33+100 to 34+120 (RT and LT)	Livestock/pasture	Removal along ROW along limit of the north/south parcels. Access may require attention. About 80 ha parcel fragmented into 40 ha and 30 ha parcels.
34+120 to 35+135 (RT and LT)	Cash crop, owner operated	Removal along ROW and interchange with County Road 86. About 50 ha parcel, with south 15 ha removed. Buildings removed.
35+175 to 36+185 (LT)	Livestock forage and fuelwood. Owner operated	Removal along ROW and interchange with County Road 86. Removal of south parcel edge and portion of fuelwood zone.
36+185 to 37+080 (RT)	Field crops	Removal along ROW. Property fragmented (isolated parcel). Access will require attention.

Table 6.4.2 reviews agricultural impact issues, mitigation strategies, and residual effects in relation to the Recommended Route (2002).

Table 6.4.2 – Highway 7 – Summary of Impacts and Mitigation for Agriculture			
Issue	**Comment and Impacts**	**Mitigation Strategy**	**Residual Effects**
Agricultural Land Crossed	• About 144 ha of agricultural land will be removed for ROW construction. This total includes about 15 ha of idle agricultural land south of Bridge Street. This is an unavoidable removal to accommodate the alignment.	• Property acquisition will be limited to only those lands required for the ROW. Compensation for purchase of land will be at market value according to MTO guidelines.	• Approval of the new alignment will provide security of tenure for farmers who have been uncertain of the future location of Highway 7 for many years. • Viability of remaining farms will vary depending on size of residual parcels and access. Discussions with Woolwich Township staff revealed that even 5 ha parcels will support hobby farm or other farm activities. Of the 22 property code areas crossed by the ROW, 7 range from 40 to 80 ha in area, and fragmented parcels range from 10 to 40 ha in area. See Table 6.4.1 for details.
Specialty Crop Operations Affected	• Two operations affected just west of Shantz Station Road, and Pick Your Own Berry Operation affected east of Shantz Station Road.	• Property acquisition will be limited to only those lands required for the ROW. Compensation for purchase of land will be at market value according to MTO guidelines	• Loss or reduction of use.
Field Crop Areas	• Eight property blocks supporting field crops are crossed by the Recommended Route (2002).	• Property acquisition will be limited to only those lands required for the ROW. Compensation for purchase of land will be at market value according to MTO guidelines	• Loss or reduction of use.

Table 6.4.2 – Highway 7 – Summary of Impacts and Mitigation for Agriculture			
Issue	**Comment and Impacts**	**Mitigation Strategy**	**Residual Effects**
Dairy/Livestock Operations	• Eight property blocks supporting dairy/livestock operations are crossed by the Recommended Route (2002). • Difficult to mitigate effects where competing tradeoffs occur between resources.	• Difficult to mitigate effects where competing tradeoffs occur between resources. • Some shifts in the Recommended Route (2002) such as at the west end, avoided livestock operations that were affected by the Recommended Plan (1997). • Property acquisition will be limited to only those lands required for the ROW. Compensation for purchase of land will be at market value according to MTO guidelines	• Loss of some portions and anticipated reduction of use, depending on size and nature of residual parcels. (See Table 6.4.1)
Farm Access Effects	• There are 8 property blocks for which access will be removed or made limited by the Recommended Route (2002). • Access to some farm properties and/or within a property will be affected in cases where the alignment severs a property or otherwise presents a barrier that does not exist at present.	• Access issues and barrier concerns will be negotiated between MTO and affected landowners on a case by case basis during Detailed Design. The mitigation approach may take several forms in order to address concerns. Provision of alternate access is one approach that will be considered.	• Variable depending on the nature of access impact and ability to mitigate. • Successful resolution of access requirements after the highway is in place will reduce residual effects to the extent possible.
Farm Equipment Movements	• Farm equipment at present moves along sections of existing Highway 7, creating risk for both farm vehicles and faster moving traffic.	• Wherever possible, separation of slower moving farm equipment from higher speed traffic is desirable.	• The Recommended Route (2002) will reduce the potential for the type of conflicts that presently occur on existing Highway 7 between commuter/through traffic and farm equipment. The new alignment is expected to attract the longer distance higher-speed commuter traffic, leaving existing Highway 7 available for more local traffic use and movement by farm equipment (thereby reducing conflicts with higher speed traffic).

