3. DETAILED DESCRIPTION OF THE RECOMMENDED DESIGN

3.1. Community Value Plan

3.1.1. Overview of the CVP Process

During the EA, a Proactive Involvement Plan (PIP) was developed as part of the project’s consultation process. The PIP included a number of objectives and principles that were designed to aid MTO in facilitating effective, proactive and continuous stakeholder involvement. One of the processes developed through the PIP was the Community Value Plan (CVP). The CVP process allowed more engagement between MTO and stakeholders and provided additional opportunities for active participation in the project design. Stakeholders were invited to provide input and share their knowledge about the unique community values and features adjacent to, or within close proximity to the transportation corridor.

The CVP was developed through a series of workshops hosted by MTO. This process established a broad range of historical, environmental, social and environmental features. Based on comments and input received through the CVP workshops, MTO was able to identify opportunities to improve the transportation corridor design, within its right-of-way (ROW) limits, through the inclusion of additional mitigation and enhancement treatments to be carried forward into the detail design of the project.

The outcome of the CVP process was the creation of a CVP Plan for the entire 407 East Transportation Corridor. The recommendations became part of the preliminary design plans and these were presented to agencies, stakeholders and the public at the final round of public information centres for the EA, for further comment and refinement. The CVP process and final recommendations are documented in the CVP Report that forms part of the EA.

3.1.2. Community Identified Values and CVP Themes

At the workshop held by MTO during the EA, the following list represents the initial community values and features identified:

- Natural areas including wetlands, forests and streams;
- Quietness and darkness at night;
- Close to nature and wildlife;
- Agricultural and farming community;
- Protection of environmentally sensitive areas;
- Heritage homes and farms;
• Community pride;
• Rural landscapes and vistas;
• Historic villages and sites;
• Slower pace; and
• Open spaces.

Concentrating on specific areas along the corridor, participants were asked to focus on issues that they would like addressed and make suggestions on possible enhancements they would like to see. These are identified in Table 3.1.

Table 3.1: Areas of Interest, Concerns for Consideration, Enhancement Measures

<table>
<thead>
<tr>
<th>Area of Interest</th>
<th>Issues/Concerns</th>
<th>Enhancement Measures to Consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almond Village</td>
<td>visual and sound issues</td>
<td>prefer berms, landscaping, aesthetics</td>
</tr>
<tr>
<td>West Whitby community</td>
<td>visual and sound issues, wildlife corridor, recreational trails, local road realignment</td>
<td>preserve topography; maintain Lynde Creek, animal paths along valley; maintain pedestrian access</td>
</tr>
<tr>
<td>Brooklin</td>
<td>re-forestation, visual and sound issues</td>
<td>prefer berms, landscaping, leave wooded area around valley, reduce lighting</td>
</tr>
<tr>
<td>Brooklin</td>
<td>approach/entrance to the community</td>
<td>signage, incorporate heritage features of community, landscaping, gateway feature</td>
</tr>
<tr>
<td>Simcoe Street</td>
<td>bridge decoration, preservation of heritage/community features</td>
<td>signage, incorporate heritage and farming features, preserve buildings, landscaping</td>
</tr>
<tr>
<td>Ritson Road/ Harmony Road</td>
<td>wildlife crossings, Oak Ridges Moraine, snow drifting, fog, visual impacts, recreational trails</td>
<td>maintain access to creek systems, fence highway, use extra lands for mitigation, plantings for weather</td>
</tr>
</tbody>
</table>

A variety of mitigation and enhancement measures were identified for application at various locations throughout the corridor. The mitigation and enhancement measures were grouped into seven broad CVP themes:

**Universal Measures**

Universal Measures consist of a variety of mitigation and enhancement strategies that could be applied throughout the corridor such as using low maintenance and salt tolerant plant species; naturalizing the appearance and function of stormwater management ponds and using animal-friendly fencing.
Landscape Screenings

Landscape Screenings provide a screening effect for aesthetic purposes, as well as providing sound and visual mitigation. They include: planting berms, using trees and shrubs to disguise slope and ramp fills; plantings to soften the look of noise barrier structures; and using dense coniferous hegderows to protect against wind, salt spray and snow drift.

Gateways

Gateways visually enhance the approach to a community located along the transportation corridor. They can be built to reflect community, municipal and regional values; include the use of signs with themed elements, with complementary plantings.

Architecture Enhancement Strategies

Architecture Enhancement Strategies are used on road related structures to complement the landscape character or local community. They may include using decorative signage on bridges and using themed motif or pre-cast liners on bridges.

Local Heritage Strategies

Local Heritage Strategies recognize the importance of local heritage and cultural resources in a community. They can include the use of themed signage and other elements to reflect heritage character; and buffering measures to protect heritage elements.

Wildlife Crossings

Wildlife crossings were refined to ensure the safe movement of animals across the corridor. They can include the use of wildlife funnel-fencing to guide animals to and through the crossings; specially designed structures for wildlife passage; and plantings that provide food and cover at the crossing locations.

Wetland Restoration Measures

Wetland Restoration Measures were considered in environmentally significant areas. They can include: restoring lands back to wetland habitat; using native species to simulate natural succession; using salt tolerant species to buffer wetland areas; developing opportunities for educational and recreational use.

3.1.3. Detail Design of CVP

MTO included a commitment to further develop and finalize the CVP as commitment of the EA to ensure the highway is developed with the additional mitigation and enhancement treatments as visualized by the community. The development of the CVP to a detail design level and implementation of the mitigation and enhancement elements in the plan is the responsibility of
407EDG in accordance with the Project Agreement (PA) with the Province to design, build, finance and maintain Highway 407 East Phase 1.

The CVP developed by MTO identified areas of concern and interest to local residents. 407EDG has reviewed the preliminary mitigation treatments identified in the CVP and through the Detail Design Phase has built-on the mitigation measures to fully address EA commitments and the values and features of interest to the community.

The following sections provide an overview of the CVP developed during the Detail Design Phase for the Project. The full CVP document in its entirety is available for review electronically from the Project website [http://www.407eastphase1.ca](http://www.407eastphase1.ca) and at 407EDG's Project Office.

### 3.2. Landscape Plan and CVP Design Elements

#### 3.2.1. Ecological Restoration Approach

To build on the CVP, 407ECGP has adopted an ecologically-integrated design focus for the landscape planning related to the CVP design elements. This ecological based approach employs a range of restoration and aesthetic enhancement strategies that maximize the potential for natural habitat regeneration and increased biodiversity, through ensuring the establishment of native vegetation communities, ecosystem linkages, and conservation of local heritage values. In order to improve the overall success of vegetation restoration within the highway ROW and on the Project Lands, and to achieve the diverse objectives of the Project, an integrated approach is being used to merge elements of landscaping with ecological restoration. Landscape Plans are therefore based on the following principles for conservation of ecological values in the following order of priority, to the greatest extent possible:

1. Protection (by avoidance and/or mitigation);
2. Restoration; and

The following principles and objectives have guided the planning, design and implementation of the landscape and ecological restoration approach applied to the CVP themes and design elements:

- Preservation of the predominately rural character of the landscape;
- Preservation of existing topography and blending of corridor grades into the existing site situations, such as creating and/or maintaining view sheds;
- Use local source-identified wild-type native plants for both landscaping and ecological restoration components of the Project.
- Develop vegetation restoration plans within the corridor (e.g., valley lands, stream riparian areas, embankment areas, landscape screenings, forest edges) and in adjacent
compensation areas to emulate the natural character of local plant communities and restore the features and functions of forests, thickets, wetlands, and meadows.

- Use ecological restoration templates in planning and implementation of design elements to effectively restore vegetation communities that have the richness, resiliency and redundancy characteristics of natural sustainable ecosystems.

- Establish native plant communities (herbaceous layer) as an alternative to exotic grasses and legumes for groundcover in the roadside environment, wherever possible, which increases the survival of trees and shrubs in the highway corridor.

- Establish native species coupled with the removal of non-native/invasive species.

- Use a palette of robust, diverse, native plant species that are suitable for the CVP design elements/themes, with consideration of sustainable low maintenance solutions for a variety of difficult environs (e.g., dry areas, areas of poor drainage, salt spray areas, etc.) and also performance with regards to long term erosion control and slope stability.

- Enhancement of stormwater management pond landscapes to achieve ecological features and functions, while adding to the aesthetic quality of the corridor.

### 3.2.2. CVP and Landscape Design Components

The CVP encapsulates the social features (noise, visual, aesthetics, cultural heritage, etc.), as well as landscaping and ecological restoration components of the Project. The design and implementation of CVP and landscape design elements within the highway ROW limits include mitigation and enhancement treatments that focus on addressing the 7 broad themes identified in the conceptual CVP. The CVP and landscape design elements for each of the CVP themes are as follows:

**Universal Measures (Applied Throughout Corridor)**

- Use of native tree, shrub and groundcover (grass) species to restore areas within the corridor, including use of salt tolerant species (e.g., Salt Screen Areas) in vulnerable salt spray areas.

- Landscaping of the 32 stormwater management ponds for the highway with the objective to naturalize their appearance, as well as to promote shade and cooler water temperatures.

**Gateway Features**

- Local gateway features for the communities of Brooklin and Columbus through the use of signage and plantings.
Bridge Architectural Enhancements

- Design of bridge architectural enhancements at Baldwin Street through the use of embossment of images to reflect an agricultural heritage theme, and at Simcoe Street with cultural/spiritual images of significance to Seven First Nations of the Williams Treaties, as an Aboriginal commemorative feature.

Local Heritage

- Design and implementation of local heritage commemorative sites to reflect Settlement, Agriculture, Industry and Transportation themes near the Hamlet of Greenwood, the Oshawa North area, the Village of Brooklin, and Almond Village, respectively; as well as an Aboriginal themed commemorative site in the City of Oshawa.

- Design and implementation of heritage streetscape plantings at eleven (11) municipal road crossings to replicate the rural cultural landscape surrounding the highway corridor.

Wildlife Crossings

- Design and construction of 33 wildlife passage structures at watercourse crossing features (culverts, bridges) and 2 dry culvert structures dedicated for wildlife conveyance to maintain a connection among a variety of terrestrial and aquatic wildlife habitats.

