

407 East Individual Environmental Assessment (IEA) and Preliminary Design Study

Landscape Composition Impact Assessment of the Recommended Design

August 2009

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1. Introduction

1.1 Study Overview

The Ontario Ministry of Transportation (MTO) in consultation with the Region of Durham, its constituents and surrounding municipalities, is undertaking an Individual Environmental Assessment (EA) Study to address the long-term transportation needs in the Region of Durham and surrounding area. The study supports the transportation objectives of the provincial *Growth Plan for the Greater Golden Horseshoe* by providing for the efficient movement of people and goods within the study area. A proposed extension of the 407 transportation corridor, consisting of a highway and transitway, has been recommended as part of a number of transportation improvements, as defined in an earlier phase of the EA.

A technically preferred corridor (TPR) for the transportation corridor was presented in June 2008. The preferred corridor extends from the current terminus at Brock Road in Pickering to Highway 35/115 in Clarington and includes two north-south links connecting Highway 401 to the proposed extension of the 407 corridor, one in West Durham (Whitby) and the other in East Durham (Clarington).

Since the release of the TPR, further analysis and preliminary design work has been undertaken to define the transportation corridor in greater detail, including additional corridor refinements and the location / size of support facilities for the corridor. In addition, ongoing studies and analysis have been undertaken to determine potential environmental impacts and proposed mitigation measures and strategies. The Recommended Design for the proposed transportation corridor, including the two north-south links, was presented in January / February 2009.

1.2 Report Overview

In summary, this report documents the Landscape Composition Impact Assessment of the Recommended Design associated with the 407 East Environmental Assessment (EA). Readers are encouraged to view this report in its entirety. Similarly, it is recommended that all Impact Assessment Reports (discussed further below) are to be read in tandem with this report, to ensure that measures and recommendations within each discipline's report are compatible and carried forward where recommended.

In the preceding Alternative Methods phase, a net effects analysis and comparative evaluation of the short-listed corridors were carried out to determine a Technically Recommended Corridor (TRR)¹. The potential environmental effects, mitigation or compensation measures to address the potential adverse environmental effects, and the remaining net effects following the application of the mitigation or compensation measures were identified for the TRR.

1. Ministry of Transportation, 407 East Environmental Assessment, Alternative Methods Report, August 2007.

Based on stakeholder input, further analysis and preliminary design work to define the preferred corridor in greater detail, including the location / size of support facilities for the corridor, and to further avoid or mitigate environmental effects, the TRR was refined in a number of locations as part of determining the Technically Preferred Corridor (TPR). The footprint of the Recommended Design for the transportation corridor, including support facilities such as transitway stations, maintenance facilities and stormwater management ponds, is illustrated in **Exhibit 1-1**.

The approved 407 East EA Terms of Reference (ToR) proposed that a concept design (including plan and profile) of the Recommended Design would be prepared so the potential environmental effects and mitigation or compensation measures previously identified during the Alternative Methods phase, could be more accurately defined along with enhancement opportunities and approval requirements². However, the Ministry of Transportation (MTO) has enhanced the design effort from Concept Design to Preliminary Design in order to further increase the level of detail for the Recommended Design and advance the overall project delivery schedule.

The discipline specific work plans developed earlier in the 407 East EA, outlining how impacts associated with the Recommended Design would be assessed, were carried out within the context of Preliminary Design rather than Concept Design. The results from assessing the impacts are documented in the following 11 stand alone Impact Assessment Reports:

- Terrestrial
- Fisheries
- Hydrogeology
- Landscape Composition
- Socio-Economic (including Land Use)
- Noise
- Air Quality
- Agricultural
- Waste Management and Contamination
- Archaeology
- Cultural Heritage

Notwithstanding the fact that the Impact Assessment Reports are stand alone documents, there are interrelationships between the reports where the information discussed overlaps with related disciplines. Examples of this include the following:

- Terrestrial, Fisheries, and Hydrogeology
- Socio-Economic (including Land Use) and Agricultural
- Hydrogeology and Waste Management and Contamination

The Landscape Composition Impact Assessment Report utilizes and builds on the mitigation and compensation measures outlined by other disciplines providing an amalgamation of the proposed mitigation and compensation measures from all Impact Assessment Reports. Through the course of the study the landscape architecture team has worked in collaboration with all disciplines and technical design teams. In addition, the landscape architects worked closely with the Community Value Plan (CVP) team and the public in exploring and assessing localized landscape related issues, opportunities and enhancements. Further, this Report also

2. Ministry of Transportation, 407 East Environmental Assessment Terms of Reference, as amended November 29, 2004.

meets the requirements of the MTO Environmental Reference for Highway Design (ERD) *Section 3.9 – Landscape Composition*.

The resultant Landscape Composition Report includes:

- The Impact Assessment;
- Preliminary Design Plates that present the mitigation recommendations of all disciplines as well as landscape composition and CVP enhancements; and
- Plans illustrating plant palette, landscape enhancements, benefits of plant material, and visualizations of the proposed treatments.

1.3 Landscape Composition Study Team

A study team consisting of AECOM (formerly TSH) and Ecoplans staff undertook the Landscape Composition impact assessment. The actual individuals and their specific roles are as follows:

AECOM – West and Central Mainline, West Durham Link

Michael Hubicki – Senior Landscape Architect and Project Manager, Landscape
Sara Taylor – Associate Landscape Architect

Ecoplans Limited – East Mainline and East Durham Link

Shannon Baker – Senior Landscape Architect
Brad Smith – Landscape Architect

Exhibit 1-1 Transportation Corridor Footprint / Sections



2. Study Area

As illustrated in **Exhibit 1-1**, the study area associated with the Recommended Design is composed of seven sections; five sections for the mainline and one section each for the West and East Links. These seven sections reflect how the TRR was subdivided during the Alternative Methods phase. A description of the transportation corridor for each of these sections is provided below.

Transitway stations are proposed at all interchange locations with the exception of Thornton Road on the mainline.

West Mainline – Section 1 (Brock Road to Kinsale Road)

The transportation corridor commences at Brock Road in Pickering and continues easterly to Kinsale Road crossing Highway 7 at Sideline 16. It is compatible with the proposed Brock Road realignment east of the Village of Brougham and the proposed Westney Road realignment east of the Hamlet of Greenwood. Interchanges are located at Brock Road By-Pass, Westney Road and Salem Road, with a realignment of Highway 7 required in the vicinity of Sideline 16 to accommodate the Brock Road Interchange. A highway maintenance facility and a Commercial Vehicle Inspection Facility (CVIF) are proposed at Salem Road.

West Mainline – Section 2 (Kinsale Road to Ashburn Road)

Continuing easterly from Kinsale Road, the transportation corridor crosses to the south of Highway 7 between Cochrane Street and Ashburn Road in Whitby. The corridor remains to the south of Brooklin and continues east past Baldwin Street. Interchanges are proposed at Lake Ridge Road and Baldwin Street and a freeway to freeway interchange is proposed just east of Lake Ridge Road to accommodate moves between the mainline and the West Durham Link. A transitway maintenance facility is proposed at Lake Ridge Road.

Central Mainline – Section 3 (Ashburn Road to Simcoe Street)

From the Baldwin Street interchange, the transportation corridor heads directly east to Thickson Road and then northeast crossing Winchester Road in the vicinity of Thornton Road in Oshawa. Interchanges are proposed at Baldwin Street, Thickson Road, Thornton Road and Simcoe Street.

Central Mainline – Section 4 (Simcoe Street to Enfield Road)

From Simcoe Street, the corridor continues easterly paralleling the hydro corridor north of Winchester Road. East of Harmony Road, the transportation corridor crosses the hydro corridor and heads in a southeasterly direction to Enfield Road in Clarington. Interchanges are proposed at Simcoe Street, Harmony Road, and Enfield Road within this section. A transitway maintenance facility is proposed at Simcoe Street.

East Mainline – Section 5 (Enfield Road to Highway 35/115)

From Enfield Road, the transportation corridor continues to the east, remaining south of Winchester Road until Nixon Road, at which point the corridor heads north to connect with Highway 35/115. Local road realignments will be required for Winchester Road at Regional Road 57 as well as Winchester Road at Darlington-Clarke Townline Road. Interchanges are proposed at Regional Road 57, Darlington-Clarke Townline Road and Highway 35/115. A freeway to freeway interchange is proposed just east of Solina Road to accommodate moves between the mainline and the East Durham Link. A highway maintenance facility is proposed at Regional Road 57 and a CVIF is proposed at Bethesda Road.

West Durham Link – Section 6

Commencing at Highway 401, the West Durham Link runs north east of Lake Ridge Road in Whitby. A realignment of Coronation Road is proposed from Dundas Street to Taunton Road. Full interchanges are proposed at Rossland Road and Taunton Road. Partial interchanges are proposed at Dundas Street and Highway 7. A freeway to freeway interchange is proposed to accommodate moves between Highway 401 and the West Durham Link, just east of Lake Ridge Road. Two CVIF lay-bys are proposed north of Taunton Road.

East Durham Link – Section 7

Commencing at Highway 401, the East Durham Link runs to the west of Solina Road to Nash Road in Clarington, where it then crosses Solina Road, running parallel to Rundle Road on the west side. Realignments of Hancock Road at Highway 2 and of Rundle Road just south of Taunton Road are required. A full interchange is proposed at Highway 2 and a partial interchange is proposed at Taunton Road. A freeway to freeway interchange is proposed to accommodate moves between Highway 401 and the East Durham Link east of Courtice Road. A CVIF lay-by is proposed just north of Bloor Street.

3. Methodology

The assessment of impacts associated with the Recommended Design was undertaken through a series of steps based on a number of previously prepared reports (see **Exhibit 3-1**). The net effects associated with the TRR in the Alternative Methods Technical Report (Socio-economic, August 2007) were based on functional plans of the transportation corridor. These effects were reviewed within the context of the preliminary design plans developed for the TPR to determine the type and extent of additional investigations required as a result of Preliminary Design (including corridor refinements, preliminary design alternatives and identification of supporting facilities). Additional investigations (documented in **Chapter 4** of this report) were then carried out where necessary to augment the previous work undertaken during the Alternative Methods phase.

In light of additional investigations and Preliminary Design planning, the environment potentially affected by the Recommended Design was updated from what was previously presented during the Alternative Methods phase and has been documented in **Chapter 5** of this report.