Table 6.4.2 – Highway 7 – Summary of Impacts and Mitigation for Agriculture			
Issue	**Comment and Impacts**	**Mitigation Strategy**	**Residual Effects**
Capital Investment Effects	• Eleven property blocks are affected by the Recommended Route (2002). The effects vary in extent, from edge intrusion, fragmentation, or separation from an irrigation water source. • Difficult to mitigate effects where competing tradeoffs occur between resources.	• MTO will review alternative irrigation water source with affected landowner. • Property acquisition will be limited to only those lands required for the ROW. Compensation for purchase of land will be at market value according to MTO guidelines	• Loss of some portions and anticipated reduction of use, depending on size and nature of residual parcels. (See Table 6.4.1)
Agricultural Severances	• Twelve parcels have been identified as having significant severances from the Recommended Route 2002.	• As noted in the text, alignment shifts that were implemented to avoid or reduce intrusion in wetland blocks have resulted in some farm property severances where property lines could not be followed.	• Loss of some portions and anticipated reduction of use, depending on size and nature of residual parcels. (See Table 6.4.1)
Farm Community Effects	• New highway alignments can result in farm community effects when the cohesiveness and inter-relationship of the existing farm community is fragmented by a roadway. • It is recognized that a new alignment could encourage non-farm related development in the area between the new alignment and existing Highway 7. This is reviewed further in Section 6.2.1 Community Effects and Land Use.	• The Recommended Route (2002) is in the same general vicinity of the Recommended Plan (1997). In this setting it has been noted that farm uses are somewhat transitional in nature because of the influence of existing Highway 7. • Municipalities play an important role in promoting and maintaining agricultural land uses and farm community cohesiveness (through Official Plans and land use policies). The Township of Woolwich has specifically reiterated its intent to promote this objective.	• The major farm community setting further to the north, which is characterized by a number of major agricultural operations, has been avoided by the Recommended Route (2002). • Impacts on the farming community are softened somewhat by its transitional nature with the influence of existing Highway 7, and the presence of a number of leased lands along the route (ratio of owner-operated to leased properties about 13:8)
Tile Drain / Farm Fence Impacts	• Highway construction may result in damage to existing tile drains and farm fence materials.	• Contract provisions will be developed for the management, repair and/or reinstatement of affected farm fences and tile drains. These provisions incorporate relevant OPSS specifications and/or existing MTO specifications for tile drain and fence repair.	• None are anticipated with proper implementation of the stated measures.

6.5 Transportation

6.5.1 Road Network

The construction of proposed Highway 7 from the KWE in Kitchener to the Hanlon Expressway in Guelph will complete an east-west freeway linking Kitchener and Guelph. It will become part of the provincial freeway network that includes Highway 401, Highway 8, the Kitchener-Waterloo Expressway and the Hanlon Expressway to provide long-term interregional/provincial transportation service.

Within the Regional Municipality of Waterloo, the present road network will remain essentially the same with the exception of the roads in the vicinity of the existing Wellington Street and Victoria Street interchanges. As shown on Plate 1, Wellington Street will be connected with Shirley Avenue. Shirley Avenue, in turn, is being extended to the east by the City of Kitchener, to provide a continuous east-west road to Lackner Boulevard and beyond. Two two-way roads will connect Wellington Street to Victoria Street at the Wellington Street ramp terminals. Riverbend Drive will be realigned to the east of the KWE interchange, and will connect to Wellington Street/Shirley Avenue, and to the new Highway 7.

This revised interchange layout has the benefit of resolving concerns about community impacts, which were brought forward by the Mount Hope-Briethaupt ratepayers association and the Waterloo Public Interest Research Group. Residents along Wellington Street expressed concerns that the Recommended Plan (1997) would increase traffic volumes along Wellington Street. The revised interchange actually will function as two interchanges: one that is a freeway to freeway interchange and one that is a local interchange from the KWE to Wellington Street. Westbound traffic on Highway 7 will be directed to the KWE. Westbound traffic vehicles destined for the local road network will exit the highway, using the ramp to Riverbend Drive.

The revised interchange also addresses concerns brought forward by business owners, regarding access to property located on Wellington Street, southwest of the interchange. For example, Electrohome had expressed concerns about undesirable access provided by the Recommended Plan (1997). The revised layout provides improved access for traffic northbound on the KWE, destined for properties on Wellington Street west of the KWE.

As part of the Recommended Plan (1997) consideration was given to a realignment of Ebycrest Road (Regional Road 17) north of existing Highway 7. This was in support of a project being carried out by the RMW. The 'Breslau Bypass,' to the south of existing Highway 7, is currently under construction. RMW also plans to construct a realignment of Ebycrest Road north of existing Highway 7. (It is likely that the realignment of Ebycest Road will be complete before construction of the Recommended Route (2002)).

