ENVIRONMENTAL IMPACTS, PROPOSED MITIGATION AND COMMITMENTS

This section identifies the impacts to the natural, socio-economic and cultural environments associated with construction of the components of the Highway 407 East Phase 1 included in this Design Construction Report (DCR), and the proposed measures to mitigate potential effects during construction. This section also describes and documents how the commitments outlined in the 407 East Individual Environmental Assessment and Preliminary Design Study (August, 2009) and the associated MOE Conditions of Approval (June, 2010) have been addressed.

Construction works associated with this DCR will not commence until all applicable permits, approvals and authorizations are in place.

4.1. Natural Environment

4.1.1. Fish and Fish Habitat

Existing conditions and impact assessment of fish and fish habitat for the Highway 407 East Phase 1 Project have been documented in detail in the EA report and the associated Natural Environment Impact Assessment of the Recommended Design Report (August, 2009) (Fish and Fish Habitat).

The Highway 407 East Phase 1 corridor crosses 4 major watersheds, encompassed within the jurisdictions of the TRCA and CLOCA. The watercourses from west to east are:

- Duffins Creek;
- Carruthers Creek;
- Lynde Creek; and
- Oshawa Creek.

The highway also crosses 1 minor watershed, Pringle Creek, which is in CLOCA’s jurisdiction. This watershed drains an area of 2,847 ha, with a stream length of approximately 39 km. It originates at Highway 7, just north of the Highway 407 East Phase 1 corridor and outlets to Lake Ontario. There is a tributary of Pringle Creek that crosses the highway corridor. It is a swale feature through agricultural lands and does not support direct fish use.

Each major watershed is briefly described below, providing a general discussion of major watershed and tributaries, stream thermal classification and fish habitat.
Duffins Creek

The Duffins Creek watershed lies within TRCA’s jurisdiction and is primarily within the Regional Municipality of Durham (Durham Region) at the western limit of Highway 407 East Phase 1. The Duffins Creek watershed is the largest watershed in the Project area at approximately 28,766 ha.

Most of Duffins Creek (333.8 km) is considered coldwater habitat, with 37.5 km classified as warm water. The remainder (8.0 km) is unclassified. According to the Duffins Creek and Carruthers Creek Watershed Plan, Duffins Creek supports a diverse fish community with 33 species, based on fish community surveys. Species recorded include: resident and migratory salmonids (e.g., Brook Trout (*Salvelinus fontinalis*), Brown Trout (*Salmo trutta*), Chinook Salmon (*Oncorhynchus tshawytscha*), Rainbow Trout (*O. mykiss*), and the provincially Endangered Redside Dace (*Clinostomus elongatus*) among others. East Duffins Creek supports diverse migratory and spawning habitat used by Coho Salmon, Rainbow, Brown and Brook Trout and re-introduced Atlantic salmon (*Salmo salar*).

Carruthers Creek

The Carruthers Creek watershed lies within TRCA’s jurisdiction and crosses 2 municipal jurisdictions: the City of Pickering and the Town of Ajax. Approximately two-thirds of Carruthers Creek (40.1 km) is considered coldwater habitat (the middle and upper reaches), with one-third classified as warmwater (21.6 km). Recent fish surveys undertaken recorded 18 fish species. Tributaries A and B of Carruthers Creek support coolwater bait and forage fish species, including the provincially “Endangered” Redside Dace.

Lynde Creek

The Lynde Creek watershed lies within CLOCA’s jurisdiction and crosses several municipal jurisdictions, including the Town of Whitby, the Town of Ajax and the City of Pickering. The watershed is the second largest watershed in the Highway 407 East EA study area, occupying approximately 13,497 ha.

Most of Lynde Creek (195.4 km) is considered coldwater habitat, with a small portion classified as warmwater (23.8 km). Lynde Creek and its tributaries support both warm and coldwater fish species, including migratory salmonids from Lake Ontario. The *Lynde Creek Aquatic Resource Management Plan* (February, 2006) lists and analyzes the results from 9 studies containing fisheries information for Lynde Creek. Additionally, the *Central Lake Ontario Fisheries Management Plan* (CLOCA/MNR, 2007) also provides further information on fisheries resources, including overall goals and objectives.
From these studies, 36 native fish species have been documented in the Lynde Creek system. Fish species observed in the Lynde Creek system include: Rainbow Trout, Brook Trout, White Sucker (*Catostomus commersonii*), Smallmouth Bass (*Micropterus Dolomieui*), Largemouth Bass (*Micropterus salmoides*) and Yellow Perch (*Perca flavescens*), among others. Redside Dace, provincial SAR has been recorded in Lynde Creek.