- Design and installation of two (2) types of wildlife fencing to direct/funnel wildlife to the wet and dry wildlife passage structures.

- Design and installation of wildlife escape ramps as measures to allow wildlife trapped in the transportation corridor to safely escape.

Forest and Wetland Restoration

- Design and construction of vegetation restoration and compensation, outside the highway corridor on Project Lands (documented in the “Vegetation Compensation and Replacement Ecological Restoration Plan” - VCRER), to meet the EA commitments. This includes:
  - Restoring/recreating 60.97 ha of forest and 12.5 ha of wetland at a compensation ratio of 1:1 for the direct removal of vegetation;

- Implementation of “Overall Benefit” activities for Species at Risk (SAR) through ecological restoration as a condition of the Endangered Species Act Permits for Butternut, Bobolink, Eastern Meadowlark, Barn Swallow and Redside Dace. This
includes the creation of forests and wetlands, as well as for SAR such as Bobolink and Eastern Meadowlark the creation of graminoid meadow type habitat.

**Overview of Key CVP and Landscaping Design Elements**

A summary of select key CVP and landscape design elements are described below. Design components in the CVP, including landscaping treatment and enhancements, are detailed in the design drawings contained in Appendix A.

**Visual Rural Screenings**

Landscaping strategies have been used to provide a screening effect for aesthetics, as well as providing sound and visual mitigation in order to address community issues and concerns. These objectives were primarily achieved through the use of the following techniques:

- Planted berms;
- Trees and shrubs to disguise and naturalize highway embankment slopes and ramp fills;
- Landscaping to buffer adjacent residential areas;
- Plantings to soften the look of noise barrier wall structures; and
- Dense coniferous hedgerows to protect against wind, salt spray and snow drifting.

Berms of variable height with 3:1 or 2:1 horizontal to vertical side slopes and minimum 2 m wide flat tops are strategically located along the 407 East Phase 1 to provide visual/noise screening. Berms in some cases will be contoured and/or undulating to lessen slopes for visual blending to the surrounding landscape.

Aesthetic enhancements for berms will include the use of native meadow species seed mix, and the use of trees and shrubs, with due regard to creating texture and colour.

The CVP includes vegetation screenings adjacent to residential and rural areas to act as a visual and/or noise buffer and, in select locations, to protect against wind/snow drifting. Vegetation screenings will consist of dense, mass plantings of deciduous and coniferous tree and shrub species, such as White Spruce, Eastern Red Cedar, Common Hackberry, Black Walnut, Bur Oak, Choke Cherry and Snowberry. Visual/Noise and/or rural screenings are to be planted along the Highway 407 East Phase 1 mainline at:

- Sideline 14;
- Salem Road;
- Sideline 4;
- Kinsale Road;
Visual/rural screenings are also proposed along the WDL at:

- Dundas Street East;
- Highway 401 and WDL Interchange;
- Lake Ridge Road (eastside north of Highway 401); and
- Halls Road.

Dense plantings will be utilized 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.

**Gateway Features**

Gateway features visually enhance the approach to a community. This type of treatment can be designed to reflect community, municipal, and regional values. The gateway features for the Highway 407 East Phase 1 Project include primarily signage and plantings, consisting mostly of native ornamental and salt tolerant species.

Local community gateway features have been developed for the City of Oshawa and Town of Whitby. The gateway feature for Oshawa is to be located along the east side Simcoe Street just north of Highway 407 East, as entry to the Village of Columbus (City of Oshawa). As well, a local gateway feature for Whitby is to be located along the east side of Baldwin Street, just north of the Highway 407 as entry to the Village of Brooklin. The gateway features for the Village of Brooklin (Town of Whitby) and Village of Columbus is illustrated in Exhibit 3.1.

As part of the Brooklin/Town of Whitby gateway feature along Highway 407 East, there was opportunity to meld bridge architecture at the Baldwin Street Bridge with local heritage elements
This design approach was also adopted for the Oshawa gateway feature, with consideration of, and complementary to, the aboriginal commemorative element on the Simcoe Street Bridge. Gateway features at both sites also include broader enhancement plantings, such as woodland plantings in the Baldwin Street Interchange loop ramps, and plantings at stormwater ponds.

A gateway feature has also been developed specifically for the urban area of Brooklin within the municipality of Whitby at the interchange of Baldwin Street and Highway 407 East. The gateway feature for the Village of Brooklin includes signage on an elevated graded platform, along with the use of native grasses, trees and shrubs to add visual prominence approaching the community. The signage element of the gateway features will be approximately 2 m above grade with display dimensions of approximately 3 m high by 6 m wide, supported on brick masonry with surrounding complementary planting beds. The gateway feature for the Village of Brooklin (Town of Whitby) is illustrated in Exhibit 3.2.

Exhibit 3.1: View of Local Gateway Features for the Village of Columbus and Village of Brooklin
Local Heritage Commemoration

Local heritage strategies have been developed to recognize the importance of agriculture, industry, transportation and historic settlements to the communities in the Highway 407 East Phase 1 study area. Historically, the study area was largely farmland settled in the late-18th to mid-19th century, characterized by a land grid pattern of the late-18th century which was originally surveyed into 200 acre lots with a system of concession and sideline roads. Crossroads, hamlets and villages arose across this grid, often where milling operations were established. Within the Highway 407 East Phase 1 area, the historical communities included Brougham, Greenwood, Kinsale, Brooklin and Columbus.

Heritage design elements and features for the Highway 407 East Phase 1 Project include:

- Adaptive reuse of salvaged materials from heritage structures (e.g., foundation stones and bricks) for installation at heritage commemorative site(s) within the highway corridor and/or Project Lands;
- Use of themed signage, with consistent sign design standards applied throughout the corridor at commemorative sites and commuter parking lots;
- Bridge architectural enhancements; and
- Heritage streetscape plantings.

Six local heritage commemorative sites have been developed for the Highway 407 East Phase 1 Project. Figure 3-1 shows the location of the six heritage commemorative sites and the following provides a synopsis of the main historical characteristics and themes applied at the four 407EDG heritage sites, along with a description of the heritage design elements/features planned as part of the CVP. Heritage commemorative sites (e.g., text for heritage signs/plaques) are currently being
finalized in consultation with local municipal representatives in the City of Pickering, Town of Whitby and the City of Oshawa.
City of Pickering (Hamlet of Greenwood) – Installation of local heritage interpretative signage to be located adjacent to the Paddock Road cul-de-sac, where the road is to be closed immediately north of the Highway 407 East.

The recommended theme for the commemorative site in the City of Pickering is historic settlement of Greenwood. This site will include a double-sided sign supported on wooden posts/beams to capture the attention of pedestrians, cyclists and other passive recreational users in the area. The sign will be located near the termination point of Paddock Road at Highway 407 East in close proximity to the existing Trans Canada Trail crossing. The signage will include text and maps/images of the former historic settlement of Greenwood in the Region of Durham near Highway 407 East.

Town of Whitby (Village of Brooklin) – Installation of local heritage interpretative signage at the commuter parking lot area in the southwest quadrant of the Baldwin Street/Highway 407 Interchange; and use of bridge architectural enhancements at the Highway 407 East/Baldwin Street Bridge. The recommended heritage theme for the commemorative site in the Town of Whitby is industry, such as sawmills, etc. and its historic role in servicing agricultural communities.

Architectural bridge enhancement with a local heritage theme will be applied to the Baldwin Street Bridge. This includes the use of a themed motif of decorative embossments on the bridge. Based on background research, it is proposed that a wheat sheaf and millstone/grindstone motif be installed with concrete embossments on the Baldwin Street Bridge parapet walls and abutment wing walls. The design of the concrete panel motifs on the bridge will meet the requirements of the Canadian Highway Bridge Design Code and has considered the technical requirements needed to install the artwork, so as to not compromise the bridge’s strength, serviceability, maintainability, functionality or durability.

A graphic rendering of the bridge architectural enhancement is displayed in Exhibit 3.3.
• Town of Whitby (Almond Village) – Construction of a cairn, using stones salvaged from heritage structures, with a local heritage interpretative plaque, to be located in an open space area east of Lake Ridge Road and south of Almond Avenue (Refer to Figure 3-1).

The recommended heritage theme for the commemorative site near Almond Village in the Town of Whitby is the historic transportation network (roads, rail, etc.) that contributed to local economic development in the area and historic Village of Almond. Two heritage commemorative elements will be created to reflect the above themes. This would include the construction of a pyramidal cairn to act as a monument/landmark with inclusion of a historical interpretative plaque affixed to the structure. The cairn is proposed to capture the interest of pedestrians and cyclists in the local community. An example of a typical commemorative cairn, with a plaque is shown in Exhibit 3.4.
Exhibit 3.4: Example - Photo of the commemorative Glengarry Landing Stone Cairn in Glengarry, Ontario

- **City of Oshawa (Oshawa North, Local Heritage Theme)** – Installation of local heritage interpretative signage, with a stone seating area located just east of Ritson Road and north of the Highway 407/Ritson Road Overpass/Bridge within the open space/floodplain area of Oshawa Creek East Branch.

  The recommended heritage theme for the commemorative site in City of Oshawa is “Agriculture”. The commemorative element proposed at this location includes local heritage interpretative signage and a field stone seating area, with the purpose to capture the attention and interest of pedestrians, cyclists and drivers along Ritson Road.

- **City of Pickering** - Installation of heritage commemorative signage at commuter parking lot at Brock Road (work by MTO).

- **City of Oshawa (Aboriginal theme)** - Installation of aboriginal signage at the commuter parking lot in the northwest corner of Simcoe Street and Winchester Road (work by MTO).

*Heritage Streetscapes*

Heritage streetscape planting designs have been developed to replicate the rural cultural landscape of the local area surrounding the Highway 407 East corridor. Heritage Streetscape plantings are
proposed alongside select municipal road crossings of the highway and include random offset and spacing of native trees and shrubs, with a groundcover seed mix of grasses, sedges and forbs to form a cultural meadow community. Trees to be planted are generally of larger stock size compared to other landscaped areas, and include such species as Freeman Maple, Red Oak, American Basswood and Princeton Elm.