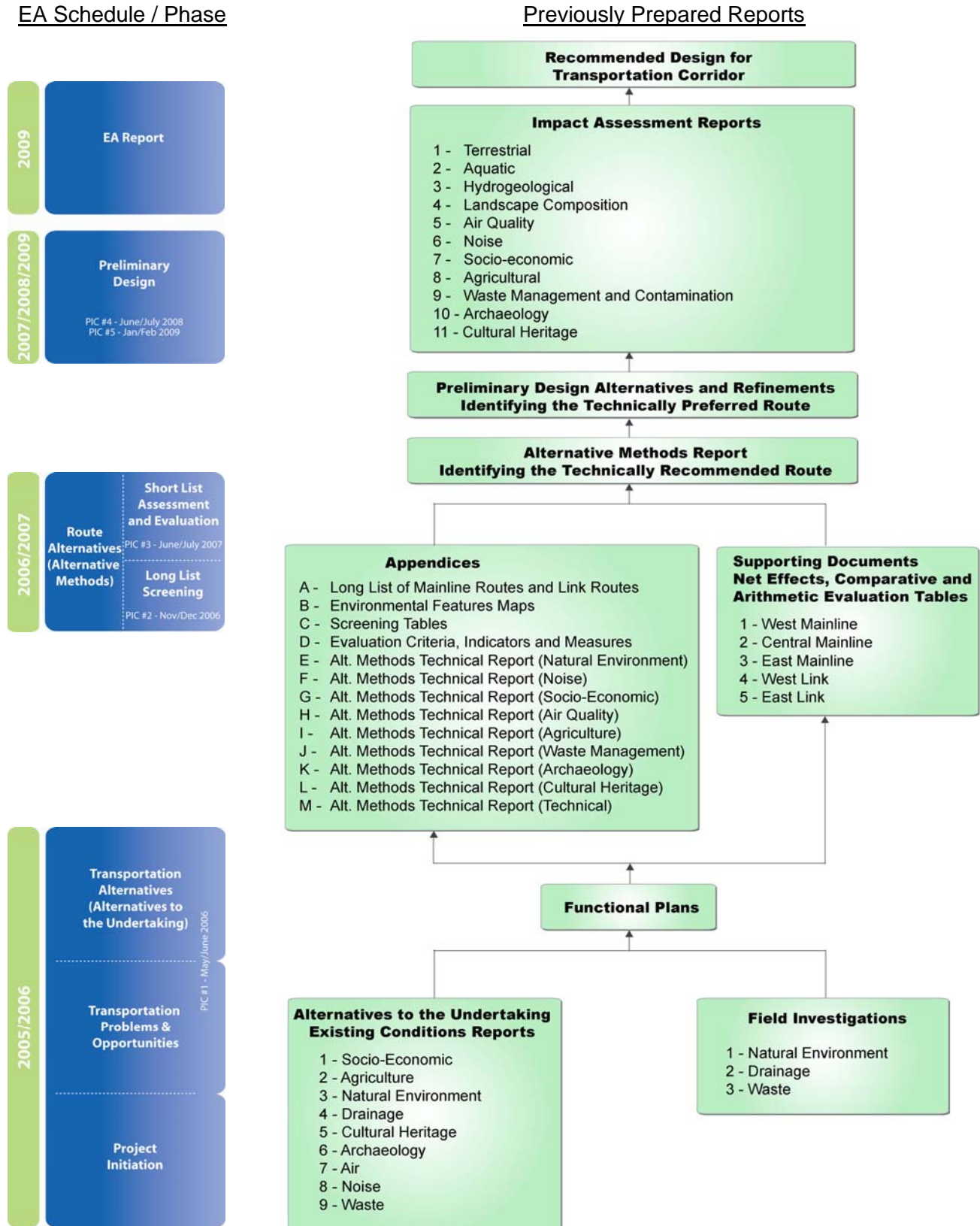
The previously identified potential effects and recommended mitigation or compensation measures associated with the TRR, (documented in the Alternative Methods Technical Report Socio-economic, August 2007) were then reviewed to ensure their accuracy in the context of a more detailed understanding of the environment and in the context of Preliminary Design. The Recommended Design for the transportation corridor was then evaluated to confirm the potential effects, mitigation or compensation measures, and net effects associated with the Recommended Design and document them in accordance with MTO's Environmental Reference for Highway Design (ERD – MTO 2006) in **Chapter 6**.

Once field investigations were completed, the key objective of the landscape composition work during Preliminary Design (including developing and evaluating design refinements and alternatives) was to augment the existing information along the transportation corridor (highway/transitway) to a level of detail so that a comprehensive impact assessment and appropriate preliminary mitigation measures could be developed.

In addition to identifying mitigation or compensation measures, potential enhancement opportunities associated with the Recommended Design were also explored and are discussed in **Chapter 6**.

Following this confirmation exercise, monitoring associated with the identified net effects was identified (see **Chapter 7**) as were any additional approvals required as part of implementing the Recommended Design (see **Chapter 8**).

Exhibit 3-1 Roadmap of Previously Prepared Reports



4. Additional Investigations

As noted in **Chapter 3**, additional site-specific inventories were carried out in 2008 to ensure all relevant landscape features associated with the ERD were identified in sufficient detail to support the Preliminary Design process, impact assessments and the development of mitigation measures.

The field data collection and background research incorporated landscape composition parameters outlined in the ERD, as well as any additional site specific parameters of interest.

The scope of the field work and analysis included the following activities:

- a) Verification of landscape composition requirements based on MTO's Environmental Reference for Highway Design (ERD).
- b) Review of available technical reports, including aquatic and terrestrial ecosystems, noise, land use, vegetation, heritage, and wildlife resources technical reports.
- c) Review of aerial photography and all relevant base mapping.
- d) Personal communications initiated with other consultants to identify potential key visual resources and landscape features.
- e) Identification and description of the landscape composition related to the existing landscape within the transportation corridor. The identification of areas where the landscape would be most susceptible to disturbance, to ensure adequate mitigation is recommended on Preliminary Design plans (see **Chapter 6**).
- f) Noted scenic compositions, arrangements, and sequences of visual landscape features and inventoried natural geomorphologic landforms, waterscapes, and vistas within the viewshed of the transportation corridor.
- g) Identify potential impacts and influences of landscape composition by noting the proximity of sensitive features to the corridor and potential for mitigation. Examples of sensitive features in relation to the landscape composition include high quality vegetation, heritage properties, cultural vegetation, scenic viewsheds, topography, and wetlands.
- h) Identification of areas along the transportation corridor and on the Recommended Design plans for landscape composition treatments and enhancements, as developed through the CVP process (CVP summary in **Chapter 4**). Landscape enhancements include gateway features, noise mitigation, slope reduction through enhanced grading and contouring, signage, decorative lighting, bridge aesthetics, and enhanced plantings.
- i) Representative site photographs at key/receptor points (on file at Project Office).

Scenic composition was described based on visual character and viewer response and evaluated by vividness, intactness, and unity. Particularly in the fall season, areas of dense vegetation can be represented or described as vivid due to composition of colour. Long, open, and undulating views of the surrounding landscape were identified.

Once field investigations were completed, the key objective of the landscape composition work during Preliminary Design (including developing and evaluating design refinements and alternatives) was to augment the existing information along the transportation corridor to a level of

detail so that a comprehensive impact assessment and appropriate preliminary mitigation measures could be developed.

Additional investigations were conducted to verify that the information that had been collected in earlier stages was still relevant and up-to-date. Additional investigations included the following:

- Secondary source review to identify current best practices and standards e.g. MTO Aesthetic Guidelines for Bridges
- Windshield survey and photo collection of features impacted by and in close proximity to the proposed transportation corridor including but not limited to:
 - Wetlands
 - Brooklin and East Lynde Creek
 - Almond Village, Hampton, Solina and other local hamlet areas
 - Visual impact from homes and agricultural properties
 - Nurseries
 - Valley Trails

Further to the investigations listed above, additional consultation was undertaken which included the following:

- Technical Design Group Coordination to comment upon and influence: contour grading, bridge architecture, trails, slope restoration and landscape protection and enhancement
- Environmental Working Group Coordination to comment upon and influence: creek realignment, riparian plantings, wildlife crossings and general implementation of factor-specific mitigation measures
- Community Value Plan (CVP) Workshops

A key component of consultation for the 407 study and the development of the landscape composition recommendations was the CVP process, which allowed a group of community members to be actively involved in shaping the mitigation and compensation measures from a landscaping and aesthetic perspective.

The following paragraphs provide a summary of the 3 CVP sessions held as part of the 407 consultation process.

Workshop #1 – Community Values / Features (What and Why)

The introductory session held in June 2008 and the completed CVP Questionnaires identified some preliminary community values and features / areas of interest. The intent of Workshop #1 was to provide an opportunity for stakeholders to further identify and describe key community values and local features that are important to their community.

Summary of Objectives

- Identify community values
- Identify key community features reflecting these values
- Understand why these features are important
- Understand which features are most essential

Based on the input from Workshop #1, the project team developed mitigation and enhancement strategies that retained and/or enhanced the characteristics of potentially affected communities for the areas of interest.

Workshop #2 – Mitigation / Enhancement Measures (How)

The intent of Workshop #2 was to present the alternative mitigation and enhancement strategies developed by the project team for each area of interest to participants for further input / refinement. In addition, a preferred strategy for each area of interest was selected for further development by the project team.

Summary of Objectives

- Present mitigation and enhancement strategies / measures
- Further develop / refine mitigation and enhancement strategies / measures
- Identify preferred strategy for each area of interest
- In identifying and evaluating the feasibility of mitigation and enhancement measures which preserve community values and features, it is important to:
 - Remember the community value being retained;
 - Consider both positive and negative impacts;
 - Consider temporary and long-term impacts; and
 - Consider the potential for secondary and cumulative effects associated with implementing some mitigation and enhancement measures.

Workshop #3 – Recommended Community Value Plan (Path Forward)

Workshop #3 presented the recommendations of the CVP process. A variety of mitigation and enhancement measures were discussed for application at various locations throughout the study corridor. The mitigation and enhancement measures were grouped into the following themes: universal measures, landscape screening, gateway, architecture, local heritage, wildlife crossings and wetland restoration.

The recommendations developed through this process became part of the Preliminary Design plans which were presented to agencies, stakeholders and the public at the final round of public information centres. The recommendations from the CVP were documented in a separate CVP Report and will ultimately become part of the EA Report submitted for approval.

Summary of Objectives

- Present and obtain comments on the recommended plan of the 407 corridor
- Obtain comments on the CVP process and opportunities for improvement to the process

5. Detailed Description of the Environment Potentially Affected

This section provides detailed descriptions of the landscape composition of the study area (please refer to the Inventory and Analysis Plates located in the **Appendix B** for additional information). As outlined in **Chapters 3** and **4**, these descriptions are based on inventory and analysis findings compiled from field investigations, aerial photography reviews, as well as reviews of technical reports and findings from other environmental disciplines.

Using the ERD as a guide, details of the existing landscape related to culturally significant vegetation, views and viewsheds, topography, waterscapes, natural geomorphic landforms, and adjacent land-use conditions and densities within the proposed transportation corridor sections were described. Scenic compositions, arrangements, and sequences of visual landscape features have also been identified.

The Landscape Composition Report is a cataloguing of all other environmental disciplines, which have been referenced throughout. In accordance with the methodology described in **Chapter 3**, the inventory and analysis findings are summarized below. The potential impacts, the compensation and mitigation measures and net effects for the transportation corridor have been documented in **Chapter 6**. A discussion of the monitoring and commitments for landscape composition are provided in **Chapter 7**.

The overall character of the existing landscape across the corridor is relatively consistent. Much of the study area is rural in character with gently rolling topography, forested creek valley systems and having agricultural cropland as the dominant land use. Residential settlement and farm complexes are scattered in low densities throughout the area, with higher densities located in the 13 hamlets situated adjacent to the corridor. The most urban portions of the transportation corridor are represented by the communities of West Whitby and the expanding village of Brooklin.

In general the viewsheds along the transportation corridor mainline have greater scenic integrity, as they contain more intact natural vegetation systems and varied topography which provides greater visual interest. The landscape begins to flatten as it gets closer to Lake Ontario offering less opportunity for broad or expansive views.

Detailed section-specific descriptions of the existing landscapes are provided below.

5.1 Section 1 – Brock Road to Kinsale Road

The major characteristics of this section are its gently rolling topography, valleys and tableland used primarily for agricultural cropland, the dominant land use in this area. Additional land uses include scattered rural residential settlement as well as the hamlets of Brougham and Greenwood,

horticultural and nursery operations, and equestrian facilities. The East Duffins Creek valley and associated vegetation is also a major feature of the area.