**Oshawa Creek**

The Oshawa Creek watershed lies within CLOCA’s jurisdiction and crosses 2 municipal jurisdictions, the Town of Whitby and the City of Oshawa. Most of Oshawa Creek (264.1 km) is considered coldwater habitat, with a small portion classified as warmwater (8.7 km) (lower reaches). The *Oshawa Creek Watershed Management Plan* (July, 2002) (OCWMP) reports that 20 native fish species, including Brook Trout, were captured in the Oshawa Creek system. Four non-native species were also captured: Rainbow Trout, Brown Trout, Chinook Salmon and goldfish. Five species of fish have been stocked by MNR on a large scale, to improve sport-fishing opportunities, these include, Brook Trout, Brown Trout, Atlantic Salmon and Chinook Salmon. The OCWMP also indicates that Oshawa Creek East and West are “major salmonid migration routes”. Further information with respect to fish and fish habitat, including overall fisheries goals and objectives, can be found in the *Central Lake Ontario Fisheries Management Plan* (CLOCA/MNR, 2007).

**Mitigation and Compensation**

As part of the Detail Design stage for the Highway 407 East Phase 1, 407EDG confirmed existing fish and fish habitat sensitivity and the impact and associated risk assessment that was undertaken as part of the Highway 407 East EA.

The approach undertaken in confirming and completing the impact assessment on fish and fish habitat in the Detail Design phase for the Project was conducted with reference to the *MTO Environmental Guide for Fish and Fish Habitat* (June, 2009) and the standard approach outlined in the DFO practitioners guide to the Risk Management Framework. Therefore, the risk assessment for fish and fish habitat has been finalized based on a refined database and analysis of the design details presented in this DCR. The process of developing and integrating mitigation measures into the design was conducted in a progressive and iterative manner as the Project proceeded through route planning, Preliminary Design and the current Detail Design phase.

All reasonable opportunities to avoid or minimize impacts to aquatic features were identified and incorporated, where feasible and appropriate, based on the character and sensitivity of the potentially affected fish species and fish habitat. However, the objective of avoiding encroachment into watercourses through structure design was frequently not possible at interchange locations, and often on sinuous watercourses where the main spans of multi-span
structures required to accommodate the highway cross-section could not accommodate the existing channel pattern or anticipated future channel migration.

In situations where the avoidance of impacts to fish and fish habitat and the application of mitigation measures cannot sufficiently address the residual effects of the highway crossing, fish habitat compensation measures have been developed to counterbalance or offset the residual effects. In these cases, the highway construction works have been determined to result in the harmful alteration, disruption or destruction of fish and/or fish habitat, and an authorization under the Fisheries Act must be secured from DFO prior to the commencement of construction. As a commitment within both the provincial and federal EAs, Fish Habitat Compensation Plan(s) will be developed within the context and application of the MTO/DFO/MNR Protocol for Protecting Fish and Fish Habitat on Provincial Transportation Undertakings (October, 2006) (“the Protocol”).

A Conceptual Fisheries Compensation Strategy for the Highway 407 East Phase 1, as documented in the MTO Fisheries Framework (May 2012), describes the strategy for fish habitat alterations and proposed compensation measures. The Fisheries Framework document was developed by MTO following the EA process in order to clearly define an approach for 407EDG to move forward with preparing fish habitat mitigation and compensation packages during Detail Design to secure the required authorizations under the Fisheries Act. The compensation strategy took into account the existing fish habitat conditions along the Highway 407 East Phase 1 corridor and included natural channel design principles for stream relocations designs to recreate and enhance habitat characteristics and ecological functions by establishing additional in-stream and bank cover/shelter habitat for fish.

Through the design process, the 407EDG project team has continued to build upon the concept plans proposed in the Fisheries Framework. The ongoing highway design has remained consistent with the Recommended Plan in the EA, such that changes to the overall compensation concepts are minor and the fish habitat plans proposed are consistent with those developed previously in consultation with the MNR, local conservation authorities and DFO.

Specific mitigation measures (e.g., groundwater, SWM) and implementation of an Overall Benefit Activities plan will also be undertaken as a Condition of the ESA Permit, where construction works will impact Redside Dace and/or its habitat, which are protected under the ESA. Components of the Overall Benefit Activities for Reside Dace include: stream restorations to enhance and restore habitat; removal of in-stream barriers to improve access; and wetland and riparian plantings.