Heritage Streetscape landscaping plantings are proposed at the following municipal road crossings associated with the Highway 407 East Phase 1 Project.

- Sideline 14;
- Westney Road;
- Salem Road;
- Lake Ridge Road;
- Coronation Road;
- Cochrane Street;
- Ashburn Road;
- Thickson Road;
- Thornton Road;
- Winchester Road; and
- Harmony Road.

Aboriginal Commemoration

Engagement with Aboriginal groups began at the start of the EA study and has been ongoing. MTO retains responsibility for First Nation communications and consultation and is committed to a continued, open dialogue with First Nation communities.

As part of the CVP, and ongoing discussion with First Nation communities during the Detail Design phase for the project, an opportunity for Aboriginal commemoration at the Simcoe Street and Highway 407 interchange was identified. A series of workshops with the Williams Treaties Group of First Nations has been held to further discuss and develop the details related to the Aboriginal commemorative installations on the Simcoe Street Bridge and within the interchange area, such as the commuter parking lot at Simcoe Street and Winchester Road.

On the Simcoe Street Bridge, the intention is to have Aboriginal commemorative images of cultural significance on the bridge deck parapet walls and bridge abutment wing walls on both sides of the
structure. The architectural enhancement or commemorative images will be “embossed” (embedding design elements into the fabric of the bridge).

In keeping with the Aboriginal theme at the Simcoe Street Bridge, traditional plantings have also been specified within the interchange area, with input from Aboriginal communities on appropriate traditional cultural and/or medicinal plant species of importance. The incorporation of landscape design elements to complement the required Aboriginal commemorative installation at the Simcoe Street Bridge was identified by MTO in the Final Aboriginal Commemorative Installation Strategy (July 2011).

The aboriginal commemorative images that have been adopted for the Simcoe Street Bridge, in consultation with the seven First Nations of the Williams Treaties, include Turtle, Medicine Wheel, Seven Feathers, and Braid of Sweet Grass with an Eagle Feather. A graphic rendering of the Aboriginal commemorative images for the Simcoe Street Bridge is displayed in Exhibit 3.5. An explanation of the cultural/spiritual significance of the Williams Treaties Group commemorative images will be displayed in a signage installation located at the commuter parking lot at Simcoe Street and Winchester Road.

Exhibit 3.5: Rendering of the aboriginal commemorative images proposed for the Simcoe Street Bridge
Wildlife Crossings, Directional Fencing and Escape Ramps

A significant portion of the wildlife mitigation strategy for the Highway 407 East Phase 1 Project is dedicated to the design and construction of 35 wildlife crossings. There are 2 dedicated (dry) wildlife passage structures being constructed within the transportation corridor (Crossings 43A and 43B). The designated wildlife structures are being constructed along the WDL, and will serve to maintain a connection among a variety of terrestrial and aquatic wildlife habitats. Other wildlife crossings include bridge and culvert sites that will be constructed to convey water and allow for safe wildlife passage.

The goal of the wildlife passage system is to provide designated corridors to facilitate the movement of wildlife. The size and placement of the crossing structures, directional barrier fencing and habitat features found within and adjacent to the crossing structures are integral for reducing road mortality and facilitating movement through designated corridors.

Directional funnel fencing will be constructed along Highway 407 East Phase 1 with the objective to exclude wildlife from the transportation corridor and re-direct animals to the wildlife passage structures. The location of funnel fencing has been determined on a site-specific basis and in association with the limits of the wildlife passage structures and nature and extent of landscape alterations.

There are two types of funnel fencing that will be installed for the Highway 407 East Phase 1 Project.

- **Type 1 - Large and Small Exclusion Fence** designed for large wildlife (e.g., white-tailed deer) and small wildlife such as amphibians and reptiles. The fencing will be 2.4 m high, with a fine wire mesh affixed and trenched below the ground to act as a barrier to small wildlife.

- **Type 2 - Small Exclusion Fence** designed for a variety of small wildlife, such as amphibians, reptiles and small mammals. The fencing will be 1.35 m high with a fine wire mesh (opening size of ¼ by ¼ inch) affixed and trenched below the ground to exclude small animals from accessing the highway corridor.

As identified in the EA, earth escape ramps are proposed to provide provision for wildlife, especially ungulates, trapped within the lands to safely exit the lands. Ramps will be constructed of earth materials with gradual 3:1 slopes and stabilized with a native seed mix. Where possible, escape ramps will be placed near natural cover. Escape ramps will be located near the wildlife structure, with ramps placed at 400 m to 800 m intervals, depending on site and adjacent habitat conditions.
3.2.3. Summary of Community Interests/Concerns and CVP and Landscape Design Elements

As previously cited, the CVP was developed through a series of workshops hosted by MTO, as part of the Proactive Involvement Plan and enhanced consultation process adopted during the EA, which has continued as part of the Detail Design phase for the Project.

A summary of the EA commitments related to community values and areas of interest as identified through the CVP process, along with the mitigation and enhancement treatments are presented in Table 3.2. In the table, community areas of interest/EA commitments and proposed treatments are organized by highway design segment, with specifics on the treatments/enhancement measures to be implemented to address community issues and concerns. Figure P-4 provides a Key Plan showing the highway design segments for reference.