The primary watercourses which travel through this area include Brougham Creek, Spring Creek, East Duffins Creek and Carruthers Creek. Other waterscapes include several natural and man-made ponds, whose open water enhances the scenic quality of the area. For example the small ponds to the east of Sideline 14 provide interest and variety within the viewshed across the valley lands between Sideline 14 and Westney Road.

The vegetation types within this section range from high quality forest habitats, mixed hardwood woodland areas, meadow marshes and wetland pockets, to cultural thickets and hedgerows. The most important natural feature of the area is the East Duffins Creek forest valley system located between Paddock Road and Westney Road. This system includes a mosaic of upland and wetland vegetation communities, a high component of mature trees and provides interior forest habitat. It also provides an important north-south linkage, both in terms of wildlife travel corridors and landscape connectivity.

Other notable vegetation communities include the cedar forest-swamp community at the southeast corner of Highway 7 and Sideline 16, a high quality area providing interior forest habitat, as well as the large maple-beech woodland unit located between Westney and Salem Road just south of the proposed corridor. This area containing numerous large mature Sugar Maple specimens is an important component of the overall landscape composition of the area. Butternut trees were also observed in several locations within this section (refer to the Terrestrial Impact Assessment Report).

Noteworthy cultural vegetation within this area is associated with existing roadsides and includes: row of mature Sugar Maples along Sideline 16 north of Highway 7 (several are in decline); mature stands of Black Locust along Sideline 14 (low ecological importance but are strong visual elements – frame and enclose views along the roadway); mature row of spruce trees along Salem Road at the proposed interchange location.

Significant views within this section include those across the valley lands between Sideline 14 and Westney Road (East Duffins Creek system and surrounding area). Vantage points along Sideline 14 provide both expansive views across the valley to the east as well as views framed by existing vegetation. Westward views across the valley can be seen from vantage points along Westney Road, just north and south of Highway 7, with the East Duffins Creek forest being the dominant visual feature. From Sideline 16 north of the property used as a nursery, (one of the highest elevations within this section), there are some long distant views with glimpses of Lake Ontario to the south. From Salem Road at the proposed interchange location there is a scenic vista looking west with long, broad views across rolling agricultural land encompassing several hedgerows and woodlots.

Both Sideline 14 and Paddock Road are examples of scenic rural roadsides. Both are gravel roads flanked by a variety of vegetation including mature trees – Paddock Road follows the edge of

the East Duffins Creek forest – which frame views along the road and create a sense of enclosure, providing a contrast within the general openness of the surrounding landscape.

Pedestrian trail systems within this section include some informal footpaths within the East Duffins Creek valley area, the Brougham Creek valley area, and the cultural woodland/ field areas east of Sideline 4. Paddock Road is designated as part of the Trans Canada Trail system, although no formal “trail” exists here. The proposed design should allow for a north-south trail connection at Paddock Road.

Apart from the hamlets of Brougham and Greenwood, the residential dwellings (potential sensitive receptors) scattered throughout the area vary in proximity to the proposed corridor.

5.2 Section 2 – Kinsale Road to Ashburn Road

The section of the study area is bounded by Kinsale Rd. to the west, Seventh Concession/ Columbus Road to the north, Winchester Rd. to the south and Ashburn Road on the east. The predominant land use in the area is agriculture (cropland) area, with residential settlement concentrated in the hamlet of Kinsale, and along Coronation Road north of Winchester Road.

There are very few intact natural areas in this section, with many areas having high levels of past disturbance and vegetation clearing. The existing vegetation in the area is comprised mainly of cultural thickets, woodlots and hedgerows. The major exception is the West Lynde Creek valley system which passes through the study area just east of Coronation Road. The valley system is a high quality ecological area with a mix of coniferous and deciduous forest areas, including many large mature White Cedar, Hemlock and Sugar Maple. There are also several occurrences of the regionally rare Butternut species in the woodlot between Lakeridge Rd. and Coronation Rd., at the proposed mainline/ WDL interchange location.

Some noteworthy examples of cultural vegetation in this section are associated with hedgerows. For example there is a hedgerow/ windbreak of mature spruce trees located east of Kinsale Rd. just north of the proposed ROW which creates a dominant element in the landscape. Another example is a row of mature sugar maples located between Lakeridge Rd. and Halls Rd. N, within the proposed ROW.

The frequency of hedgerow and woodlot vegetation scattered throughout the area as well as the less varied topography limit the number of expansive views. The scenic attractiveness of the area is generally positive or pleasant, yet lacking distinctiveness. Typical views are comprised of a cultural thicket or roadside planting in the foreground, across agricultural crops or gently rolling topography towards a hedgerow or woodlot in the distance. Somewhat broader/ expansive views to both the east and west can be seen from vantage points at the higher elevations on Country Lane and Cochrane St. These viewsheds are also comprised primarily of cropland, hedgerows and also include the development of Brooklin in the view to the west.

There are no formalized trail systems in this section, although informal ATV trails occur along the main West Lynde Creek valley system, as well as the two consecutive tributary systems to the east.

5.3 Section 3 –Ashburn Road to Simcoe Street

A large portion of this section (from Ashburn Road to Garrard Road) consists of the village of Brooklin and the expanding surrounding development areas. The land use is primarily residential, with commercial development along Winchester Road. There is one pocket of suburban residential development between St. Thomas Street and Anderson Street which directly abuts the proposed corridor. East of Brooklin the land use changes back to predominantly agricultural cropland. Other land uses include the Winchester Golf Course on Winchester Road just west of Thornton Road, and the Windfields Farms thoroughbred breeding stables south of Winchester Road, west of Simcoe Street.

The major watercourses in this area are the main branch of Lynde Creek which passes through the heart of Brooklin and crosses the transportation corridor between Baldwin and St. Thomas Street, and the West Oshawa Creek and tributary, which skirts the eastern limits of Brooklin and crosses the transportation corridor in the Thornton Road area. Other waterscapes include several stormwater management ponds, such as the Lynde Creek pond just west of St. Thomas Street, whose open water enhances the scenic quality of the area.

There are very few intact natural areas in this section, with many areas having high levels of past disturbance and vegetation clearing. The existing vegetation in the area is comprised mainly of cultural thickets and meadows, successive communities and hedgerows. The primary exception is the natural area associated with the West Oshawa Creek valley system which includes mixed white cedar-hardwood and white cedar coniferous forests. The valley system provides a north-south linkage, although the forest areas are occasionally interrupted by open patches of cultural meadow, as well as the Winchester Golf Course.

The less varied topography throughout this section limits the number of broad or expansive views. The highest elevation in this section is the rise of land on the north side of 268 Winchester Road. (Century Streetables) – there are views from this vantage point across the West Oshawa Creek valley system to the west. The areas to the south and east of Brooklin are primarily rural in character with a positive scenic attractiveness, yet lack distinctiveness. Within the development of Brooklin, the more picturesque and heritage areas are located north of Winchester Road, away from the study area. The Town of Whitby has developed urban design guidelines to direct future development of the Baldwin Street – Winchester Road intersection (Brooklin Business District) in an attractive and pedestrian-friendly manner and addressing the historical context of the area.

There are several pedestrian trails, both formal paved trails and mown grass trails, through the Lynde Creek floodplain area, as well as some interpretive signs at the trail head from Brooklin Community Park. The forested areas in the West Lynde Creek valley also have some active ATV trails and an old laneway crossing.

5.4 Section 4 – Simcoe Street to Enfield Road

The major characteristics of this section are its gently rolling topography, forested valleys and tableland used primarily for agricultural cropland (the dominant land use in this area) as well as scattered rural residential settlement and farm complexes. A notable topographic feature in this area is the bluffs/ steep eroding slopes east of Ritson Road on the east side of the watercourse.

The primary watercourse within this section is Oshawa Creek East which travels through the study area on the east side of Ritson Road. A major tributary of Oshawa Creek East traverses the study area from northeast of Columbus Road and Grandview Street, and travels southwest where it joins the main creek near the southwest corner of Ritson Road and Winchester Road.

The main natural vegetation features of this section are the large forested valley systems associated with these two watercourses. These systems fall within the Greenbelt Policy Area and the East Branch of Oshawa Creek Environmentally Sensitive Area (ESA) and are considered high quality wildlife corridors. The canopy of these valley systems is dominated by mature White Cedar with limited understory. Along the major tributary of Oshawa Creek East (just west of the proposed Harmony Creek interchange) is a high quality deciduous forest dominated by mature Basswood, Hemlock and Sugar Maple, where the occurrence of rare species has been noted including Butternut trees and several mature Leatherwood shrubs (refer to the Terrestrial Impact Assessment Report).

Other vegetation within this section can be characterized primarily by hedgerows between agricultural fields, as well as cultural meadows, thickets and woodlots. Other vegetation with aesthetic value (i.e. mature Sugar Maple or Spruce specimens) is associated with individual Built Heritage properties within the area (refer to the Built Heritage Impact Assessment Report).

Several microclimatic conditions within this section influence the character of the surrounding landscape. This includes the wind corridor identified to the east of Harmony Road. The surrounding agricultural fields contain little to no vegetation, therefore there is little to screen moving winds, allowing snow to drift onto the roadway. The low points in the landscape associated with the Oshawa Creek valley along Winchester Road between Ritson Road and Wilson Road are susceptible to foggy conditions, especially in the early hours of the day.

The scenic attractiveness of the area is generally positive or pleasant, with a typical southern Ontario rural landscape character. Typical views are across agricultural crops or gently rolling topography towards a hedgerow or woodlot in the distance and may include farm complexes (including barns, silos, heritage farmhouses – refer to Built Heritage Report). Somewhat broader/ expansive views can be seen from vantage points at the higher elevations such as at Langmaid Road south of Concession Road 7 which affords long views south to Lake Ontario. This area also contains several other picturesque rural roads such as Bridle Road, Ritson Road, Wilson Road, Leask Road, as well as Harmony Road north of the proposed interchange at Enfield Road and Concession Road 6. The main non-aesthetic element of significance within the viewsheds of

the area is the hydro corridor, which traverses this section of the study area just north of Winchester Road.

There is an Oak Ridges Moraine (ORM) trail system in the Oshawa Creek East valley system east of Ritson Road, as well as some informal footpaths and ATV trails following the west banks of the East Oshawa Creek east of Ritson Road.

5.5 Section 5 – Enfield Road to Highway 35/115

The east mainline section of the transportation corridor begins just east of Enfield Road and continues east, crossing to the north of Hampton and slightly south of Concession 6 Road. From the Darlington-Clarke Townline interchange, the corridor continues in a northeast direction traveling south of Leskard, crossing Best Road to the north of Concession 7 Road. From Best Road, the corridor continues northeast, paralleling Concession 7 Road and ultimately tying into Highway 35/115. The Enfield Road to Highway 35/115 section traverses several streams and small tributaries.

There are several areas within the landscape where cultural vegetation is present. There are several rural tree lined roads with cultural associations to agricultural fields, with minor residential development in close proximity. The Villages of Leskard and Hampton also contain several heritage characteristics such as mature tree lined streets, signage, building architecture, and designated heritage features (i.e. Hampton Cemetery). Of the 39 Built Heritage properties identified, many contain mature cultural vegetation that contributes to the aesthetic value and cultural associations of the area (refer to Built Heritage Report). Several properties are located within the study area and others located in close proximity within the surrounding landscape. Long, mature sugar maple (*Acer saccharum*) hedgerows line many of the heritage properties (refer to the Built Heritage Impact Assessment Report).