**Works Associated with DCR #5**

There are no stream realignments associated with the works in DCR #5. Stream realignment works in Segment A2 were previously addressed in DCR #4.
Lynde Creek Tributary ‘A’ (Water Crossing Site 16, Structure M22)

Lynde Creek Tributary ‘A’ is an intermittent flowing stream that originates from agricultural lands and wooded areas approximately 3.2 km north of Highway 7 and flows south through the Highway 407 East Phase 1 ROW west of Kinsale Road. South of the 407 crossing, the tributary crosses Highway 7 through a perched (0.3m) concrete culvert. The perched outlet presents a barrier under most flow conditions to upstream movement of at least bait and forage fish species that might use this feature seasonally. A poorly defined channel characterizes the ROW and upstream reaches and, within the highway ROW, riparian vegetation through the reach is dominated by meadow, meadow marsh and early successional cultural woodland. Based on the sensitivity of the habitat and potential seasonal baitfish species present, the overall sensitivity of Lynde Creek Tributary ‘A’ has been classified as low.

The proposed works at Site 16 include construction of an open footing arch culvert (Structure M22 - 14.63 m wide x 3.35 m high x 67 m long). No direct impact or alteration to the stream is required for the proposed culvert works; and therefore it has been determined that no harmful alteration, disruption or destruction (HADD) of fish habitat under the Fisheries Act will occur. Standard mitigation and best management practices, as outlined below, will be implemented to minimize potential impacts to fish/fish habitat. Design drawings for the structural works of Structure M22 at Lynde Creek Tributary ‘A’ (Water Crossing Site 16) are included in Appendix A.

Lynde Creek Tributary ‘G’ (Water Crossing Site 19, Structure M35/M36)

Lynde Creek Tributary ‘G’ (West Lynde Creek) originates in the Oak Ridges Moraine, over 5 km north of the proposed highway ROW, flows in a southerly direction, and outlets into the main branch of Lynde Creek approximately 10.5 km downstream of the highway ROW. Flow is permanent and riparian vegetation within the ROW consists of White Cedar coniferous forest. Channel form is relatively straight with gentle meanders and the stream is considered to support permanent salmonid spawning and rearing habitat. A cold water fish community is present with such species as Rainbow Trout, Brook Trout, Mottled Sculpin (Cottus bairdii) and the provincially endangered Redside Dace. Based on the sensitivity of the habitat and fish species present, the overall sensitivity of Lynde Creek Tributary ‘G’ has been classified as high. This reach has also been classified as regulated habitat for the provincially endangered Redside Dace, and as such a permit (AU-C-001-11) has been secured under the ESA.

The proposed works at Site 19 include the construction of 3 single-span bridges (Structures M35 (2 parts) and M36), which carry the Highway 407 East Phase 1 mainline eastbound and westbound lanes and ramp to the southbound WDL over the tributary. No direct alteration to the stream or in-water work is required for the bridges; and therefore, it has been determined that no harmful alteration, disruption or destruction (HADD) of fish habitat under the Fisheries Act will occur.
Act will occur. However, the proposed works do directly impact regulated habitat of Redside Dace under the ESA. As part of the ESA permitting process, Overall Benefit Activities have been developed for this site, which include wetland creation and planting of native riparian vegetation to establish cover and food; help regulate cool water temperature through shading; filter surface water runoff; and help maintain long term channel morphology. Design drawings for the bridges at Lynde Creek Tributary ‘G’, Water Crossing Site 19, are included in Appendix A.

**Lynde Creek Tributary ‘H’ (Water Crossing Site 20, Structure M37)**

Lynde Creek Tributary ‘H’ originates in the Oak Ridges Moraine, over 5 km north of the proposed highway ROW, flows in a southerly direction, and outlets into the main branch of Lynde Creek approximately 1 km downstream of the highway ROW. Flow within the ROW is intermittent and the channel is relatively stable and uniform, with riparian vegetation dominated by grasses, raspberry, and some mixed hardwood trees. The tributary is considered to support a diverse warmwater baitfish population as well as Redside Dace, which were recorded from sampling. Based on the sensitivity of the habitat and fish species present, the overall sensitivity of Lynde Creek Tributary ‘H’ has been classified as high.

The proposed works at Site 20 include the construction of a twin single-span structure, which carries the Highway 407 East Phase 1 mainline over the tributary. No direct alteration to the stream or in-water work is required for the bridge. However, due to the anticipated loss of riparian vegetation under the bridge, the works will cause a harmful alteration, disruption or destruction of fish habitat and require authorization under the Fisheries Act. The bridge works will also impact regulated habitat for Redside Dace; and as such, a permit (AU-C-001-11) has been secured under the ESA. As part of the ESA permitting process, Overall Benefit Activities have been developed for this site, which include wetland creation, planting of native riparian vegetation and removal of instream structures that are causing physical habitat disturbance. Design drawings for the bridge at Lynde Creek Tributary ‘H’, Water Crossing Site 20, are included in Appendix A.