<table>
<thead>
<tr>
<th>Highway Segment</th>
<th>Location</th>
<th>Potential Environmental Effect or Community Area of Interest/Concern</th>
<th>CVP and Landscape Design Elements to be Implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Hwy 407/ Sideline 14</td>
<td>Highway construction and grading will result in the removal of vegetation.</td>
<td>Heritage Streetscape plants are to be provided on Sideline 14 bridge approaches to compensate for the loss of vegetation.</td>
</tr>
<tr>
<td>A1</td>
<td>E of Sideline 14, Hwy 407 ROW</td>
<td>Visual impact needs to be minimized on both sides of the highway.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A1</td>
<td>E of Sideline 14, N of Hwy 407</td>
<td>Visual impact of the bridge needs to be minimized and a terrestrial edge planted.</td>
<td>Rural screen and edge plants are required to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A1</td>
<td>N side of the Hwy 407 east of Sideline 14</td>
<td>The highway ROW will form the new edge of the terrestrial zone.</td>
<td>Enhance terrestrial edge to buffer from salt spray damage, incorporate edge management plants. Ecological plants near wildlife fencing to enhance habitat and cover.</td>
</tr>
<tr>
<td>A1</td>
<td>SWM Zone, Hwy 407, E of Sideline 14</td>
<td>Loss of habitat and vegetation associated with the Spring Creek crossing and highway grading.</td>
<td>Enhancement woodland plants are to be added to areas south of the ROW adjacent to the 2 SWM Ponds.</td>
</tr>
<tr>
<td>A1</td>
<td>South side of Hwy 407</td>
<td>Winter winds will blow salt spray into rural lands to the south potentially causing damage to vegetation.</td>
<td>Linear planting of evergreen trees to mitigate the effects of the salt spray on the environment.</td>
</tr>
<tr>
<td>A1</td>
<td>North side of Hwy 407</td>
<td>Noise affects from the highway on property at 3790 Paddock Road.</td>
<td>Required mitigation plantings/berming, where feasible, in accordance with the Noise Mitigation Plan for the subject property.</td>
</tr>
<tr>
<td>Highway Segment</td>
<td>Location</td>
<td>Potential Environmental Effect or Community Area of Interest/Concern</td>
<td>CVP and Landscape Design Elements to be Implemented</td>
</tr>
<tr>
<td>-----------------</td>
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<td>---------------------------------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>A1</td>
<td>East Duffins Creek &amp; Hwy 407</td>
<td>Loss of habitat and vegetation associated with the Duffins Creek meander belt corridor. Approach slopes and bridge will require wildlife funnel fencing and plants.</td>
<td>Restore, and where possible enhance, vegetation communities within the highway ROW. Landscape/ecological restoration plants to enhance the effects of the wildlife fencing and improve the habitat linkages. Woodlot edge management techniques.</td>
</tr>
<tr>
<td>A1</td>
<td>Paddock Rd.</td>
<td>Access will be restricted at this location.</td>
<td>Trail connection (Trans Canada Trail) under the new bridge.</td>
</tr>
<tr>
<td>A1</td>
<td>Hwy 407/ Westney Rd. overpass</td>
<td>Construction and grading will result in the removal of roadside vegetation.</td>
<td>Heritage Streetscape plants at the Westney Rd. bridge to compensate for the loss of roadside vegetation.</td>
</tr>
<tr>
<td>A1</td>
<td>Carruthers Creek Tributaries Hwy 407 overpasses</td>
<td>The approach slopes and bridge abutment structures will require wildlife funnel fencing and buffer plants.</td>
<td>Landscape/ecological restoration plants to enhance the effects of the wildlife fencing and improve the habitat linkages. Woodlot edge management techniques.</td>
</tr>
<tr>
<td>A1</td>
<td>Hwy 407/ Salem Rd. overpass</td>
<td>Construction and grading will result in the removal of roadside vegetation.</td>
<td>Heritage Streetscape plants at the Salem Rd. bridge to compensate for the loss of roadside vegetation.</td>
</tr>
<tr>
<td>A1</td>
<td>N of Hwy 407 at Salem Rd.</td>
<td>Visual impact needs to be minimized from the rural properties to the north.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A1</td>
<td>E side of Sideline 4, N of Hwy 407</td>
<td>Visual impact needs to be minimized and a terrestrial edge to be planted.</td>
<td>Rural screen and edge plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A1</td>
<td>N side of Hwy 407, E of Sideline 4</td>
<td>Noise affects from the highway on property at 3805 Sideline 4.</td>
<td>Visual screening plantings in accordance with the Noise Mitigation Plan for the subject property.</td>
</tr>
<tr>
<td>A1</td>
<td>S of Hwy 407, E of Sideline 4</td>
<td>Visual impact needs to be minimized from the rural properties to the south.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A2</td>
<td>Lynde Creek Tributary/ Hwy 407 overpass</td>
<td>The approach slopes and bridge structures will require wildlife funnel fencing and buffer plants.</td>
<td>Landscape/ecological restoration plants to enhance the effects of the wildlife fencing and improve habitat linkages. Woodlot edge management techniques.</td>
</tr>
<tr>
<td>A2</td>
<td>Lynde Creek Tributary/ Hwy 407</td>
<td>Loss of habitat and vegetation in associated meander belt corridor.</td>
<td>Restore, and where possible enhance, vegetation communities within the highway ROW.</td>
</tr>
<tr>
<td>A2</td>
<td>S of Hwy 407 both sides of Kinsale Rd.</td>
<td>Visual impact needs to be minimized from the rural properties to the south.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A2</td>
<td>Hwy 407/ Lake Ridge Rd.</td>
<td>Highway construction and grading will result in the removal of vegetation.</td>
<td>Heritage Streetscape plantings at Lake Ridge Rd. bridge approaches to compensate for the loss of vegetation.</td>
</tr>
<tr>
<td>Highway Segment</td>
<td>Location</td>
<td>Potential Environmental Effect or Community Area of Interest/Concern</td>
<td>CVP and Landscape Design Elements to be Implemented</td>
</tr>
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</tr>
<tr>
<td>A2</td>
<td>Lake Ridge Rd. &amp; Hwy 407 Interchange</td>
<td>Loss of habitat and vegetation due to the land area required for the interchange.</td>
<td>Woodland plantings are to be added to areas within the Lake Ridge Rd. &amp; Hwy 407 interchange.</td>
</tr>
<tr>
<td>A2</td>
<td>Hwy 407/ WDL Interchange</td>
<td>Loss of habitat and vegetation due to the land area required to accommodate the interchange.</td>
<td>Woodland plants are to be added to areas within the Hwy 407 East Mainline/WDL interchange.</td>
</tr>
<tr>
<td>A2</td>
<td>Hwy 407/WDL Interchange</td>
<td>Installation of Aboriginal commemorative site with sculpture to commemorate the culture of Aboriginal communities</td>
<td>Plantings and grading platform to be constructed east of SWM Pond 42E by 407EDG, with sculpture to be added by MTO.</td>
</tr>
<tr>
<td>A2</td>
<td>Hwy 407/ Coronation Rd.</td>
<td>Construction and grading will result in the removal of roadside vegetation.</td>
<td>Heritage Streetscape plants at Coronation Rd. bridge approaches to compensate for the loss of vegetation.</td>
</tr>
<tr>
<td>A2</td>
<td>Lynde Creek Tributary &amp; Hwy 407</td>
<td>Loss of habitat and vegetation associated with the Lynde Creek valley/stream corridor. Approach slopes and bridge structures will require wildlife funnel fencing and plants.</td>
<td>Restore, and where possible enhance, vegetation communities within the highway ROW. Landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages. Woodlot edge management techniques.</td>
</tr>
<tr>
<td>A2</td>
<td>N of Hwy 407, West of Country Ln.</td>
<td>Visual impact needs to be minimized from the rural properties to the south.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A2</td>
<td>S of Hwy 407, West of Country Ln.</td>
<td>Noise affects from the highway on property at 6202 Country Lane.</td>
<td>Required mitigation plantings in accordance with the Noise Mitigation Plan for the subject property.</td>
</tr>
<tr>
<td>A2</td>
<td>Road Closure at Country Ln.</td>
<td>Access will be restricted at this location.</td>
<td>Landscape to mitigate visual impact of the SWM Pond and ROW limit for properties along Country Lane.</td>
</tr>
<tr>
<td>A2</td>
<td>Lynde Creek Tributary &amp; Hwy 407</td>
<td>The approach slopes and bridge abutment structures will require wildlife funnel fencing and plants. Loss of habitat and vegetation associated with the corridor.</td>
<td>Landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages. Woodlot edge management techniques will also be applied. Restore, and where possible enhance, vegetation communities within the highway ROW, near the SWM pond.</td>
</tr>
<tr>
<td>A2/A3</td>
<td>N &amp; S of Hwy 407</td>
<td>Visual impact of the highway needs to be minimized from rural properties.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A2</td>
<td>Hwy 7 &amp; WDL Interchange</td>
<td>Loss of habitat and vegetation due to the land area required to accommodate the interchange ramp and bridge.</td>
<td>Woodland plants are to be added to areas within the Highway 7/WDL interchange.</td>
</tr>
<tr>
<td>Highway Segment</td>
<td>Location</td>
<td>Potential Environmental Effect or Community Area of Interest/Concern</td>
<td>CVP and Landscape Design Elements to be Implemented</td>
</tr>
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</tr>
<tr>
<td>A3</td>
<td>Hwy 407/ Baldwin Street Interchange</td>
<td>Opportunity to include cultural heritage commemorative at interchange.</td>
<td>Consideration of cultural heritage commemoration for the Village of Brooklin.</td>
</tr>
<tr>
<td>A3</td>
<td>Lynde Creek Tributary &amp; Hwy 407</td>
<td>The approach slopes and bridge abutment structures will require wildlife funnel fencing and plants.</td>
<td>Landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407/ Cochrane St.</td>
<td>Highway construction and grading will result in the removal of vegetation.</td>
<td>Heritage Streetscape plants at the Cochrane St. bridge approaches to compensate for the loss of vegetation.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407/ Ashburn Rd.</td>
<td>Highway construction and grading will result in the removal of vegetation.</td>
<td>Heritage Streetscape plants at Ashburn Rd. bridge approaches to compensate for the loss of vegetation.</td>
</tr>
<tr>
<td>A3</td>
<td>N &amp; S of Hwy 407, W of Baldwin St.</td>
<td>Visual impact of the highway needs to be minimized from the north and south rural properties.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407 &amp; Baldwin St Interchange</td>
<td>Loss of roadside vegetation due to the land area required to accommodate the interchange ramps and bridge.</td>
<td>Woodland plants are to be added to areas within the Hwy 407/Baldwin St. interchange.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407 &amp; Baldwin St. Interchange</td>
<td>Driver orientation requires additional signage indicating municipal jurisdiction.</td>
<td>Gateway signage/features for the Village of Brooklin.</td>
</tr>
<tr>
<td>A3</td>
<td>Baldwin St., S of Hwy 407</td>
<td>Noise from vehicles and view of elevated roadway approaching highway interchange.</td>
<td>Visual/noise screen vegetation to buffer the adjacent property owners.</td>
</tr>
<tr>
<td>A3</td>
<td>Baldwin St., N of Hwy 407 &amp; W off ramp</td>
<td>Noise from vehicles and off ramp approaching Baldwin St.</td>
<td>Visual/noise screen vegetation to buffer the adjacent property owners.</td>
</tr>
<tr>
<td>A3</td>
<td>S side of Hwy 407, E of Baldwin St</td>
<td>Winter winds will blow salt spray potentially causing damage to vegetation and habitat areas.</td>
<td>Linear planting of evergreen trees to mitigate the effects of the salt spray on the environment.</td>
</tr>
<tr>
<td>A3</td>
<td>Lynde Creek &amp; Hwy 407</td>
<td>Loss of habitat and vegetation with the Lynde Creek meander belt corridor. Proposed approach slopes and bridge abutment structures will require wildlife funnel fencing and plants.</td>
<td>Restore, and where possible enhance, vegetation communities within the highway ROW. Landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages.</td>
</tr>
<tr>
<td>A3</td>
<td>Lynde Creek</td>
<td>Pedestrian access from neighbourhood; highway limiting movements.</td>
<td>Trail connection under the new bridge, vegetation plants to improve habitat along the trail system.</td>
</tr>
<tr>
<td>Highway Segment</td>
<td>Location</td>
<td>Potential Environmental Effect or Community Area of Interest/Concern</td>