The Recommended Route (2002) provides a second access to the Bridgeport area. With a partial interchange at Bridge Street, as shown on Plate 4, emergency access to Bridgeport is improved. At the present time, access to the Bridgeport community from Kitchener/Waterloo is limited to Bridge Street at the Grand River crossing. In the event of a two fold emergency, (for example, an accident on the bridge combined with a fire in

Bridgeport), emergency services access to Bridgeport would be circuitous. The Recommended Route (2002) provides improved access to Bridgeport, with a new crossing of the Grand River.

Within the City of Guelph, the Recommended Route (2002) requires closure of Curtis Drive, from Silvercreek Parkway westerly for 260 metres. As noted in Section 5.2, the location of the ramps connecting new Highway 7 to Silvercreek Parkway has been moved further north than in the Recommended Plan (1997), in order to provide the best possible spacing between the signalized ramp terminals, and the existing signalized intersection at Woodlawn Road. Implementation of the Recommended Route (2002), in conjunction with the upgrading of the Hanlon Expressway, will require closure of the existing at-grade intersection at Woodlawn Road and the Hanlon Expressway. The layout of the Highway 7-Highway 6 interchange is shown on Plate 24.

In the EA Report (1997), reference was made to concerns expressed by the County of Wellington and the Township of Guelph-Eramosa, regarding the ramp terminal on Silvercreek Parkway from the northbound Hanlon/Highway 7. Their concern was that vehicles destined for Highway 6 north would use Silvercreek Parkway north and not travel south to Woodlawn Road. Both municipalities passed resolutions requesting that left turns from the highway to Silvercreek Parkway be restricted. This concern would exist until the proposed future extension of the Hanlon is constructed (See Section 5.3.9).

With the Recommended Route (2002), the configuration of the ramp terminal has been modified to provide for a southbound move only. Northbound traffic will be directed to follow the existing Highway 6 Connecting Link along Woodlawn Road to Highway 6 north. The concerns of the County and Township, as identified in the original EA Report, have been addressed.

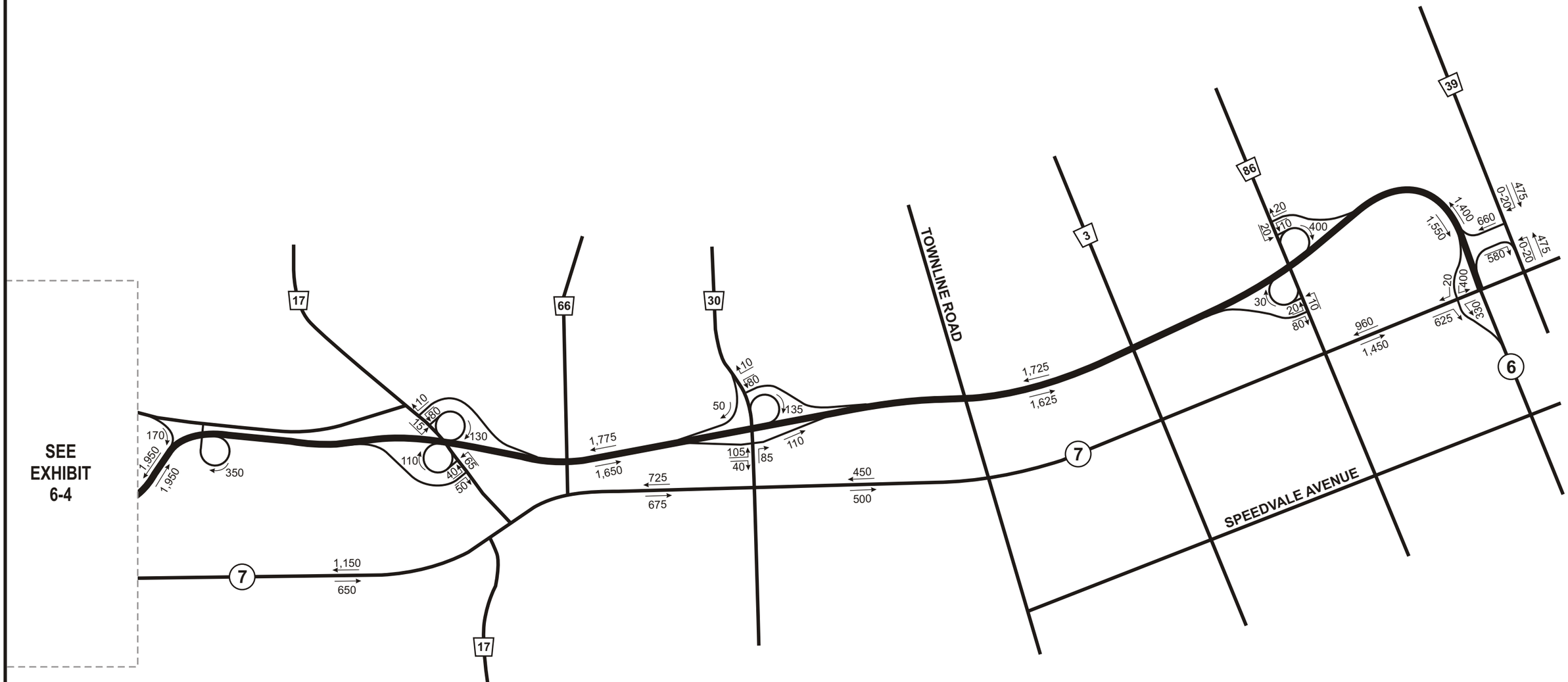
It is anticipated that after construction of the Recommended Route (2002), existing Highway 7 will be transferred to the appropriate municipal authorities (Regional Municipality of Waterloo and County of Wellington). As an upper tier municipal road, existing Highway 7 will maintain its function of providing access to adjacent properties and east-west regional travel.