Additional vegetation throughout this section is primarily characterized by large, contiguous forested valleylands. Cedar-dominated forests are the most common forest type in this area, with smaller areas of mixed and deciduous forest and plantation communities. Within the landscape, several ecologically important areas exist including, five forest units identified as high quality, a large unevaluated wetland delineated along West Bowmanville Creek; seven large, linear Environmentally Sensitive Areas (ESAs) oriented in a north-south direction; and large valley systems of the Farewell, Bowmanville, Soper and Wilmot Creeks.

Settlement areas are sparse within this section of the transportation corridor. The landscape is dominated by culturally modified forests, plantation, thickets and meadow communities. In this section, there are numerous areas of natural habitat with strong north-south connectivity, with much weaker connections in an east-west direction as a result of the intervening agricultural use.

This section of the transportation corridor is within Ontario's Greenbelt, 1.8 million acres of land that encompasses the Oak Ridges Moraine, and hundreds of rural towns and villages and numerous farm properties. A majority of the long, open, pastoral views of the undulating rural

landscape occur from approximately 90m east of Leskard Road and continue in an easterly direction towards Best Road for about 430m.

Development between Enfield Road and Highway 35/115 is minimal. The area is largely rural and sparsely populated. Adjacent land uses are primarily agricultural with the exception of the occasional commercial or residential property. This section of the landscape also contains the hamlets of Leskard and Hampton, which offer the greatest densities in population and surrounding dwellers. The Enfield Road to Highway 35/115 area has a pastoral quality and the scale of the landscape shifts from open, long views to a more intimate scale in the settlement areas, where built form has a much smaller setback from the transportation corridor.

Scenic composition and sequence of the visual landscape character of the Enfield Road to Highway 35/115 section of the study area can be described in terms of natural geomorphologic landforms and topography, notable vegetation and waterscapes (i.e. wetlands, streams), key vistas, microclimates, and adjacent development. This section of the study area has high scenic quality. Particularly, at Leskard Road through to Highway 35/115, the surrounding landscape becomes more undulating offering broader and more picturesque views of the surrounding landscape. The southern portions of the eastern mainline offer less variation in topography and depending on the position of the viewer in the landscape (i.e. high point, low point) scenic views to Lake Ontario as well as the rolling topography may be achieved. The majority of the Enfield Road to Highway 35/115 section of the study area characterized as gently rolling topography, is typical of the landscape associated with the drumlinized till plain of the South Slope (Oak Ridges Moraine) Physiographic Region (Chapman and Putnam 1984).

Due to the undulating topography particularly around the Leskard area, potential wind corridors exist, creating unfavourable weather conditions and potential for snow drifting, particularly adjacent to Best Road. The surrounding agricultural fields contain little to no vegetation, therefore there is little to screen moving winds, allowing snow to drift onto the roadway. The rolling topography creates low points in the landscape which lend themselves to foggy conditions, especially in the early hours of the day. These particular microclimatic conditions contribute to the character of the surrounding landscape.

In summary, the Enfield Road to Highway 35/115 section of the transportation corridor can be characterized by the dominance of the agricultural fields, with relatively little settlement. The long, open pastoral viewsheds are composed of culturally modified woodland, plantation, thicket and meadow communities. The villages of Leskard and Hampton contain cultural vegetation and offer the greatest population densities in the area. The land use is predominantly agricultural with minor residential and recreational properties throughout. The rolling topography and large, open viewsheds provide a high quality of scenic composition and landscape character.

5.6 Section 6 – West Durham Link

This section focuses on the landscape between Lake Ridge Road and Coronation Road, from Highway 7 south to Highway 401 with a consideration of the surrounding context, in particular the

areas of residential development. The dominant land use within this section is agricultural cropland, interspersed with some natural and cultural woodlots. This area is flanked by several residential communities including Almond Village, Macedonian Village and the large suburban community of West Whitby located on the east side of the proposed West Durham Link, from Taunton Road south to Highway 401. Additional land uses in this section include gravel extraction activities, at Coronation Road, just south of Highway 7, as well as a topsoil landscape supply yard on Halls Road north of Taunton Road.

This section falls within the Lynde Creek Watershed, with the primary watercourse being the west branch of Lynde Creek as well as several meandering tributaries. Other waterscapes in the area include several man-made ponds associated with private residence/ farm operations as well as the gravel extraction activities.

The largest areas of natural vegetation in this section are concentrated north of Taunton Road. Across from Macedonian village, flanked by Coronation Road and the proposed corridor, an important feature of the landscape is Heber Downs; a large mixed hardwood-hemlock forest where the canopy includes Hemlock, Sugar Maple, Black Cherry, and American Beech. The south end of this forest changes to Red Pine and Scotch Pine plantations. South of Taunton Road the vegetation becomes more scattered and sparse, and consists primarily of cultural woodlands, thickets, hedgerows and old field meadows. The vegetation units north of the 401 are part of the Lynde Creek Coastal Wetland Complex Provincially Significant Wetland (PSW) (refer to the Terrestrial Impact Assessment Report).

Cultural vegetation within this section is primarily associated with individual Built Heritage properties as well as hedgerows. There are several examples of long hedgerows in this area with large mature Sugar Maples (*Acer saccharum*), as well as many mature tree specimens connected to farm complexes and heritage properties which provide aesthetic value and enhance the landscape character of the area.

The topography within this section is gently rolling in the area to the north with some valley areas created by West Lynde Creek tributaries. Just north of Taunton Road the landscape begins to flatten out as it moves south towards Lake Ontario with some minor north-south ridgelines, such as those east of Halls Road, south of Rossland Road.

Overall, the viewsheds within this section have a positive level of scenic attractiveness due to the relatively pastoral nature and rural character of the area. However as much of the area has less varied topography and flatter slopes, particularly in the landscape to the south, the views provide less visual interest and distinctiveness. There are also a few areas where non-aesthetic man-made elements start to encroach on the viewsheds such as the hydro corridor, which crosses this area just south of Macedonian Village, as well as apartment complexes located further east on Dundas Street, which are visible from a distance.

The relatively flat topography and reduced vegetation to the west of the proposed corridor, particularly between Taunton Road and Dundas Street, does create microclimatic conditions with the potential for windy conditions and blowing snow.

There are several examples of informal trail systems within this section such as the ATV trails following the tributary on the east side of Halls Road, north of Taunton Road. There are active footpaths and ATV trails throughout the Almond Village area, particularly on the west side of the creek channel.

5.7 Section 7 – East Durham Link

The 10.5km East Durham Link of the transportation corridor commences at Highway 401 and runs west of Solina Road to Nash Road, where it crosses Solina Road and then parallels Rundle Road on the west side. The East Durham Link joins with the mainline at Rundle Road, south of Concession 6 Road.

The East Durham Link area is characterized predominately by agricultural land uses, interspersed with large natural areas through its central section. The landscape contains the Harmony-Farewell Iroquois Beach Wetland and Maple Grove Wetland Complexes and also four Environmentally Sensitive Areas (ESAs). Five watersheds also occur within the boundaries of the East Link study area, including Darlington Creek, Tooley Creek, Black Creek, Farewell Creek, and Harmony Creek. A high diversity of wetland community types are represented within the East Durham Link area including coniferous, mixed and deciduous swamp, thicket swamp, shallow and meadow marsh communities. Natural areas include a range of common upland communities including coniferous, mixed and deciduous forest and cultural communities including cultural meadow, thicket and woodland communities and units of plantation. Several Provincially Significant Wetland's (PSWs) and two high quality forest units are present within this section (refer to the Terrestrial Impact Assessment Report).

There are several areas within the landscape where cultural vegetation is present. Cultural vegetation or landscape is defined as vegetation associated with residential or heritage development that performs as a screen or buffer, or contributes to the overall cultural character of the area due to its size, species, age, or cultural associations. There are several rural tree lined roads with cultural associations to agricultural fields, with minor residential development in close proximity. Of the 27 Built Heritage properties identified (refer to the Built Heritage Report), many contain mature cultural vegetation that contributes to the aesthetic value and cultural associations of the area. Several properties are located within the study area and others located in close proximity within the surrounding landscape. Long, mature sugar maple (*Acer saccharum*) hedgerows and forest thickets occur throughout many of the heritage properties (refer to the Built Heritage Impact Assessment Report).

The East Durham Link contains rural residential, commercial, and agricultural land uses. Much of the natural vegetation cover was historically cleared for agriculture. The vegetation currently existing lies within agricultural fields and is composed of culturally modified forests, plantation, thickets, and meadow communities.

Development within the East Durham Link landscape is minimal. Adjacent land uses are primarily agricultural, with the exception of the occasional commercial or rural residential property. There are several aesthetic/non-aesthetic man-made features within the East Durham Link study area. The intersection at Hancock Road and Highway 2 has a manicured, man-made character. The towns of Courtice to the west and Bowmanville to the east of the study area offer the highest population densities. The landscape has a pastoral quality and the scale of the landscape shifts from open, long views to a more intimate scale in the settlement areas closer to the lake, where built form has a much smaller setback from the transportation corridor.

Scenic composition and sequence of the visual landscape character of the East Durham Link study area can be described in terms of natural geomorphologic landforms and topography, notable vegetation and waterscapes (i.e. wetlands, streams), key vistas, microclimates, and adjacent development. The broadest views of the landscape occur to the north of the section, as the southern portions of the landscape become more flat as the land moves toward Lake Ontario. The cultural vegetation associated with the heritage and residential properties contribute to the overall sequence of the visual landscape. Visual quality with respect to views and vistas is more prominent in areas of greater topography or more undulation in the landscape. The viewshed is made up of tighter views caused by agricultural uses and forests lands. Due to the relatively flat nature of the surrounding landscape, scenic views are infrequently achieved with the occasional exception to the north where views to Lake Ontario as well as the rolling topography are more frequently observed.

The undulating topography that comprises the majority of the Enfield Road to Highway 35/115 section begins to flatten and undulations decrease in frequency as the landscape moves south toward Lake Ontario. The general topography of the land is flat with relatively minor undulations. The landscape slopes from high points towards the north, to low points in the south in closer proximity to Lake Ontario. Land closer to the south and adjacent to the lake may tend to be cooler depending on the direction of wind moving off the lake, creating particular microclimatic conditions.

In summary, the East Durham Link is predominantly agricultural land use, interspersed with large natural areas, five watersheds, and several high diversity wetland complexes. The East Durham Link contains rural residential, commercial, and agricultural properties and vegetation cover that was historically cleared for agriculture and lies within agricultural fields composed of culturally modified woodland, plantation, thicket, and meadow communities. The towns of Courtice and Bowmanville are in close proximity and contain the greatest population densities in the area.

6. Landscape Composition Net Effects

6.1 Introduction

The process of identifying potential impacts and various net effects was undertaken in a progressive and iterative manner as the landscape composition proceeded through the CVP and Preliminary Design processes. The Landscape Composition Report is a cataloguing of all other environmental disciplines. In general, the landscape composition design plates illustrate a comprehensive collection of all physical treatments being recommended by the various factor-specific disciplines. The design plates use symbols to conceptually illustrate the various treatment categories being proposed for the Recommended Design.