<td>CVP and Landscape Design Elements to be Implemented</td>
</tr>
<tr>
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</tr>
<tr>
<td>A3</td>
<td>S side of Hwy 407, W of St Thomas St.</td>
<td>Noise from the highway is considered for the property at 200 St Thomas St.</td>
<td>Visual/noise screening plantings on 5 m high berm in accordance with the Noise Mitigation Plan for the subject property.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407 – N side between Baldwin St. &amp; Anderson St.</td>
<td>Highway noise and visual impact of the new highway on the residential community (Brooklin).</td>
<td>A noise barrier wall along the highway and clear panel on the bridge over Lynde Creek to mitigate impacts of the highway. Trees and shrubs are to be planted on backside of the wall as an additional buffer for adjacent property owners.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407/ Anderson St.</td>
<td>Construction and grading will result in the removal of roadside vegetation.</td>
<td>Heritage Streetscape plants at the Anderson St. bridge approaches to compensate for the loss of vegetation.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407 W on-ramp near Anderson St. and Thickson Rd.</td>
<td>The noise and view of on-ramp traffic needs to be screened from the residential community.</td>
<td>Visual/noise screen vegetation to buffer the adjacent property owners.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407 &amp; Thickson Rd. Interchange</td>
<td>Loss of roadside vegetation due to the land area required to accommodate the interchange ramps and bridge.</td>
<td>Woodland plants are to be added to the areas within the Hwy 407 and Thickson Rd. interchange.</td>
</tr>
<tr>
<td>A3</td>
<td>Hwy 407/ Thickson Rd.</td>
<td>Construction and grading will result in the removal of roadside vegetation.</td>
<td>Heritage Streetscape plants at the Thickson Rd. bridge to compensate for the loss of roadside vegetation.</td>
</tr>
<tr>
<td>A3</td>
<td>N of Hwy 407 Thickson Rd.</td>
<td>Visual impact of the highway needs to be minimized from the rural properties.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A4</td>
<td>Oshawa Creek West &amp; Hwy 407</td>
<td>Loss of habitat and vegetation with the Oshawa Creek West stream/valley.</td>
<td>Restore, and where possible enhance, vegetation communities within the highway ROW.</td>
</tr>
<tr>
<td>A4</td>
<td>Oshawa Creek West &amp; Hwy 407</td>
<td>The approach slopes and bridge abutment will require wildlife funnel fencing and plants.</td>
<td>Landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages. Woodlot edge management techniques.</td>
</tr>
<tr>
<td>A4</td>
<td>Hwy 407 at Thornton Rd. &amp; Winchester Rd.</td>
<td>Construction and grading will result in the removal of vegetation.</td>
<td>Heritage Streetscape plants at the Thornton Rd. and Winchester Rd. bridge to compensate for the loss of vegetation.</td>
</tr>
<tr>
<td>A4</td>
<td>S of Hwy 407 of Winchester Rd.</td>
<td>Visual impact of the highway needs to be minimized to the south.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A4</td>
<td>Oshawa Creek West Tributary culvert</td>
<td>The proposed approach slopes adjacent to the culvert will require wildlife funnel fencing and bank stabilization plants.</td>
<td>Native landscape plants to slopes next to the culvert in order to stabilize the steep grades. Planting will also be used to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages.</td>
</tr>
<tr>
<td>Highway Segment</td>
<td>Location</td>
<td>Potential Environmental Effect or Community Area of Interest/Concern</td>
<td>CVP and Landscape Design Elements to be Implemented</td>
</tr>
<tr>
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</tr>
<tr>
<td>A4</td>
<td>N &amp; S of Hwy 407, E of Simcoe St., N to Ritson Rd.</td>
<td>Visual impact of the highway needs to be minimized from the rural properties to the south.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A4</td>
<td>Simcoe St./Highway 407 Interchange</td>
<td>Loss of roadside vegetation due to the land area required to accommodate the interchange ramps and bridge.</td>
<td>Woodland plants are to be added to areas within the interchange.</td>
</tr>
<tr>
<td>A4</td>
<td>W side of Simcoe St./Hwy 407 Interchange</td>
<td>Winter winds will blow salt spray to the south potentially causing damage to vegetation.</td>
<td>Linear planting of evergreen trees to mitigate the effects of the salt spray on the environment.</td>
</tr>
<tr>
<td>A4</td>
<td>Simcoe St./Hwy 407 Interchange</td>
<td>Local Heritage.</td>
<td>Opportunity to include community gateway signage/features to be examined. Columbus - Historical Community.</td>
</tr>
<tr>
<td>A4</td>
<td>Simcoe St. Bridge</td>
<td>Aboriginal Commemorative Strategy.</td>
<td>Bridge Architecture enhancements to be implemented as part of Aboriginal Commemorative Strategy.</td>
</tr>
<tr>
<td>A4</td>
<td>Oshawa Creek E Tributary culvert</td>
<td>The proposed approach slopes adjacent to the culvert will require wildlife funnel fencing and bank stabilization plants.</td>
<td>Landscape plants to slopes next to the culvert in order to stabilize the steep grades. Planting will also be used to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages.</td>
</tr>
<tr>
<td>A5</td>
<td>Oshawa Creek E &amp; Ritson Rd./Hwy 407</td>
<td>Loss of habitat and vegetation with the Oshawa Creek East stream/valley corridor. Slopes and bridge abutment require wildlife fencing and plants.</td>
<td>Restore vegetation communities within the highway ROW. Provide landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages. Woodlot edge management techniques will also be applied.</td>
</tr>
<tr>
<td>A5</td>
<td>Hwy 407, N side at Ritson Rd.</td>
<td>Noise from highway traffic requires screening for the residential properties on Ritson Road North.</td>
<td>Visual/noise screen plantings within the ROW to buffer the adjacent property owners.</td>
</tr>
<tr>
<td>A5</td>
<td>N &amp; S of Hwy 407 to Wilson Rd.</td>
<td>Visual impact of the highway needs to be minimized from rural properties.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>A5</td>
<td>Oshawa Creek E Tributary W of Harmony Rd./Hwy 407</td>
<td>Loss of habitat/vegetation with the Oshawa Creek East stream corridor. The approach slopes and bridge requires wildlife fencing and plants.</td>
<td>Restore vegetation communities within the highway ROW. Provide landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages. Woodlot edge management techniques will also be applied.</td>
</tr>
<tr>
<td>A5</td>
<td>Harmony Rd./Hwy 407 Interchange</td>
<td>Loss of roadside vegetation due to the land area required to accommodate the interchange ramps and bridge.</td>
<td>Woodland plants are to be added to areas within the interchange.</td>
</tr>
<tr>
<td>Highway Segment</td>
<td>Location</td>
<td>Potential Environmental Effect or Community Area of Interest/Concern</td>
<td>CVP and Landscape Design Elements to be Implemented</td>
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</tr>
<tr>
<td>A5</td>
<td>Harmony Rd. overpass</td>
<td>Construction and grading will result in the removal of roadside vegetation.</td>
<td>Heritage Streetscape plants at Harmony Rd. bridge to compensate for the loss of roadside vegetation.</td>
</tr>
<tr>
<td>B1</td>
<td>Hwy 401 &amp; WDL Interchange</td>
<td>Loss of habitat and vegetation due to the land area required to accommodate the interchange ramp and bridge.</td>
<td>Woodland plants are to be added to areas within the interchange.</td>
</tr>
<tr>
<td>B1</td>
<td>Hwy 401 east of WDL</td>
<td>Highway noise and visual impact of the new highway on the residential community (Whitby).</td>
<td>A 5 m high noise barrier wall will be constructed to replace the existing barrier along the north side of highway from Lynde Creek to just west of Annes Street, a distance of 1057 m. Trees and shrubs are to be planted on backside of the wall as an additional buffer for adjacent property owners.</td>
</tr>
<tr>
<td>B1</td>
<td>WDL ramps onto Almond Village</td>
<td>Visual and noise concerns of community from the new highway ramps.</td>
<td>Mitigation will include tree planting and berm to provide a visual screen and address noise concerns.</td>
</tr>
<tr>
<td>B1</td>
<td>West Lynde Creek &amp; Lynde Creek Bridge</td>
<td>Loss of habitat and vegetation continuity at water course crossings.</td>
<td>Vegetation plants to restore, and where possible enhance, habitat conditions. Planting enhancements along the riparian corridor will be coordinated with fish habitat restoration and geomorphology for channel stability for the subject Lynde Creek crossings.</td>
</tr>
<tr>
<td>B1</td>
<td>Hwy 401 at Whitby - N ROW</td>
<td>Loss of tree buffer zone and shifting of Hwy 401 to the residential properties along Flemington Crt. &amp; Michael Blvd.</td>
<td>Tree plants to address removal of vegetation and to enhance the visual screening of the highway.</td>
</tr>
<tr>
<td>B1</td>
<td>Dundas St. &amp; WDL Interchange</td>
<td>Loss of habitat and vegetation due to the land area required to accommodate the interchange ramp and bridge.</td>
<td>Woodland plants are to be added to areas within the interchange.</td>
</tr>
<tr>
<td>B1/B2</td>
<td>West Whitby &amp; Halls Rd. Community</td>
<td>Visual impact of the highway ramps due to the flat topography.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>B1/B2</td>
<td>West Lynde Creek corridor &amp; Halls Rd.</td>
<td>Visual impact of the highway on the rural environment.</td>
<td>Landscape plants to mitigate visual impact of the highway and provide a landscape screen.</td>
</tr>
<tr>
<td>B2</td>
<td>Lynde Creek Tributary at Rossland Rd.</td>
<td>The proposed watercourse realignment of the tributary will require wildlife funnel fencing and associate plants.</td>
<td>Landscape plants to enhance the effects of the wildlife fencing and improve the habitat of the realigned watercourse.</td>
</tr>
<tr>
<td>B3</td>
<td>Taunton Rd. WDL Interchange</td>
<td>Loss of habitat and vegetation due to the interchange and Lynde Creek Tributary Realignment.</td>
<td>Woodland plants are to be added to areas within the interchange.</td>
</tr>
<tr>
<td>Highway Segment</td>
<td>Location</td>
<td>Potential Environmental Effect or Community Area of Interest/Concern</td>
<td>CVP and Landscape Design Elements to be Implemented</td>
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</tr>
<tr>
<td>B3</td>
<td>N section of Halls Rd.</td>
<td>Visual impact of the WDL to be minimized from local property.</td>
<td>Landscape plants to mitigate visual impact and provide a solid landscape screen.</td>
</tr>
<tr>
<td>B3</td>
<td>Lynde Creek Tributary on WDL</td>
<td>The proposed watercourse realignment of the tributary will require wildlife funnel fencing and associate plants.</td>
<td>Landscape plants to enhance the effects of the wildlife fencing and improve the habitat of the realigned watercourse. Planting enhancements along the riparian corridor will be coordinated with fish habitat restoration and geomorphology for channel stability for the subject watercourse crossing.</td>
</tr>
<tr>
<td>B3</td>
<td>Wildlife Crossing WDL</td>
<td>The proposed structures will require wildlife funnel fencing and associate plants.</td>
<td>Landscape plants to enhance the effects of the wildlife fencing and improve the habitat and ecological linkages.</td>
</tr>
<tr>
<td>B3</td>
<td>Terrestrial zone, E of the WDL</td>
<td>The highway ROW is located at the edge of the terrestrial zone resulting in potential negative impacts.</td>
<td>Enhance terrestrial edge with landscape screening to buffer from potential salt spray damage. Mitigate edge vegetation losses due to grading by incorporating edge management.</td>
</tr>
<tr>
<td>B3/A2</td>
<td>Windscreen on the W side of WDL</td>
<td>Evergreen buffer plants to augment wildlife fence plants and address winter wind conditions.</td>
<td>Additional evergreen wind screen plants along the perimeter of the ROW to address concerns with seasonal winds and blowing snow.</td>
</tr>
<tr>
<td>A1/A2/A3/A4/A5/B1/B2/B3</td>
<td>SWM Ponds</td>
<td>Control water quality and storm event quantities prior to discharge.</td>
<td>Mitigate the effects of warm water entering the pond from the stormwater pond by providing plants around the perimeter of the SWM pond and outlet channel to assist in cooling of storm water during the summer months.</td>
</tr>
</tbody>
</table>
3.3. Vegetation Restoration Plans