The 2001 construction cost of a 4 lane freeway between Kitchener and Guelph is approximately $147 million (2002 dollars). The greatest need for improvements is in the central section. Therefore the most logical staging of the project would be the central section first, followed by the west (Kitchener) section, and then the east section (from County Road 86 to the Hanlon Expressway). Staging is discussed in detail in Section 5.3.1.

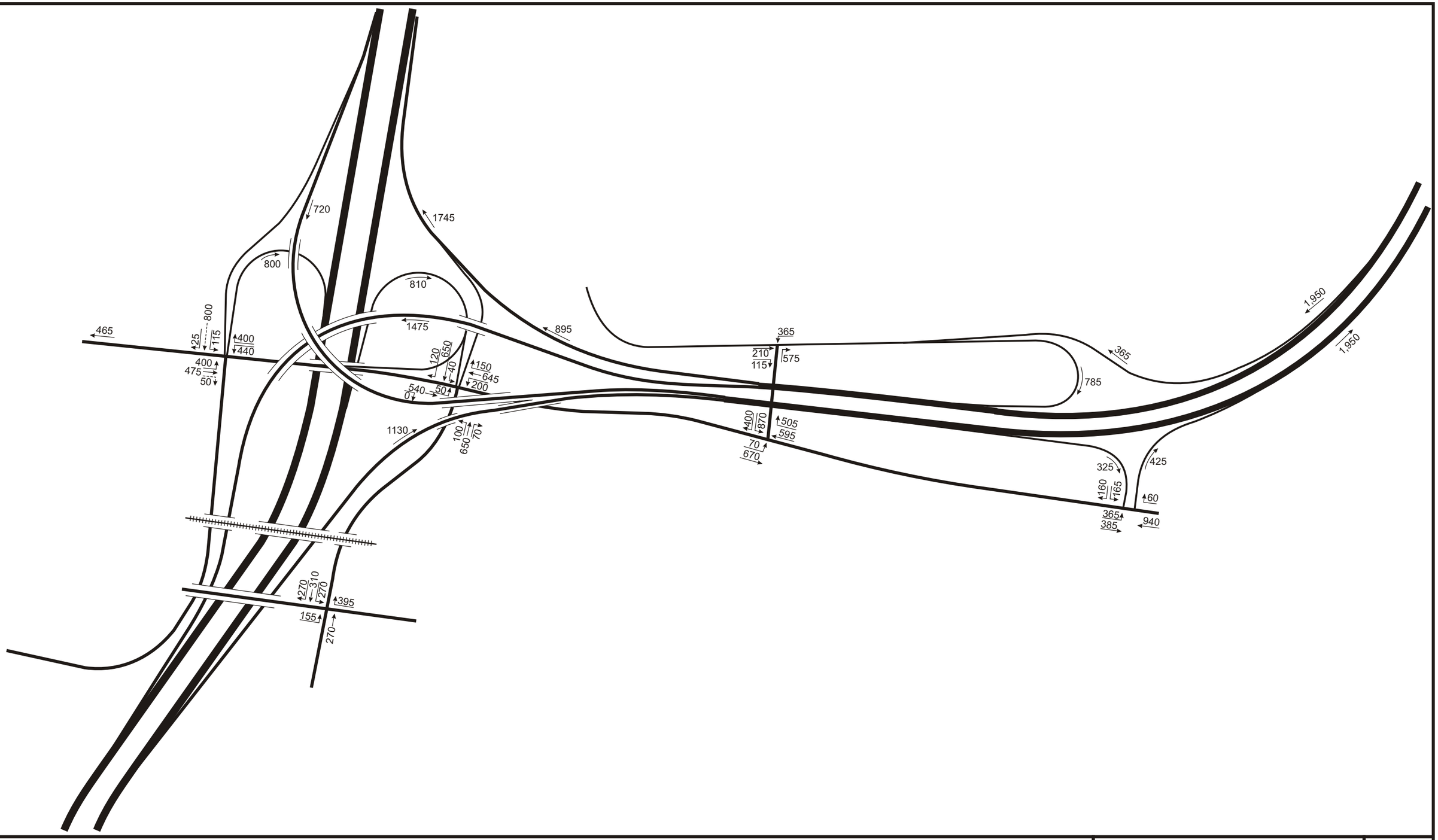
6.5.2 Traffic

An objective of the Highway 7 Planning Study is to provide adequate capacity to handle the forecasted demand. Traffic volumes will be reduced on other roads within the network as the new highway will attract traffic from existing parallel roads, such as Speedvale Avenue and Bridge Street. The level of service on existing Highway 7 will be improved.

Exhibits 6-3 and 6-4 show 2011 traffic assignment for the Recommended Route (2002).



HIGHWAY 7 PLANNING STUDY KITCHENER TO GUELPH	RECOMMENDED ROUTE (2002) TURNING MOVEMENTS 2011 P.M. PEAK HOUR	EXHIBIT 6-3



HIGHWAY 7 PLANNING STUDY
KITCHENER TO GUELPH

RECOMMENDED ROUTE (2002)
TURNING MOVEMENTS
2011 P.M. PEAK HOUR

EXHIBIT
6-4

The network will include a new controlled access highway for the through traffic travelling between Kitchener and Guelph. The existing highway will provide a local function for residents and businesses. From the new highway, the access to the nursery mall will be via interchanges at Ebycrest Road (Regional Road 17) and Shantz Station Road (Regional Road 30).

6.6 Excess Materials and Contaminated Property

6.6.1 Management of Excess Materials

Impact/Issue

This project will generate surplus material, including earth which is not suitable for construction purposes, cleared vegetation, and asphalt and concrete from existing roadways.

Mitigation Strategy

For each waste material, an MTO/MOE protocol identifies management options both within and outside the construction area. Re-use or recycling is the preferred approach for excess materials. MTO encourages the re-use of materials, such as excess asphalt by accepting crushed asphalt in Granular "A" and recycled material in specified asphalt binder courses, (typically, the first 'layer' of asphalt). For this project, an appropriate proportion of recycled material will be determined during the design stage.