Refer to the discipline specific Impact Assessment Reports for all standard mitigation associated with terrestrial, aquatic, and wildlife habitat, edge management, mitigation to impacted heritage properties, and all other relevant factor-specific environmental disciplines. Site specific buffer and vegetative screening mitigation measures associated with residential properties have been identified in the Socio-Economic Impact Assessment Report prepared by Meridian Planning Consultants Inc. (2009), and have been reflected on the Preliminary Design Plans (**Appendix G**). Also reflected on the Recommended Design Plans are buffer and screening recommendations from the Built Heritage Impact Assessment Report, prepared by Unterman McPhail Associates (2009) and URS Canada Inc (2009). Cultural vegetation shall be protected and preserved, where feasible, to enhance the scenic character of the transportation corridor and provide buffer, screening, and aesthetic value.

The specific impacts of the proposed transportation corridor construction and associated activities were assessed in accordance with the ERD. The magnitude and duration of the impacts, as well as the ability to mitigate potential impacts of the project were reviewed and incorporated into the assessment of impacts and development of appropriate mitigation measures.

6.2 Overview

The following sections provide an overview outlining the impacts of the proposed transportation corridor common across the corridor, as well as the overall mitigation approach and description of net effects on landscape composition, as well as elements of other disciplines including Terrestrial, Aquatic, Built Heritage and Socio-economic assessments.

6.2.1 Potential Effects

The potential effects on Landscape Composition from the proposed transportation corridor can be described in terms of the likely alterations to the landscape character and scenic integrity, as well as the landscape experience of the area.

As described in **Chapter 5**, the majority of the study area is predominantly rural in character with gently rolling topography, forested creek valley systems and tableland used primarily for agricultural cropland. The primary impact on the landscape character will be a disruption to the pastoral quality and landscape connectivity caused by the actual physical obstruction of the transportation corridor as well as the removal of natural and cultural resources required to construct the project.

The construction of the transportation corridor may also create alterations to the existing viewsheds within the area. The construction of the transportation corridor may also require changes to the existing topography including cuts through steep slopes and raising of elevations through valley areas either by filling or by erecting bridge structures to span a creek system or environmentally sensitive area. In particular these raised elevations and structures may create some obstructions in some long north-south viewsheds.

The transportation corridor will also impact surrounding dwellers and adjacent users depending on their proximity to the proposed corridor. The proximity of the transportation corridor will also impact views for nearby residences.

In terms of a user of the transportation corridor, views from it and the perception and experience of the landscape (i.e. vegetation, topography, natural features) will be one of the most distinguishing features.

The potential impacts of the transportation corridor on Built Heritage resources may involve displacement (removal) or disruption of the resource, including heritage dwellings, farm complexes, roadscapes as well as significant cultural vegetation (i.e. mature Sugar Maple trees associated with the dwelling, farm or roadscape).

Regarding the natural environment, vegetation clearing required to accommodate the transportation corridor is the primary direct effect related to construction of the transportation corridor. This includes vegetation removals to accommodate interchanges, vertical/horizontal alignment, grading, drainage design, temporary road access, bridges, culverts, storm water management facilities, channel realignments, traffic and noise barriers, utility relocation and general construction activities. The direct removal of forest vegetation often has the secondary effect of creating new forest edges that expose the retained vegetation to the effects of increased light, wind, sun and road spray (refer to Terrestrial Impact Assessment Report). While the creation of an edge is a direct effect, the secondary edge effects that influence the retained vegetation are considered indirect effects that will occur following construction. Additional secondary effects on the natural environment include potential introduction of roadway contaminants into the environment, as well as shading from proposed bridge structures.

The removal of vegetation may result in the reduction of both the quantity and quality of habitat for forest and edge/ field flora and fauna species. The transportation corridor may also impact endangered or rare vegetative species such as Butternut trees as well as several herbaceous species (refer to the Terrestrial Impact Assessment Report).

6.2.2 Mitigation

The Landscape Elements Tool Kit chart (**Appendix C**) provides a summary of the proposed mitigation measures and enhancements relating to landscape composition which will be employed throughout the corridor.

Site specific mitigation and compensation measures have also been identified for key areas along the transportation corridor through the comprehensively detailed CVP process. Several of the enhanced features include buffer plantings, noise attenuation measures, contour grading, vegetative slope stabilization, enhanced edge management, protection of heritage features, and enhanced gateway opportunities. Cultural vegetation shall be protected and preserved, where feasible, to enhance the scenic character of the transportation corridor and provide buffer, screening, and aesthetic value.

Mitigation requirements for the Terrestrial and Aquatic environments are identified in the Terrestrial Impact Assessment Report and the Aquatic Impact Assessment Report (2009). The direct impacts from the transportation corridor will be mitigated through implementation of standard mitigation measures, as described in those reports. Three main areas recommended for mitigation and/or compensation above the standard level of treatments have been identified, and these include edge management, wildlife movement, and wetland restoration.

Edge management measures will be implemented to protect newly created forest edges where the retained vegetation is large enough to warrant this measure (refer to the Terrestrial Impact Assessment Report, 2009). Mitigation measures will include retaining a narrow zone where no root grubbing will occur (in order to stimulate suckering of cut trees), removing hazard trees and installing edge plantings using appropriate native and salt-tolerant species, and suckering deciduous species to promote slope/bank stabilization. Key edge management principles will be developed further during subsequent design phases.

Temporary vegetation protection fencing will be installed at the edge of the clearing limits where the edge of a forest community is removed. This fencing will delineate the clearing limits and prevent further intrusion into the adjacent forested habitat. It is recommended that trees along the newly created forest edge will be flush cut (not grubbed) to stimulate suckering regeneration.

Implementation of enhanced feature elements, such as the reuse of woody debris, boulders and snags displaced by the corridor and use of nesting box structures to promote wildlife connectivity and habitat, shall be explored. Where minimal vegetation removal is not possible, mitigation should use native materials for restoration. It is also recommended that native planting combinations are selected which have all season interest, specifically strong fall colour, and strong tolerance of salt.

Additional mitigation measures related to edge management include, locating construction access in less sensitive areas, replanting construction access roads, locating and transplanting regionally rare plants or salvaging soils, limiting sizes of construction zones, and maximizing retention of vegetation to the greatest extent possible.

For all areas within the transportation corridor where minimal vegetation removal occurs, tree preservation zones should be implemented during subsequent design phases to promote minimal impacts to the views of vegetation both within and outside of the transportation corridor. All trees located on private property which are not directly impacted by the proposed corridor, shall be protected from the impacts of construction.

The transportation corridor can have a number of direct effects on wildlife. For example, the displacement of individuals and/or their habitat, or obstruction of movement. An enhanced mitigation measure is the use of wildlife funnel fencing at crossing locations (structures or dry land) in an effort to improve wildlife habitat connectivity at key locations and aid in the reduction and management of wildlife conflicts. Fencing design and materials will be appropriate for the type of animal using the crossing, whether it is small mammals, amphibians, turtles, and snakes, or larger mammals such as deer and foxes (refer to the Terrestrial Impact Assessment Report, 2009). Fencing should typically extend beyond the prime habitat zone, and, where ungulate movement zones are relatively clear or known. Funnel fencing should be angled to tie into structure entrances, with no gap between the fencing and the structure, to ensure that wildlife is guided to the structure with limited opportunity to access the corridor. Fencing shall have a rural or agricultural feel (i.e. post and cable) in Greenbelt areas. Where wildlife structures extend into an open median, the funnel fencing should be continued as two parallel sections across the median to ensure that wildlife are restricted from entering the corridor via the open median.

Landscape features and mitigation techniques for wetland restoration include woody debris, root wads, aquatic vegetation, salt-tolerant shrub and tree buffer plantings, as well as trail opportunities (refer to CVP plans in **Appendix G**). Vegetative buffer plantings will be installed to help increase shade, reduce wind on retained vegetation, particularly wetland vegetation and other sensitive natural areas, and from the effects of the adjacent transportation corridor.

Side slopes around bridge structures and along the transportation corridor shall be vegetated where feasible with native plant species to reduce erosion, improve slope stability, increase infiltration and reduce overland flow. Water quality shall also be addressed through emergent and submergent vegetation. In some instances, shading of storm water management facilities and watercourses may be implemented with deciduous tree and shrub materials to help with temperature where feasible. Low maintenance, salt tolerant, hardy materials shall be specified in subsequent design phases.

Slope reduction, contour grading, and vegetative slope stabilization will be more common around bridge structures and culverts. Bridge structures should be designed to be aesthetically compatible with the character of the landscape and to take advantage of scenic opportunities. The transportation corridor will cross many watercourses and impacts can be lessened by minimizing the removal of native vegetation, reducing the impact to existing vegetation, maintaining water balance and avoiding native soil disturbance where possible.

The application of salt on roadways for safety reasons is in accordance with Best Management Practices (BMPs). Salt tolerant species will be planted along the corridor to help buffer lands adjacent to the corridor. In addition, buffer plantings of dense deciduous and coniferous tree and

shrub species have been proposed within the right-of-way for the transportation corridor adjacent to sensitive vegetative areas and wetland complexes so as to protect cultural vegetation, water quality, and to intercept and infiltrate runoff. Stormwater management facilities will capture and treat run-off prior to release to natural areas beyond the corridor.

6.2.3 Net Effects

Throughout the transportation corridor routing and preliminary design process, all reasonable opportunities to avoid or minimize impacts to culturally significant vegetation, views and viewsheds, topography, waterscapes, natural geomorphic landforms, and adjacent land-use conditions were identified and incorporated as feasible and appropriate. There are, however, several overarching impacts to the existing landscape composition throughout the resultant transportation corridor which are likely to be observed following the application of mitigation measures.

Alterations to the existing viewsheds within the transportation corridor represent permanent effects on scenic integrity. Though the corridor will result in a permanent alteration to existing landscape connectivity, significant vegetative buffering and screening measures will mitigate impacts to views for receptors in close proximity to the transportation corridor. View corridors will also be permanently obstructed, particularly those to the north and south, but the proposed mitigation measures will assist in softening the view of the corridor and help it blend with the existing character of the area and land use.

Properties in close proximity to the corridor may also experience indirect effects from the corridor (e.g. noise and light effects). The landscape composition measures proposed will not eliminate these effects but will temper them by providing screening and buffering to the visual aspect of the corridor.

Net effects on the natural environment components are described in detail in the Terrestrial Impact Assessment Report, the Aquatic Impact Assessment Report and the Hydrogeology Impact Assessment Report. From a natural environment perspective, the removal of vegetation for transportation corridor construction will result in the creation of edge effects due to the length of the newly exposed forest edge in some areas. Vegetation removal will also result in impacts to wildlife including an overall reduction in habitat as well as anticipated adjustments to behaviour and movement patterns. However, maintenance of valley connectivity will be achieved through the implementation of mitigation measures such as edge management and compensation plans. Impacts to wildlife will also be mitigated through such measures as the edge management plans as well as wildlife-friendly crossing designs and fencing to direct animals to the crossings.

Potential effects, mitigation measures and net effects specific to each section of the transportation corridor are described below.

6.3 Section 1 – Brock Road to Kinsale Road

6.3.1 Potential Effects on Landscape Composition

The proposed transportation corridor will potentially result in several alterations to the landscape composition within this section. In total approximately 30 ha of terrestrial vegetation and 8.5 ha of wetland habitat (i.e. swamp and marsh vegetation communities) will be removed with implementation of the corridor between Brock Road and Kinsale Road. This may result in a reduction of both quantity and quality of habitat in certain areas, as well as adjustments to wildlife behaviour and movement through the landscape (refer to the Terrestrial Impact Assessment Report).