Vegetation compensation and ecological restoration for the Project is an environmental commitment outlined in the 407 East Extension EA and associated MOE Notice of Approval, Condition 18; and as a condition of the Permits issued to MTO for Species at Risk (SAR) under the *Endangered Species Act* (ESA). Specifically, the commitment to vegetation compensation and ecological restoration involves:

- Restoring/enhancing/creating forest and wetland communities at a ratio of 1:1 for the direct removal of vegetation; and
- Providing “Overall Benefit” through ecological habitat restoration activities for SAR as a condition of the ESA Permits for Butternut, Bobolink and Eastern Meadowlark, Barn Swallow and Redside Dace.

To address the above environmental commitments, MTO developed the Highway 407 East Phase 1 Vegetation Restoration Plan Framework (VRPF) (May, 2012) as a guide on the initial conceptual restoration plan options for meeting the compensation/restoration requirements for the Project. Building on the VRPF, 407ECGP developed a Vegetation Compensation/Replacement Ecological Restoration Plan (VCRER). The VCRER encompasses individual Detailed Site Vegetation Restoration Plans to provide compensation for the loss of forest and wetland communities, including SAR habitat, which have been developed in consultation with provincial and federal regulatory agencies, and local conservation authorities.

The establishment of new forests, wetlands and SAR habitat as compensation will be undertaken on surplus MTO owned lands (outside the highway corridor). These surplus lands, referred to as the “Project Lands”, are remnant parcels of lands that were acquired by MTO as part of the 407 East project, but which are not directly required for the construction of the highway.

3.3.1. Vegetation Removals and Compensation for Habitat Loss

Vegetation removals identified in the 407 East Extension EA (Phases 1 and 2) included the entire transportation corridor, encompassing the highway and a designated future Transitway. Vegetation removals required for construction of the Highway 407 East Phase 1 Project are limited to the area within the highway right-of-way, and excludes the future Transitway. As such, the design and implementation of vegetation compensation for the direct removal of vegetation within the Transitway will be undertaken by the Province in the future and is not part of the current Highway 407 East Phase 1 Project.

As previously documented in DCR #1, the Highway 407 East Phase 1 Project will result in a loss of 60.97 ha of forest and 12.5 ha of wetland. The Project will also require the removal of 31.64 ha of grassland/graminoid meadow that is considered breeding habitat for two SAR –
Eastern Meadowlark and Bobolink. Additionally, the works will result in the removal of riparian vegetation/habitat for Redside Dace and 148 Butternuts, both SAR.

In order to determine suitable compensation sites for replacement of vegetation, the 407ECGP Team carried out an extensive review and analysis of potential restoration sites identified by MTO. Assessments were undertaken to characterize the existing site conditions and to select and/or confirm appropriate Restoration Objectives for each site. Based on this review and assessment, a final set of compensation/replacement restoration sites were selected for the project. Criteria used in this selection process included but were not limited to the following:

1. Restoration sites were selected on “Project Lands” identified by MTO as potential restoration sites in the VRPF;
2. Restoration sites were selected with a preference to maximize size and connectivity (linkages) of natural and/or restored habitat areas and linkages;
3. To replace like habitats at a 1:1 ratio, by habitat type, and to the extent possible, on a watershed basis;
4. To restore the highest quality habitats possible (i.e., those which can be expected to sustain a high level of natural biodiversity and/or a higher relative abundance of species);
5. To maximize “Overall Benefit” for SAR within the selected restoration compensation sites; and
6. To maximize the amount of forest interior habitat within the Project Lands.

In total, 407ECGP has selected 34 sites on the Project Lands to achieve the required compensation for forest and wetlands, and Overall Benefit for SAR.

**Species At Risk**

Establishment of habitat and vegetation management for SAR includes:

1. **Butternut** (*Juglans cinerea*) and companion tree planting, tending and monitoring. The ESA Permit for Butternut requires the planting of approximately 705 Butternut at a density of no more than 200 Butternut per hectare (ha) and planting of 1,410 trees of other compatible species (e.g., white pine, oak, maple) in proximity to the Butternut planting areas.

2. **Bobolink** (*Dolichonyx oryzivorus*) and **Eastern Meadowlark** (*Sturnella magna*) habitat creation, tending and monitoring. The ESA Permit for Bobolink/Eastern Meadowlark requires that 31.64 ha of prime breeding habitat (i.e., grassland/graminoid meadow) be established and maintained.
3. **Barn Swallow** (*Hirundo rustica*) foraging habitat restoration/creation/enhancement in areas where Barn Swallow nesting structures are to be constructed, and subsequent monitoring to evaluate performance of these benefit activities. As per the ESA permit for Barn Swallow, 407ECGP and MTO have constructed 24 large and small nesting structures with a total of 750 nesting cups for Barn Swallow, placed along the ceiling joist in the structures.

4. **Redside Dace** (*Clinostomus elongatus*) habitat restoration within defined regulated habitat area for species (i.e., stream meander belt width plus 30 m), which includes riparian tree/shrub plantings along streams, forest and wetlands (Total 26.38 ha) in East Duffins Creek, Carruthers Creek and Lynde Creek watersheds, including subsequent vegetation monitoring as outlined in the Permit. In addition to these vegetation replacement works, other Overall Benefit activities for Redside Dace will also be undertaken, such as the removal of an on-line pond, decommissioning of agricultural tile drain outlets and removal of in-stream barriers to allow for fish passage. MTO is also contributing funding towards other Overall Benefit activities in all three watersheds.

### 3.3.2. Restoration Templates and Vegetation Site Restoration Plans

Restoration templates have been developed to achieve ecological restoration outcomes. The restoration templates are developed as specific lists of ecologically appropriate plant species by stock type to achieve ecological restoration objectives, as well as a list of herbaceous species that are considered appropriate for restoring the herbaceous layer.

The seed and plant species in the Detailed Vegetation Site Restoration Plans for the Project are contained in the VCRER. The site restoration plans were developed using natural vegetation inventory information for the Durham Region and as identified in the EA for the Project. In total, over 800 native species of vascular plants that are known to occur in the Durham Region were considered as potential species for development of the seeding and planting plans.

Detailed Restoration Site Plans for all the restoration areas include the following key elements:

- Site Description (existing conditions);
- Site Specific Restoration Objectives, including Reference Model(s);
- Restoration Maps (showing restoration vegetation unit boundaries);
- Site Constraints and any Special Provisions, where applicable (e.g., to SAR, damage from unauthorized All Terrain Vehicles, etc.);
- Seed and Planting Plan;
- Site Preparation Instructions;
3.4. Illumination

From the illumination assessment completed by 407EDGs, the locations along the 407 East Phase 1 mainline, the West Durham Link, and the realigned Highway 401 require illumination as per the warranting criteria established by MTO.

There are generally two types of lighting used for highway illumination, Conventional Cantilevered Arm Lighting and High Mast Lighting.

The following is a summary of the sections warranting illumination.

**Highway 407 East Phase 1 Mainline**

High Mast Lighting at:
- Lake Ridge Road Interchange and 407 East mainline; and
- At WDL and Highway 407 East mainline Interchange.

Freeway conventional lighting at:
- Lake Ridge Road interchange ramps and WDL and Highway interchange ramps; and
- 2 km section on the highway 407 East Phase 1 mainline eastbound approach to termination limit at Harmony Road.

Interchange ramps with conventional lighting at:
• Baldwin Street - East-North/South, West-North/South, South-East and North-West exit Ramps;
• Thickson Road - East-North/South, West-North/South, South-East and North-West exit Ramps;
• Simcoe Street - East-North/South, West-North/South, South-East and North-West exit Ramps; and
• Harmony Road - West-North/South, South-East and North-West exit Ramps.

Realigned Highway 401

High Mast Lighting at:
• Highway 401 and WDL Interchange
• From existing Highway 401 high mast lighting 1 km east of Salem Road to WDL.

West Durham Link

High Mast Lighting at:
• From the realigned Highway 401 Interchange to Dundas Street.

Conventional lighting at:
• Taunton Road interchange;
• Truck la-by exit ramps; and
• Dundas Street interchange.

Light Trespass

MTO guidelines limit light levels at the edge of a highway Right-of-Way in residential areas to 5 lux. 407EDG’s designers have conducted computerized modelling of the light spread from the highway illumination to predict the light levels. In a few locations the levels will exceed 5 lux. Where this occurs, lower wattage lamps have been specified for the contributing light fixtures to ensure the 5 lux level is not exceeded, while maintaining safety standards.

3.5. Structures and Stream Realignments

3.5.1. Lynde Creek Tributary ‘A’ Culvert (Structure W17) and Stream Realignment

For the works in DCR #6, a realignment of approximately 205 m of Lynde Creek Tributary ‘A’ (Watercourse Crossing Site No. 97) and construction of a 6.0 m wide x 3.0 m high box culvert at Rossland Road is required in order to accommodate the ultimate configuration of the WDL and
Rossland Road interchange. The ultimate configuration of the WDL/Rossland Road interchange will include a ramp from Rossland Road eastbound to southbound WDL to be constructed in the future. As such, the stream realignment and culvert are proposed to be constructed in advance of the ultimate interchange work, and will also help facilitate the construction of the future intersection improvements at Lake Ridge Road and Rossland Road.

A natural channel design approach has been adopted for the required stream realignment by fluvial geomorphologists and hydrologists, with input from fisheries biologists and landscape architects, to ensure that the specific fish habitat elements and their functions are re-instated and, where possible, enhanced. The stream realignment will be constructed to mimic the existing channel attributes with respect to form (width, depth), function and channel slope. Fish habitat elements, such as natural substrate, pool-riffle morphology, and planting of trees and shrubs to promote shading and reduce erosion, will be implemented throughout the realigned tributary. Further details on the fish habitat mitigation and compensation measures for the subject stream realignment are provided in Section 4.1.1.

3.5.2. Design Modifications to Structures and Stream Realignments in Past DCRs

A DCR is required to document the Detail Design phase of a project, including modifications made to designs developed in previous phases of the project. DCR #6 documents a number of changes to designs of structures and stream realignments presented in previous DCRs. It should be recognized that the design process is evolutionary by nature, with assumptions and knowledge used in the earlier stages of the design often giving way to more specific information obtained through ongoing investigations, consultation and design optimization processes. These processes often result in refinements to the design, including minor changes in the geometry of structures, or even the location of specific design elements.