Within the limits of the right-of-way, materials such as asphalt, concrete and earth, may be re-used as construction materials. Materials may also be temporarily stockpiled inside the right-of-way in preparation for these uses.

The options for managing excess materials outside of the right-of-way include re-use, stockpiling for re-use, disposal as waste and, for certain materials, disposal as fill. Site protection is provided through specific constraints adapted from existing legislation.

Management of excess materials outside the right-of-way also requires the contractor to obtain written agreements with property owners. Where a re-use/recycling option cannot meet the established constraints, another option must be pursued or the material must be disposed of as waste.

Residual Effects

No adverse residual effects are anticipated if the above measures are implemented during the construction and site cleanup process.

6.6.2 Contaminated Property

Impact/Issue

There is the possibility that contaminated soils may be encountered in areas to be affected by the Recommended Route (2002). Contaminated soils may exist within the right-of-way of existing roadways, or on property purchased for the undertaking. The risk of encountering contaminated soils is greatest in or near existing commercial/industrial

areas, such as at the west (Kitchener) and east (Guelph) ends of the alignment. However, experience has shown that contaminated sites may be found at other locations as well. There is at least one known site that is contaminated.

Mitigation Strategy

MTO follows a site screening protocol in order to identify potential areas of contaminated soil, prior to property acquisition. If a contaminated property is purchased, then environmental site assessments and remediation activities will be undertaken, in accordance with MOE regulations.

If contaminated property escapes detection during the design process, and unexpected contamination is identified during construction, the material will be investigated. Contaminated soil will be disposed of in a manner acceptable for its classification. Consultation with MOE will be undertaken, as required. Contaminated materials will be considered in more detail, at detail design.

Residual Effects

With the implementation of these mitigation measures, no adverse residual effects are anticipated.