The construction of the transportation corridor through this section will result in a potential loss of landscape connectivity by fragmenting natural areas, interrupting viewsheds, and by disrupting movement (both human and wildlife) through the landscape, particularly north-south travel. Other potential indirect effects of the transportation corridor include shading from bridge structures, possible roadway contaminants as well as light pollution.

The loss of vegetation will have direct impacts on the scenic quality, altering vistas and views of the area. Viewsheds will also be potentially impacted by the physical form of the transportation corridor once constructed, particularly in areas of fill or raised elevations. Such areas within this section include:

- The proposed interchange at Brock Road and the realigned Highway 7, which will likely interrupt views south to Lake Ontario
- Closure of Paddock Road and proposed fill area will result in loss of scenic rural roadscape
- Raised fill areas and structures over the four Carruthers Creek tributaries between Westney Road and Kinsale Road
- The existing scenic vista looking west from the proposed Salem Road interchange location will be altered by the proposed transportation corridor by disruptions to the existing landscape as well as addition of the transportation corridor itself

Properties adjacent to the transportation corridor may warrant potential landscape screening and buffering measures (refer to Built Heritage and Socio-Economic Impact Assessment Report).

6.3.2 Mitigation/Compensation Measures

Mitigation and compensation measures specific to this section include: dense plantings for visual screening (i.e. to mitigate impacts to Paddock Road properties); woodlot plantings within the proposed Brock Road, Westney Road and Salem Road interchange loops and gores; as well as bank stabilization plantings at all creek and tributary crossing structures. Through the CVP process additional enhanced treatment options were identified within this section including a proposed Regional gateway at the Brock Road interchange, and enhanced grading and plantings at the proposed Paddock Road closure and East Duffins Creek bridge structure (refer to **Appendices F and G**).

Impacts to landscape connectivity associated with recreational and wildlife movement may be mitigated through the provision of large-span bridge structures in areas such as the East Duffins Creek valley system which will allow passage through this key natural area. The provision for a TransCanada Trail connecting the proposed north and south Paddock Road cul-de-sacs has been designed as part of this East Duffins Creek bridge structure and crossing. Retaining as much of the existing tree canopy in the valley, particularly as close as possible to the transportation corridor and bridge structure will help to reduce the “gap effect” and to retain some connectivity of habitat (refer to the Terrestrial Impact Assessment Report).

In addition to the standard mitigation measures identified for wildlife, (refer to the Terrestrial Impact Assessment Report), the implementation of enhanced funnel fencing will lessen habitat fragmentation, encourage wildlife passage and help to reduce wildlife conflicts. There are a total of eight wildlife passage structures designed for this section of the corridor between Brock Road and Kinsale Road.

6.3.3 Net Effects

The impacts between Brock Road and Kinsale Road which are likely to be observed following the application of mitigation measures are summarized above. In particular, there is likely to be a net loss of landscape connectivity created by the transportation corridor. However, mitigation measures to replace, restore or reuse the removed vegetation will minimize the impact of the corridor on landscape connectivity and habitat loss (refer to Terrestrial Impact Assessment Report).

Alterations to the viewsheds and impacts to properties in close proximity to the corridor, will also be mitigated through landscape composition measures which will include significant vegetative screening and buffering which are consistent with the character and surrounding land uses of the area. Measures developed through the CVP process will also mitigate impacts and include measures which will enhance the landscape composition of the area at select locations.

6.4 Section 2 – Kinsale Road to Ashburn Road

6.4.1 Potential Effects on Landscape Composition

The proposed transportation corridor will potentially result in several alterations to the landscape composition within this section. In total, approximately 42.5 ha of terrestrial vegetation and 0.6 ha of wetland habitat (i.e. swamp and marsh vegetation communities) will be removed within the transportation corridor between Kinsale Road and Ashburn Road. This may result in a reduction of both quantity and quality of habitat in certain areas, as well as adjustments to wildlife behaviour and movement through the area (refer to the Terrestrial Impact Assessment Report).

The loss of vegetation will also potentially impact the scenic quality, altering vistas and views of the area. Viewsheds will also be potentially impacted by the physical form of the transportation corridor once constructed, particularly in areas of fill or raised elevations. Such areas within this section include:

- Disruptions to scenic rural roads including the proposed Country Lane road closure and the overpass structures proposed for Coronation Road.
- Raised fill areas and structures over the three Lynde Creek tributaries between Coronation Road and Ashburn Road
- The existing east-west viewsheds from high points on Country Lane and Cochrane Street within the proposed corridor will be altered by disruptions to the existing landscape as well as addition of the transportation corridor itself

Properties adjacent to the transportation corridor may warrant potential landscape screening and buffering measures (refer to Built Heritage and Socio-Economic Impact Assessment Report).

6.4.2 Mitigation/Compensation Measures

Mitigation and compensation measures specific to this section include: dense plantings for visual screening (i.e. to mitigate impacts to Coronation Road properties); woodlot plantings within the proposed Lake Ridge Road and West Durham Link interchange loops and gores; as well as bank stabilization plantings at all creek and tributary crossing structures. Through the CVP process additional enhanced treatment options were identified within this section including enhanced grading and plantings at the freeway-to-freeway interchange to soften proposed slopes and to help blend the transportation corridor into the existing landscape (refer to **Appendices F and G**).

The mitigation measures for impacts to the natural environment as described above and the Terrestrial Impact Assessment Report shall apply to this section. Such measures include the implementation of edge management plans, valley restoration plans, and the use of tree hoarding to protect the federally endangered Butternut tree species which occur within this section.

In addition to the standard mitigation measures identified for wildlife (refer to the Terrestrial Impact Assessment Report), the implementation of enhanced funnel fencing will lessen habitat fragmentation, encourage wildlife passage and help to reduce wildlife conflicts with motorists. There are a total of three wildlife passage structures designed for this section of the corridor between Kinsale Road and Ashburn Road.

6.4.3 Net Effects

The impacts between Kinsale Road and Ashburn Road which are likely to be observed following the application of mitigation measures are summarized above. In particular, there is likely to be a net loss of landscape connectivity created by the transportation corridor. However, mitigation measures to replace, restore or reuse the removed vegetation will minimize the impact of the corridor on landscape connectivity and habitat loss (refer to Terrestrial Impact Assessment Report).

Alterations to the viewsheds and impacts to properties in close proximity to the corridor, will also be mitigated through landscape composition measures which will include significant vegetative screening and buffering which are consistent with the character and surrounding land uses of the area. Measures developed through the CVP process will also mitigate impacts and include measures which will enhance the landscape composition of the area at select locations.

6.5 Section 3 – Ashburn Road to Simcoe Street

6.5.1 Potential Effects on Landscape Composition

The proposed transportation corridor will result in several alterations to the landscape composition within this section. In total, approximately 19 ha of terrestrial vegetation and 2 ha of wetland habitat (i.e. swamp and marsh vegetation communities) will be removed between Ashburn Road and Simcoe Street. This may result in a reduction of both quantity and quality of habitat in certain areas, as well as adjustments to wildlife behaviour and movement through the landscape (refer to the Terrestrial Impact Assessment Report).

The loss of vegetation will potentially have direct impacts on the scenic quality, altering vistas and views of the area. Viewsheds will also be potentially impacted by the physical form of the transportation corridor once constructed, particularly in areas of fill or raised elevations. Such areas within this section include:

- Large bridge structure over the main branch Lynde Creek just south of Brooklin
- Raised fill areas and structures over West Oshawa Creek (just west of Thornton Road) and the West Oshawa Creek tributary (just west of Simcoe Street)
- The existing east-west viewsheds from high points on Country Lane and Cochrane Street

Construction of the Lynde Creek Bridge structure will impact the existing recreational amenities (i.e. trail network and furnishings) located within the Lynde Creek valley area.

Properties adjacent to the transportation corridor may warrant potential landscape screening and buffering measures (refer to Built Heritage and Socio-Economic Impact Assessment Report).

6.5.2 Mitigation/Compensation Measures

Through the CVP process options for gateway features, planting enhancements, bridge aesthetics and signage have been developed for the primary intersections to increase the aesthetic feature, scenic composition, and connectivity of the landscape (refer to **Appendices C, F and G**). Gateway features have been identified at the Baldwin Street and Simcoe Street interchanges to enhance the entranceways into Brooklin and Columbus respectively. Gateway enhancements will include themed signage, slope reduction/contour grading, and enhanced plantings of deciduous and coniferous trees, shrubs, perennials and ornamental grasses.

The higher densities of residential settlement within this section warrant site specific noise attenuation measures. The results of the noise study identifies a noise attenuation structure is warranted along the north side of the proposed transportation corridor between Baldwin Street and Thickson Road. The noise impacts of the corridor will be mitigated by this structure as well as the proposed vegetative screening to provide visual screening and softening along the structure.

Dense visual screen plantings have also been proposed along the south side of the transportation corridor between Lynde Creek and Anderson Street, as well as some woodlot type plantings (small

calliper and whip material) to provide additional buffering for residential properties on St. Thomas Street. Use of the local trail in the Lynde Creek valley area will be maintained as the proposed corridor in this location will be high enough to ensure continued access to and use of the trail.

The mitigation measures for impacts to the natural environment as described above and in the Terrestrial Impact Assessment Report shall apply to this section. Such measures include the implementation of valley restoration and enhancement plans, and the use of location and transplanting of regionally-rare herbaceous species which occur within this section.

In addition to the standard mitigation measures identified for wildlife in the Terrestrial Impact Assessment Report, the implementation of enhanced funnel fencing will lessen habitat fragmentation, encourage wildlife passage and help to reduce wildlife conflicts with motorists. There are a total of five wildlife passage structures designed for this section of the transportation corridor between Ashburn Road and Simcoe Street.

6.5.3 Net Effects

The impacts between Ashburn Road and Simcoe Street which are likely to be observed following the application of mitigation measures are summarized above. In particular, there is likely to be a net loss of landscape connectivity created by the transportation corridor. However, mitigation measures to replace, restore or reuse the removed vegetation will minimize the impact of the corridor on landscape connectivity and habitat loss (refer to Terrestrial Impact Assessment Report).

Alterations to the viewsheds and impacts to properties in close proximity to the corridor will also be mitigated through landscape composition measures which will include significant vegetative screening and buffering which are consistent with the character and surrounding land uses of the area. Measures developed through the CVP process will also mitigate impacts and include measures which will enhance the landscape composition of the area at select locations.

6.6 Section 4 – Simcoe Street to Enfield Road

6.6.1 Potential Effects on Landscape Composition

The proposed transportation corridor will potentially result in several alterations to the landscape composition within this section. In total approximately 20 ha of terrestrial vegetation and 5 ha of wetland habitat (i.e. swamp and marsh vegetation communities) will be removed within the transportation corridor between Simcoe Street and Enfield Road. This may result in a reduction of both quantity and quality of habitat in certain areas, as well as adjustments to wildlife behaviour and movement through the landscape (refer to the Terrestrial Impact Assessment Report).

The loss of vegetation will potentially have direct impacts on the scenic quality, altering vistas and views of the area. Viewsheds will also be potentially impacted by the physical form of the transportation corridor once constructed, particularly in areas of fill or raised elevations. Such areas within this section include:

- Disruptions to scenic rural roads including the proposed Wilson Road closure, the Leask Road closure, as well as alterations to the scenic roads of Harmony Road and Ritson Road
- Raised fill areas and structures over the two East Oshawa Creek tributaries between Ritson Road and Harmony Road
- The existing view from Langmaid Road south to Lake Ontario may be impacted by the proposed overpass structure to cross the transportation corridor.