In general, the design of structures and stream realignments for the Project were documented in DCRs at what is typically referred to as the 50% design level or better. As the design elements progressed through the design process, the final Detail Design in some instances resulted in modifications that are significant enough to warrant documenting the changes in this DCR, even though they meet the technical and environmental design criteria set out for the Project, as defined in the EA.

The changes to structures and/or stream realignment designs presented in previous DCRs are described below. The Detail Design drawings for these structures and stream realignments are included in Appendix A.
Carruthers Creek Tributary ‘A’ Bridge, Structure M17 (Water Crossing Site 11)
Carruthers Creek Tributary ‘A’ Bridge, Structure M17, carries the Highway 407 East Phase 1 mainline over Carruthers Creek Tributary ‘A’ (Water Crossing Site 11). The general arrangement of this bridge was modified from what was presented in DCR #3 as it became apparent that the construction staging of the bridge foundations and the stream channel realignment was problematic. The final bridge design now has abutment walls that are fully perpendicular to the highway, where previously there was a considerable skew. The stream channel realignment design has changed to suit the new bridge arrangement.

The total span of the bridge is reduced from 31.6 m to 27 m, while the total area under the shadow of the bridge is reduced by the squaring up of the arrangement.

Caruthers Creek Tributary ‘E’ Bridge, Structure M21 (Water Crossing Site 15)
Caruthers Creek Tributary ‘E’ Bridge, Structure M21, carries the Highway 407 East Phase 1 mainline over Caruthers Creek Tributary ‘E’ (Water Crossing Site 15). The original design of this bridge structure in DCR #3 had it located in line with the existing Sideline 4 section that was to be permanently closed. Since the existing stream channel followed the ditch of this road through the site, the coordination logistics of building the foundations and realigning the channel became unfeasible. The final design relocates the structure 29 m west of the original plan, moving it away from the roadway. The stream channel realignment was also modified.

Lynde Creek Tributary ‘A’ Culvert, Structure M22 (Water Crossing Site 16)
Lynde Creek Tributary ‘A’ Culvert, Structure M22, carries the Highway 407 East Phase 1 over Lynde Creek Tributary ‘A’ (Water Crossing Site 16). This structure was presented in DCR #5 as a 14.6 m wide by 3.25 m high open bottom arch culvert. Optimization of the design to achieve a more cost-effective solution, improve manufacturing lead times and reduce duration of construction resulted in the current design, which is a 8.0 m wide by 3.5 m high box culvert. The box culvert meets the key environmental criteria (i.e., fisheries and wildlife passage) that were considered significant in preliminary design, as documented in the Watercourse Crossing Report (AECOM, 2010) for Water Crossing Site 16 (Structure M22). As well, the reduction of the culvert width from 14.6 m to 8.0 m was reviewed by Fluvial Geomorphologist and deemed to be satisfactory to address anticipated stream meander movement and erosion elements.

The box culvert will be embedded below the existing stream bed, with stone materials placed inside the culvert to provide suitable substrate and create a low flow channel to facilitate fish passage. The wildlife Openness Ratio (OR) of the box culvert is 0.27 and exceeds the EA wildlife target of 0.05 that is suitable for use by small animals. The Openness Ratio is the cross-sectional area of a structure (square metres) divided by the distance wildlife must travel through or under (in metres), and is a measure of the tunnel effect of a structure that may influence use by various wildlife species.
Winchester Road Bridge, Structure M50

The Winchester Road Bridge, Structure M50, carries the Highway 407 East Phase 1 mainline over Winchester Road. This large structure was presented in DCR #2 as a rectilinear shape with an overall span length of 231 m. Design changes to minimize the structure length were implemented, with the end result being a reduced overall length of 198 m. Other design enhancements include a fire proofing treatment to the underside of the deck structure, a fire detection and alarm monitoring system, as well as a dry standpipe system for fire fighting.

Oshawa Creek East Branch Bridge, Structure M55 (Water Crossing Site 35)

The Ritson Road and Oshawa Creek East Branch Bridge, Structure M55, carries the Highway 407 East Phase 1 mainline over Ritson Road and Oshawa Creek East Branch. This structure has not changed significantly from what was presented in DCR #4. However, the realignment of the watercourse has been shifted to the east and now passes through the clear span between Piers #2 and #3 of the structure, where it previously was between Piers #1 and #2. This relocation was implemented to reduce the length of the required stream realignment downstream of the bridge and associated impacts to fish habitat, and also to increase the separation between the watercourse and Ritson Road. The subject stream realignment was reviewed by Fisheries and Oceans Canada (DFO) and an Authorization was secured under the Fisheries Act for these works.

Lynde Creek Tributary Bridge, Structure W6 (Water Crossing 51)

The Highway 401 Bridge, Structure W6, carries Highway 401 over Lynde Creek Tributary ‘A’ (Water Crossing Site 51) and was originally presented in DCR #2. Although, the structure has not changed in form it has been moved to the west 18 m from its original position to accommodate an alternative pier design configuration for Structure W7 (see below). The stream realignment associated with this structure has been modified to suit the new bridge pier locations and was reviewed and approved by DFO under the Fisheries Act.

Highway 401 West - WDL North Ramp Bridge, Structure W7

The Highway 401 West - WDL North Ramp Bridge, Structure W7, carries the subject ramp over Lynde Creek Tributary ‘A’ (Water Crossing Site 51C) and Highway 401. This structure was included in DCR #2 and has not changed significantly other than that the piers have changed from single large pier supports to multiple piers. This change impacted the location of Structure W6 as noted above.

Lynde Creek Tributary ‘T’ Culvert, Structure W1 (Water Crossing 99)

Lynde Creek Tributary ‘T’ Culvert, Structure W1, carries the realigned Highway 401 over Lynde Creek Tributary ‘T’ (Water Crossing Site 99) and is located approximately 225 m west of Lake Ridge Road. This structure appeared in DCR #3 as a 165 m long x 9 m wide x 2.4 m high
precast box culvert. The structure dimensions have been changed to 154 m long x 8 m wide x 2.1 m high. The initial structure span width was established based on geomorphic data that applied three times the maximum bankfull width of the creek as conservative approach, which resulted in a 9 m span. Further geomorphic assessment and hydraulic analysis subsequent to DCR #3 deemed that a 8 m width x 2.1 m high culvert is sufficient to meet the EA design criteria and will accommodate the channel width, meander amplitude and migration trends of the creek. The Openness Ratio of the revised structure is 0.10 and exceeds the EA wildlife target of 0.05 that is suitable for use by small animals.

**Lynde Creek Bridge, Structure W10 (Water Crossing 100)**

The Highway 401 Bridge, Structure W10, carries Highway 401 over the Main Branch of Lynde Creek (Water Crossing Site 100). This structure appeared in DCR #2 and has not changed significantly other than the span being increased by 6 m to mitigate impacts on the existing watercourse and Provincially Significant Wetland.

**Lynde Creek Tributary ‘B’ Culvert, Structure W14 (Water Crossing Site 47)**

The WDL over Lynde Creek Tributary ‘B’, Structure W14, is located on the WDL about 500 m south of Rossland Road (Water Crossing Site 47). This structure appeared in DCR #1 as a 12.8 m wide by 4.0 m high arch culvert. The height of this arch has been changed to 3.4 metres, which is a more commercially available size. The Openness Ratio is 0.56 and exceeds the EA wildlife target of 0.05 that is suitable for use by small animals.

**Wildlife Crossing Culvert, Structure W23 (Crossing Site 43B)**

The WDL/Wildlife Crossing, Structure W23, is on the WDL about 1,350 m north of Taunton Road (Wildlife Crossing Site 43B). The width of this box culvert has been reduced from 5 metres in DCR #1 to 3.5 metres, while the length has been reduced by 4 metres to 59 m. The height of the box culvert remains unchanged at 2.0 m. The changes are a result of the final highway profile, affecting required culvert length, and selection of more standard size precast box culvert to accelerate construction and realize cost efficiencies. The Openness Ratio is 0.12 compared with the EA wildlife target of 0.05 that is suitable to encourage use by a range of small animals, including common amphibian species.

**Wildlife Crossing Culvert, Structure W24 (Crossing Site 43A)**

The WDL/Wildlife Crossing, Structure W24, is on the WDL about 2,650 m north of Taunton Road (Wildlife Crossing Site 43A). This structure was shown in DCR #1 as a 14.6 m wide by 4.1 m high arch culvert. The final design is an 8.5 m wide by 3.5 m high box culvert. The culvert has also been relocated approximately 25.0 m to south of its existing location to address highway drainage design concerns. The revised crossing location is not considered a significant change from a wildlife connectivity perspective and will continue to provide a link from
Lynde Creek Tributary to a large forest unit to the east, as well the Lynde Creek Iroquois Beach Environmentally Significant Area (ESA) further east. The final openness ratio of the modified culvert is 0.62 compared to the EA target ratio range of 0.6 – 1.0, which is suitable to encourage use by a range of small and large animals.

### 3.6. Maintenance Facility

The 407 East Phase 1 Project scope of work includes the design and construction of a Maintenance Facility to support the operations of the highway.

The Maintenance Facility is to be located on the east side of Salem Road, immediately south of the Highway 407 East mainline. The 4.2 hectare (ha) facility will be completely fenced, with access from Salem Road for staff, material deliveries and saltwater disposal (see below). Maintenance vehicles, including snow plows and sanders, will access the facility from the highway right-of-way off the Salem Road northbound to Highway 407 eastbound ramp.

The facility will include:

- 983 square metre administration building with offices, a lunchroom, staff washrooms and showers, a truck service bay and a truck wash bay;
- Staff and visitor parking;
- 1,881 square metre covered sand/salt storage building;
- Outdoor materials storage;
- Maintenance vehicle parking;
- A brine making plant;
- A saltwater pond; and
- A stormwater management pond.