Properties adjacent to the transportation corridor may warrant potential landscape screening and buffering measures (refer to Built Heritage and Socio-Economic Impact Assessment Report).

6.6.2 Mitigation/Compensation Measures

Mitigation and compensation measures specific to this section include: dense plantings for visual screening, in particular at Grandview Road area to mitigate impacts to properties on Grandview Road; woodlot plantings within the proposed Harmony Road and Enfield Road interchange loops and gores; rural screening; as well as bank stabilization plantings at all creek and tributary crossing structures. Sections of the landscape east of Harmony Road were identified as a wind corridor for potential snow drifting – proposed wind screen type plantings are proposed as a mitigation measure for this area (refer to **Appendices F and G**).

The mitigation measures for impacts to the natural environment as described above and in the Terrestrial Impact Assessment Report shall apply to this section. Such measures include the implementation of edge management plans, valley restoration and enhancement plans, and the use of tree hoarding to protect the federally endangered Butternut tree species which occur within this section.

In addition to the standard mitigation measures identified for wildlife in the Terrestrial Impact Assessment Report, the implementation of enhanced funnel fencing will lessen habitat fragmentation, encourage wildlife passage and help to reduce wildlife conflicts with motorists. There are a total of six wildlife passage structures designed for this section of the corridor between Simcoe Street and Enfield Road.

6.6.3 Net Effects

The impacts between Simcoe Street and Enfield Road which are likely to be observed following the application of mitigation measures are summarized above. In particular there is likely to be a net loss of landscape connectivity created by the transportation corridor. However, mitigation measures to replace, restore or reuse the removed vegetation will minimize the impact of the corridor on landscape connectivity and habitat loss (refer to Terrestrial Impact Assessment Report).

Alterations to the viewsheds and impacts to properties in close proximity to the corridor will also be mitigated through landscape composition measures which will include significant vegetative screening and buffering which are consistent with the character and surrounding land uses of the area. Measures developed through the CVP process will also mitigate impacts and include measures which will enhance the landscape composition of the area at select locations.

6.7 Section 5 – Enfield Road to Highway 35/115

6.7.1 Potential Effects on Landscape Composition

The subsequent paragraphs will describe in greater detail the alterations to the landscape composition within the transportation corridor between Enfield Road and Highway 35/115. In total approximately 91.2 ha of terrestrial vegetation and 13.1 ha of wetland habitat will be removed within the transportation corridor between Enfield Road and Highway 35/115. The local hamlets of Hampton and Leskard will also potentially be impacted by alterations to viewsheds caused by vegetative clearing and impacts to cultural vegetation. Several heritage properties along the East Mainline will be impacted by the proposed transportation corridor. Many properties contain visual landscape features (i.e. cultural vegetation, sugar maple hedgerows) that should be protected, where feasible, to preserve the character of the landscape. The removal of cultural vegetation will potentially impact the overall landscape character and scenic composition of the landscape through this section of the corridor.

The rolling topography will provide challenges with respect to soil erosion and options to mitigate the effects of erosion should be explored, especially in the area of heavy cut east of Leskard Road. The cut begins about 90m east of Leskard Road and continues easterly towards Best Road for about 430m. Several options include slope reduction and contour grading to lessen the degree of slope angle potentially decreasing the amount of soil erosion in the area. At site specific locations where slope reduction is required, it has been illustrated on the Recommended Design plans (**Appendix G**) and shall be further developed during subsequent design phases.

There are several interchange locations, specifically the Darlington-Clarke Townline interchange, Highway 35/115 interchange, and along East Durham Link where headlight glare and snow drifting may be an issue.

The transportation corridor contains three primary interchanges, the East Durham Link, Darlington-Clarke Townline interchange, and Highway 35/115, which will alter the vistas within the viewshed of the transportation corridor. However, the interchange configurations are potentially the highest points within the transportation corridor, allowing for long, undisturbed views into the surrounding landscape and rolling topography.

Through the CVP process, options for gateway features, planting enhancements, bridge aesthetics, themed signage have been developed for these three primary intersections to increase the aesthetic feature, scenic composition, and connectivity of the landscape (**Appendix G** and **F**). The bridge structures should be designed to be aesthetically compatible with the agricultural/heritage character of the landscape and to take advantage of scenic opportunities where possible.

6.7.2 Mitigation/Compensation Measures

Mitigation and compensation measures specific to this section include buffer plantings of dense coniferous species proposed within the transportation corridor adjacent to Hampton to protect key heritage features, such as the Hampton Cemetery. Also identified in the CVP process for Hampton and Leskard, were the inclusion of gateway features, enhanced plantings, themed bridge aesthetics to compliment the character of the surrounding area. Interchange enhancements were also identified and include reforestation in loops and gores, screening, vegetative buffering, enhanced plantings, bridge aesthetics, decorative lighting, and themed gateway features.

Bank stabilization and slope stability measures through the use of suckering and deep rooting vegetation will be implemented around all bridge structures and more specifically in the area of heavy cut adjacent to Leskard Road.

In total between Enfield Road and Highway 35/115 interior forest habitat is reduced by 21.3 ha. As a result of the direct removal of vegetation within the transportation corridor, there will be potential fragmentation of these habitat areas for wildlife movement, most notably in the forested valley systems and large, contiguous tableland forested habitat. In addition to the standard mitigation measures identified for wildlife (refer to the Terrestrial Impact Assessment Report), the implementation of enhanced funnel fencing will lessen habitat fragmentation, encourage wildlife passage and help to reduce wildlife conflicts with motorists. There are a total of eighteen wildlife passage structures designed for the transportation corridor between Enfield Road and Highway 35/115. Sixteen of these are associated with watercourse crossings, and an additional two are 'dry' crossing to allow for terrestrial wildlife movement.

Typical measures will be explored to mitigate headlight glare during subsequent design phases. Snow drift mitigation in the form of dense, linear coniferous plant species or potentially snow fencing shall also be employed during subsequent design phases of the project adjacent to Best Road, as identified on the Recommended Design Plans (**Appendix G**).

6.7.3 Net Effects

The transportation corridor from Enfield Road through to Highway 35/115 will have both direct and indirect effects on the adjacent vegetation communities. Based on the amount of vegetation to be removed and the impacts to the existing wetland complexes, there is an anticipated net/residual effect due to the length of the newly exposed forest edge in some areas, depending on the sensitivity of the vegetation communities, topography and openness of the retained wetland/forest understory adjacent to the proposed alignment. Mitigation measures will minimize these impacts through vegetation restoration, replacement and reuse (refer to Terrestrial Impact Assessment Report).

Alterations to the viewsheds and impacts to properties in close proximity to the corridor, will also be mitigated through landscape composition measures which will include significant vegetative screening and buffering which are consistent with the character and surrounding land uses of the area. Measures developed through the CVP process will also mitigate impacts and include measures which will enhance the landscape composition of the area at select locations.

6.8 Section 6 – West Durham Link

6.8.1 Potential Effects on Landscape Composition

The transportation corridor will potentially result in several alterations to the landscape composition within this section. In total, approximately 43 ha of terrestrial vegetation and 12.5 ha of wetland habitat (i.e. swamp and marsh vegetation communities) will be removed within the West Durham Link transportation corridor. This includes some areas of PSW marsh and the Lynde Creek Coastal Wetland Complex. This removal of vegetation may result in a reduction of both quantity and quality of habitat in certain areas, as well as adjustments to wildlife behaviour and movement through the landscape (refer to the Terrestrial Impact Assessment Report).

Within the West Durham Link corridor there are several occurrences of tree species of significance including the federally endangered Butternut and the regionally-rare Black Maple. These species shall be retained where possible and protected with tree hoarding during construction. It is not considered feasible however to retain all Butternut trees. In such cases the Butternut compensation plan shall be implemented (refer to the Terrestrial Impact Assessment Report).

Properties adjacent to the transportation corridor may warrant potential landscape screening and buffering measures (refer to Built Heritage and Socio-Economic Impact Assessment Report).

The CVP process identified three key residential areas as sensitive receptors along the West Durham Link corridor: the community of Almond Village, Halls Road (at Dundas Street) community, and the community of West Whitby. Residents of these communities expressed concerns regarding their proximity to the transportation corridor and the potential for increased traffic noise, light pollution and glare.

The flatter topography and the depression of the corridor within this section will result in fewer viewsheds potentially impacted by the transportation corridor. The loss of vegetation will have some potential direct impacts on the scenic quality. The transportation corridor alignment will require the closure of Halls Road, creating a disruption to this scenic rural roadscape, particularly the section between Rossland Road and Dundas Street, and the section north of Winchester Road.

6.8.2 Mitigation/Compensation Measures

Mitigation and compensation measures specific to this section are illustrated in **Appendices F** and **G** and include:

- Dense plantings for visual screening of the transportation corridor from sensitive receptors, particularly the community of Almond Village, Halls Road (at Dundas Street) community, and the community of West Whitby.
- Woodlot plantings within the loops and gores of interchanges including the Highway 7, Taunton Road, Rossland Road and Dundas Street interchanges
- Bank stabilization plantings at all creek and tributary crossing structures

- Bind screen type plantings between Winchester Road and the hydro corridor to the south
- Provision of enhanced plantings and contour grading to lessen the degree of slope and help blend the proposed ramps with the surrounding grades

The mitigation measures for impacts to the natural environment as described in the Terrestrial Impact Assessment Report shall apply to this section. Such measures include the implementation of edge management plans, the location and transplanting of regionally-rare herbaceous species, and the use of tree hoarding to protect the federally endangered Butternut trees and regionally-rare Black Maple tree species which occur within this section.

In addition to the standard mitigation measures identified for wildlife in the Terrestrial Impact Assessment Report, the implementation of enhanced funnel fencing will lessen habitat fragmentation, encourage wildlife passage and help to reduce wildlife conflicts with motorists. There are a total of eight wildlife passage structures designed for this West Durham Link corridor between Winchester Road and Highway 401 the majority of which are associated with watercourse crossing structures.

6.8.3 Net Effects

The effects along the West Durham Link corridor which are likely to be observed following the application of mitigation measures are summarized above. In particular there is likely to be a loss of landscape connectivity created by the transportation corridor. Mitigation measures to replace, restore or reuse the removed vegetation will reduce the impact of the corridor on landscape connectivity and habitat loss (refer to Terrestrial Impact Assessment Report).

Alterations to the viewsheds and impacts to properties in close proximity to the corridor, will also be mitigated through landscape composition measures which will include significant vegetative screening and buffering which are consistent with the character and surrounding land uses of the area. Measures developed through the CVP process will also mitigate impacts and include measures which will enhance the landscape composition of the area at select locations. Indeed, the CVP measures proposed in the area of Almond Village may improve on the existing landscape composition by providing greater screening and buffering from the Highway 401 corridor.

6.9 Section 7 – East Durham Link

6.9.1 Potential Effects on Landscape Composition

The subsequent paragraphs will describe in greater detail the alterations to the landscape composition within the transportation corridor along the East Durham Link. Large tracts of agricultural land are prevalent within the transportation corridor and approximately 48.6 ha of terrestrial vegetation and 12.4 ha of wetland habitat will be removed. Of the 12.4 ha of wetland vegetation to be removed, 5.5 ha are designated as PSW (refer to the Terrestrial Impact Assessment Report and the Aquatic Impact Assessment Report). The transportation corridor will

also have potential alterations to the viewsheds of the local towns of Courtice and Bowmanville through vegetative clearing, and impacts to cultural vegetation.

Several properties along the East Durham Link will be impacted by the transportation corridor. Many properties contain landscape features (i.e. cultural vegetation, sugar maple hedgerows) that should be protected, where feasible, to preserve the character of the landscape. The removal of cultural vegetation will have adverse effects of the overall landscape character and scenic composition of the transportation corridor landscape.

The transportation corridor contains four interchanges, 407 Mainline to the north, Highway 401 to the south, and at Taunton Road and Highway 2, which will alter the vistas within the viewshed of the transportation corridor. However, the interchange configurations are potentially the highest points within the transportation corridor, allowing for long, undisturbed views into the surroundings landscape and Lake Ontario.

Through the CVP process, options for gateway features, planting enhancements, bridge aesthetics, and signage have been developed for the primary intersections to increase the aesthetic feature, scenic composition, and connectivity of the landscape (**Appendix G**). Gateway features have been identified at Highway 2 and the East Durham Link to enhance the entranceways into Courtice and Bowmanville. Gateway enhancements will include themed signage, slope reduction/contour grading, and enhanced plantings of deciduous and coniferous trees, shrubs, perennials, and ornamental grasses.

Soil erosion should occur less along the East Durham Link than that of the eastern mainline due to the type of soils and the fact the majority of the landscape begins to flatten as the land moves closer to Lake Ontario and heavy cuts in the landscape are not as prevalent.

6.9.2 Mitigation/Compensation Measures

Buffer plantings, noise attenuation measures, contour grading, edge management, protection of Built Heritage features, and enhanced gateway opportunities are all proposed in close proximity to the towns of Courtice and Bowmanville, and will aid in mitigating effects, thus contributing to the overall visual landscape appeal and character of the East Durham Link.

Heavy buffering and screening will also be extremely important in areas bordering wetland communities to mitigate the effects of runoff and water quality. A 300 m structure is proposed in the vicinity of Pebblestone Road to preserve wetlands in the area and maintain wildlife movement. Further, the East Durham Link contains natural and artificial wetland complexes and the preservation of water quality is of utmost importance, and in conjunction with the engineering disciplines, an extensive and comprehensive wetland restoration plan has been developed. The restored wetland environments along the East Durham Link will have an intense configuration of water quality functions combined with the landscape enhancements and mitigation features, which contribute to the overall success. Landscape features and mitigation techniques include woody debris, root wads, aquatic vegetation, salt-tolerant shrub and tree buffer plantings to intercept road spray from traffic, as well as trail and interpretive opportunities. Continuous, buffer plantings of native, salt-tolerant coniferous tree species will be installed to help increase shade, reduce wind on

retained vegetation, particularly wetland vegetation and other sensitive natural areas and from the effects of the adjacent corridor. Further opportunities for wetland restoration will be explored during subsequent design phases depending on the availability of remnant parcels suitable for wetland restoration.

Also identified in the CVP process for Courtice and Bowmanville, were the inclusion of gateway features, enhanced plantings, themed bridge aesthetics to compliment the character of the surrounding area. Interchange enhancements were also identified and include reforestation in loops and gores, screening, vegetative buffering, enhanced plantings, bridge aesthetics, decorative lighting, and themed gateway features. All CVP enhancements have been included on the Recommended Design Plans (see **Appendix G**). Vegetative buffering through the use of linear, dense coniferous and deciduous tree and shrub species shall be implemented in key locations to alleviate effects of road spray, headlight glare, and snow drifting.

There are a total of nine wildlife passage structures designed for the East Durham Link. Seven of these are associated with watercourse crossing, and an additional crossing is considered to be 'dry', to allow for terrestrial wildlife movement. Standard and site-specific wildlife protection measures will be utilized to protect retained habitats adjacent to the alignment (refer to the Terrestrial Impact Assessment Report).

6.9.3 Net Effects

The East Durham Link routing will have both direct and indirect effects on the adjacent vegetation communities. Based on the amount of vegetation to be removed and the impacts to the existing wetland complexes, impacts include the creation of edge effects due to the length of newly exposed forest edge in some areas, depending on the sensitivity of the vegetation communities, topography and openness of the retained wetland/forest understory adjacent to the proposed corridor.

Overall, the transportation corridor for this section has been sited such that fragmentation of large habitat blocks has been minimized. Existing forest connectivity within the north third of the corridor is relatively poor with only narrow linear areas running north-south that are generally unconnected in an east-west direction as a result of agricultural land use. The central portion of this section contains large natural areas associated with the Harmony-Farewell Iroquois Beach Wetland and Maple Grove Wetland Complexes which provide east-west habitat connectivity, as well as connectivity to areas to the north. Impacts to the existing wetland complexes will be minimized through best management practices and properly executed and site-specific mitigation measures.

Where impacts to terrestrial ecosystem features cannot be avoided through planning or design, additional mitigation measures shall be applied during construction and operation/ maintenance to further minimize impacts. In situations where mitigation does not offset impacts, compensation will be applied to replace the feature/function elsewhere. Opportunities to enhance the natural environment will be explored in addition to mitigation and/or compensation where feasible.

Details regarding restoration, enhancement and compensation principles for ecological restoration and enhancement will be developed through on-going consultation with review agencies (MNR, DFO) during subsequent phases of design.

Alterations to the viewsheds and impacts to properties in close proximity to the corridor will also be mitigated through landscape composition measures which will include significant vegetative screening and buffering which are consistent with the character and surrounding land uses of the area. Where feasible, cultural vegetation (e.g. sugar maple hedgerows) should be protected, to preserve the character of the landscape. Measures developed through the CVP process will also mitigate impacts and include measures which will enhance the landscape composition of the area at select locations.

7. Monitoring and Commitments for the Undertaking

In order to ensure that the mitigation/compensation measures identified in **Chapter 6** are implemented as envisioned, a strategy and schedule was developed for monitoring landscape composition effects. Further, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the undertaking. All monitoring requirements associated with other disciplines (i.e. aquatics, terrestrial, heritage) are described further in their respective Impact Assessment reports.

7.1.1 Environmental Effects Monitoring

A monitoring strategy and schedule was developed based on all other discipline specific Impact Assessments carried out for the undertaking to ensure that (1) predicted net negative effects are not exceeded, (2) unexpected negative effects are addressed, and (3) the predicted benefits are realized. These monitoring requirements relate to activities/effects from construction and effects from the operation of the transportation corridor.

With respect to landscape composition, a monitoring strategy and schedule was developed to ensure that proper implementation of these measures occurs during and post construction. Therefore, the monitoring strategies have been broken into Construction and Operation phases.

Monitoring proposed during the **operational phase** of the transportation corridor includes:

- Maintenance and monitoring of plant materials for a minimum 2 year period
- Fencing maintenance along the transportation corridor, including wildlife passageways

Monitoring proposed during the **construction phase** of the transportation corridor includes:

- Tree protection during construction
- Manage construction access/material logistics
- Maintenance and monitoring of plant materials for a minimum 2 year period
- Fencing maintenance along the transportation corridor, including wildlife passageways

7.1.2 Development of an Environmental Management Plan(s)

An Environmental Management Plan (EMPs) or Plans will be prepared following approval of the undertaking by the Minister of the Environment and prior to construction. The EMP(s) will include a description of the proposed mitigation, commitments and monitoring.

7.2 Commitments

The following commitment has been proposed for ensuring that the identified mitigation/compensation measures and monitoring requirements are carried out as part of the construction, operation, and maintenance of the undertaking:

- Implementation of the Recommended CVP Design

8. Landscape Composition Approvals required for the Undertaking

There are no specific Landscape Composition approvals required for the undertaking, as MTO are exempt from Tree Preservation/Management Policies and Municipal By-laws.

9. Summary

Following the identification of the TPR, an impact assessment of the Recommended Design was carried out by number of disciplines to confirm the potential adverse environmental effects, mitigation or compensation measures, and remaining net effects previously identified during the Alternative Methods stage. A number of additional investigations were carried out to verify that the information collected in earlier stages was still relevant and up-to-date. Additional investigations included the following:

- Standard research to ensure current Best Management Practices such as MTO Aesthetic Guideline for Bridges
- Windshield survey and photo collection of TPR in relation to:
 - Wetlands
 - Brooklin and East Lynde Creek
 - Almond Village, Hampton, Solina and other local hamlet areas
 - Visual impact from homes and agricultural properties
 - Nurseries
 - Valley Trails

Further to the investigations listed above, additional consultation was undertaken, which included the following:

- Technical Design group coordination to comment upon and influence: contour grading, bridge architecture, trails, slope restoration and landscape protection and enhancement
- Environmental Working group coordination to comment upon and influence: creek realignment, riparian plantings, wildlife crossings and generally implementation of factor-specific mitigative measures
- Community Value Plan (CVP) Workshops

A key component of the 407 Landscape Composition was centered around consultation through the CVP process, which allowed a group of community members to be actively involved in shaping the mitigation and compensation measures from a landscaping and design perspective.

Three CVP sessions were held as part of the 407 consultation process covering the following:

- Workshop #1 – Community Values / Features (What and Why)
- Workshop #2 – Mitigation / Enhancement Measures (How)
- Workshop #3 – Recommended Community Value Plan (Path Forward)

As a result of these extra efforts, a more detailed understanding of the landscape composition was prepared. In general, the overall character of the existing landscape across the corridor is relatively consistent – much of the study area is rural in character with gently rolling topography, forested creek valley systems and having agricultural cropland as the dominant land use. Residential settlement and farm complexes are scattered in low densities throughout the area, with higher densities located in the 13 hamlets situated adjacent to the corridor. The most urban portions of the transportation corridor are represented by the communities of West Whitby and the expanding village of Brooklin.

In general the viewsheds along the transportation corridor mainline have greater scenic integrity, as they contain more intact natural vegetation systems and varied topography which provide greater visual interest. The landscape begins to flatten as it gets closer to Lake Ontario offering less opportunities for broad or expansive views.

The Landscape Composition Report is a cataloguing of all other environmental disciplines, which have been referenced throughout. Therefore, reference has been made to the discipline specific Impact Assessment Reports for all standard mitigation associated with terrestrial, aquatic, and wildlife habitat, edge management, mitigation to impacted heritage properties, and all other relevant factor-specific environmental disciplines. Site specific buffer and vegetative screening mitigation measures associated with residential properties have been identified in the Socio-Economic Impact Assessment.

From a landscape composition perspective, a number of monitoring requirements are proposed to ensure that the (1) predicted net negative effects are not exceeded, (2) unexpected negative effects are addressed, and (3) the predicted benefits are realized. These monitoring requirements include:

- Tree protection during construction
- Manage construction access/material logistics
- Maintenance and monitoring of plant materials for a minimum 2 year period
- Fencing maintenance along the transportation corridor, including wildlife passageways

One commitment has been proposed for ensuring that the identified mitigation/compensation measures and monitoring requirements are carried out as part of the construction, operation, and maintenance of the undertaking, which is to implement the Recommended CVP Design.

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10. References

Chapman, L.J. and D.F. Putnam. 1984. The Physiography of Southern Ontario (Third Edition). Ontario Geologic Survey, Special Volume 2. 270 pp.

Mantha, Raymond, P.Eng., Aesthetic Guidelines for Bridges, Ministry of Transportation