The administration building will be designed and built to achieve LEED (Leadership in Energy and Environmental Design) certification. It is a single-story building with a mezzanine. It will be clad in painted steel siding with a gabled steel deck roof. This building will be serviced by a septic system, including a sand leaching bed, all contained within the compound. Potable water for the facility will be drawn from a drilled well. Buried concrete water tanks will be used to store water for emergency fire fighting purposes.

The sand/salt storage building will have concrete foundation walls with a white flexible curved roof. It will be accessed by two overhead doors. Loading of sand and salt onto service trucks for highway winter de-icing operations will be done within this building.
Water from the vehicle wash bay will drain to the salt pond and then subsequently be used to make brine solution for highway pre-wetting. Saltwater will not be discharged to the environment but will be trucked away for disposal as per MTO and MOECC policy and guidelines.

The exterior of the property, and particularly the east side of Salem Road fronting the facility, will be landscaped with a mixture of deciduous and coniferous trees. Site lighting will minimize impacts to adjacent properties (zero LUX at 3 m from the property line). The engineering and landscape design drawings for the Maintenance Facility are presented in Appendix A-3.

3.7. Noise Barrier Walls

The noise impact assessment conducted as part of the EA for the Project, and confirmed in Detail Design, concluded that two permanent noise barrier walls are required. One is along the mainline of the highway at the Village of Brooklin (407 East mainline) and the other is along the shoulder area of the Highway 401 Westbound lanes east of the West Durham Link Interchange. The latter replaces an existing barrier along Highway 401 that will be removed to accommodate the realignment of Highway 401.

The noise barrier wall structures for noise attenuation consist of pre-cast concrete panels, with soundproof insulation and decorative/liner patterns. The architectural finish and colour proposed is a “natural” or “tan” finish that will look like a stone block motif. Based on the location of the noise barrier in close proximity to the road platform, landscape plantings for visual screening of the structures are limited to the side of the noise barrier walls that are facing residential areas, where spacing permits. Engineering design drawings of the noise barrier walls, along with details of the plantings (Landscape Plan), are contained in Appendix A-1.

3.7.1. Highway 401 – East of WDL

Along the Highway 401 Westbound lanes, in the Town of Whitby, a 5 m high noise barrier wall will replace the existing barrier along the north side of the highway from Lynde Creek to just west of Annes Street, a distance of 1,057 m (Station 12+991 to Station 14+048, refer to Exhibit 3.6). The location of the new replacement barrier will be to the north of its current position based on the overall realignment and northerly shift of Highway 401. The west limit of the new barrier wall will be the bridge structure over West Lynde Creek, and the east limit of the wall will overlap/extend slightly past the existing corrugated steel barrier wall near Annes Street. The replacement barrier wall will be constructed to allow for the short term construction staging works for Highway 401 and will be situated at the ultimate development scenario for Highway 401 that includes future lanes for the expansion of the Highway 401 and associated ramps at the Highway 401/WDL Interchange.
Exhibit 3.6: Location of the noise barrier wall barrier along the north side of Highway 401 from Lynde Creek to approximately Annes Street

Exhibit 3.7: Typical cross-section view of Highway 401 noise barrier wall

The predicted mitigation of sound levels as a result of the noise barrier wall from the analysis conducted during the Detail Design phase are described in Section 4.2.3.
### 3.7.2. Highway 407 - Brooklin Area

South of the Village of Brooklin, a noise barrier wall will be constructed from west of Lynde Creek to Anderson Street, a distance of approximately 750 m (refer to Exhibit 3.7). The noise barrier wall will be 5 m in height with the exception of at the Lynde Creek Bridge structure, where a 4 m high transparent wall will be installed on the bridge to maintain visual openness.

**Exhibit 3.7:** Length and location of the noise barrier wall near the Village of Brooklin

**Exhibit 3.8:** Transparent noise barrier wall typically installed on highway bridge structures
Exhibit 3.9 - Cross-section view of the noise barrier wall located on the bridge parapet wall; and along the roadside shoulder area of the westbound lanes of the highway at Brooklin

The predicted mitigation of sound levels as a result of the noise barrier wall from the analysis conducted during the Detail Design phase are described in Section 4.2.3.

### 3.8. Stormwater Management Ponds

The design of drainage systems for Highway 407 East Phase 1 includes a number of interrelated elements: highway and interchange drainage, stormwater management (SWM) ponds, water crossing structures and stream realignments, all of which have been documented in past DCRs for the Project. The purpose of this section of the DCR is to provide further design details on the stormwater management ponds for the Project. Detail Design drawings (Plan view) of the stormwater management ponds are contained in Appendix A-4, with other related cross sectional views and details available on 407EDG’s Project website. The following is intended to provide an overview of the key design elements of the stormwater management ponds for the Project.

There are thirty-two (32) stormwater management (SWM) ponds that will be constructed for water quality treatment, extended detention/erosion control and quantity control; these have been designed in accordance with applicable MTO and MOECC design standards and guidelines. Figure 3-2 shows the location of the SWM ponds for the Project.

The pond facilities are designed to provide an *enhanced* level (Level 1) of water quality protection with the removal of 80% of Total Suspended Solids in highway runoff by settlement. For water quality treatment, the greater of the extended detention or first flush storm event (25 mm) will provide a minimum drawdown time of 24 hours. In addition to the ponds, enhanced grass swales and wet swales are being used as part of a treatment to provide additional quality control for the highway runoff.
The water from SWM ponds will be released through controlled means to adjacent existing localized drainage features and watercourses with the objective to attenuate the increase in peak flow as a result of the highway to pre-development flow rates. The ponds will provide quantity control utilizing the runoff allowable rates as prescribed in specific watersheds by the local conservation authorities from the 2-year through 100-year design storm events. Quantity control will be provided via outlet structures with weir and orifice controls and an active storage depth area within the ponds. The SWM pond outflows at each pond (controlled by an outlet structure) will be conveyed through an outlet pipe and channel that drains at a controlled rate to existing watercourses.

In general, each SWM pond includes a sediment forebay, which traps sediment particles near the inlet area of the pond, a permanent pool, extended detention, active storage detention, freeboard, and emergency spillway for the regional storm event.

The outlet of SWM ponds have been designed with a bottom draw system to drain the cooler water from the base of the ponds in order to reduce the potential thermal impact of water released to existing watercourses. Pond outlet configuration, as well as other measures such as strategic planting around each pond, was also considered as part of a multiple mitigation strategy to reduce the thermal impact and protect coldwater streams that support aquatic species, which are sensitive to temperature increases.

In addition to the above engineering design criteria for SWM ponds, as per condition 9(b) of MNR Permit (AU-C-001-11) issued under the Endangered Species Act, for Redside Dace, ponds that discharge to this species’ habitat/streams have been designed to meet the water quality objectives as described in the Ministry of Natural Resources Draft Guidance Document Development Activities in Redside Dace Protected Habitat (February 2011). Specifically, these discharge design targets are:

- No more than 25 mg/L of total suspended solids (TSS) above the background stream level of TSS;
- Water temperatures below 24ºC; and
- Dissolved oxygen levels of at least 7 mg/L.

All stormwater management ponds will be graded with a 5:1 (horizontal:vertical) side slope, and will be surrounded by plantings to better blend into the natural landscape. The SWM ponds will be shaped with gentle curves and 5 m wide access roads for maintenance purposes. Detail Design drawings that show the planting plan for each pond are contained in Appendix A-1.
3.8.1. Design Modifications to Stormwater Management Ponds in Past DCR’s

**SWM Pond 48N**

The preliminary design for Segment B-2 of the WDL included two stormwater management (SWM) Ponds 47N and 48N. During detail design, it was determined that it would not be feasible to discharge into the intended watercourse from pond 48N based on the review of the profile elevations of the WDL through the catchment area and the actual elevation of the watercourse. Pond 48N was therefore eliminated from the drainage design with all intended flows being conveyed to Pond 49E in Segment B-1 to the south.

**SWM Pond 51A**

The preliminary design for Segment B-1 of the WDL included ponds on the north side of Highway 401 on either side of the WDL ramps within the Highway 401/WDL interchange. During the detail design phase, the geometry of the ramps had changed with the end result being that there was a larger triangular area between the ramps and Highway 401 which allowed for the placement of a single central pond instead of two ponds. This new pond has been designated as SWM Pond 51E.

**SWM Pond 21W**

During preliminary design, SWM Pond 21W was intended to provide runoff control and water quality treatment for the Highway 407 right-of-way west of Water Crossing #21. During detail design, it was determined that only a very short section of the highway west of the crossing would actually drain from west to east to Lynde Creek Tributary ‘I’. Therefore, it was decided that the flows were not significant enough to warrant a pond and instead enhance swales are now proposed to meet the stormwater management design criteria.

**SWM Pond 16E-1**

The preliminary design for Segment A-2 included SWM Pond 16E-1, located just west of Kinsale Road to provide runoff control and water quality treatment for the Highway 407 right-of-way. During detail design, it was determined that only approximately 1.80 ha of roadway improvements out of the overall 16.46 ha drainage catchment area could be conveyed to SWM Pond 16E-1. The majority of the contributing drainage area consisted of off-site flows, significantly increasing the pond storage volume and size of the pond required. The available right-of-way does not provide adequate area to create a diversion swale to route off-site drainage areas around the pond. As a result of this constraint, and the minimal drainage area from the roadway improvements to be captured, SWM Pond 16E-1 was eliminated. The portion of flow that would have been conveyed to Pond 16E-1 is now being directed to Pond 16E-2 which was increased in size to accommodate the additional catchment area.
3.9. Construction Staging, Traffic Management, Road Closures and Detours

The construction staging plans for the following municipal crossing roads are necessary in order to complete the proposed work and maintain safe and efficient traffic flow through the Project site. Construction staging, traffic management, temporary road closures and detours have been discussed with the Region of Durham and local municipalities at MTAG meetings to seek their comments and to allow for coordination of the works with municipal infrastructure projects.

3.9.1. Rossland Road

The construction of the Lynde Creek Tributary ‘A’ Culvert (W17) and associated stream realignment at the Rossland Road and WDL will involve the implementation of a traffic management and construction staging plan to minimize disruption to road users and pedestrians to the greatest extent possible. The plan will include temporary lane restrictions and/or full road closure of Rossland Road.