**Lynde Creek Tributary ‘D’ (Water Crossing Site 41B, Structure W30)**

Lynde Creek Tributary ‘D’ flows southeast through agricultural land with a narrow riparian buffer of deciduous trees and is within a defined valley feature at Site 41B. Flow is intermittent and substrate is cobble with finer substrate (e.g., gravel, sand) intermixed. The channel morphology is primarily riffles with a few flats. This reach of Lynde Creek Tributary ‘D’ supports a community of seasonal forage and baitfish, including Creek Chub (*Semotilus atromaculatus*) and Blacknose Dace (*Rhinichthys atratulus*), and is considered as recovery habitat for the provincially endangered Redside Dace. Based on the sensitivity of the habitat and species present, the overall sensitivity of Lynde Creek Tributary ‘D’ has been classified as high. Due to
the presence of Redside Dace habitat, works in this area of the Highway 407 East Phase 1 corridor require a permit under the ESA (AU-C-001-11), which has been secured, conditional on the MNR review and approval of the detail design plan for construction.

The proposed works at Site 41B include the construction of a single span bridge (Structure W30), which carries the WDL ramps over Lynde Creek Tributary ‘D’ to the Highway 407 East Phase 1 mainline. No direct alteration to the stream or in-water work is required for the bridge; therefore it has been determined that no harmful alteration, disruption or destruction (HADD) of fish habitat under the Fisheries Act will occur. However, the proposed works do directly impact regulated habitat of Redside Dace under the ESA. As part of the ESA permitting process, Overall Benefit Activities have been developed for this site, which include wetland creation and planting of native riparian vegetation.

**Mitigation and Best Management Practices**

The following mitigation and best management practices will be implemented to minimize potential impacts to aquatic resources from the proposed work described in this DCR (listed above):

- Temporary water management measures will ensure erosion and sediment control and maintain fish passage during construction;
- Any temporary watercourse diversion channels will be lined to prevent erosion and sedimentation risks;
- All in-water works, if required, (Sites 19, 20 and 41B) will be conducted within the applicable operational construction timing window to protect fish during their spawning and nursery periods (July 1 to September 15); and for Site 16 from July 1 to March 31;
- Culverts will be embedded with a constructed low flow channel to maintain fish passage and maintain natural form and fluvial processes;
- Works will be constructed in the dry, using temporary water management systems to isolate the work area from active flows. Where a dam-and-pump flow diversion method is used, appropriately sized screen intakes will be installed at the pump intake to prevent fish entrainment;
- Any fish trapped in the isolated work area or abandoned channel will be captured and relocated by a qualified fisheries specialist and for crossings with Redside Dace will involve specialized fish rescue and handling procedures to minimize stress to the species, in accordance with the ESA Permit conditions;
- Effective sediment and erosion control measures will be maintained during all stages of work to prevent sediment from entering the waterbody, as per the Sediment and Erosion Control Plan and conditions of the ESA Permit;

- The use of permanent and/or temporary SWM ponds as part of the construction phase erosion and sediment control strategy will be assessed for each individual structure site before construction commences;

- For SWM ponds in this DCR (Ponds 41W, 18W, 20E and 20W) that outlet to Redside Dace sensitive watercourses, the designs may include thermal mitigation measures to promote cooling of water, subject to MNR review/approval, such as:
  - Pond configuration/orientation to prevent occurrence of large open water areas, which cannot be shaded by riparian vegetation.
  - Plantings around the ponds to maximize shading and minimize temperature increase during intermittent event periods.
  - Bottom-draw outlet structures (reverse slope outlet pipe) from permanent pools to draw cooler water from as close to the bottom of the pond as practical.
  - Outlet cooling trenches (e.g., subsurface trenches with clear stone) for pond discharge that allow for cooling of water and promote infiltration, where feasible.

- All materials and equipment used for the purpose of site preparation and project completion will be stored and operated in a manner that prevents any deleterious substance (e.g., petroleum products, oils, lubricants, silt, etc.) from entering the water;

- Stabilize any excess materials removed from the work site, to prevent them from entering the waterbody;

- Operate machinery in a manner that minimizes disturbance to the banks of the waterbody;

- Machinery is to arrive on site in a clean condition and will to be maintained free of fluid leaks;

- An emergency spill kit will be kept on site in case of fluid leaks or spills from machinery;

- Conduct daily visual environmental inspections of the site; and

- Qualified contractors with experience in the construction and implementation of natural channel designs and fish habitat measures will be employed, with support from technical specialists (e.g., Fisheries Contract Specialist, Fluvial Geomorphologist).
Monitoring

A Fisheries Contract Specialist and Fluvial Geomorphology Specialist will be utilized to ensure that all of the mitigation measures, as well as the enhancement, and compensation measures, and Overall Benefit Activities where applicable, are constructed in accordance to the Contract Drawings and applicable legislative approvals.

An Environmental Inspection and Monitoring Coordinator will also oversee the environmental aspects of construction in the field to ensure that the mitigation measures are implemented in a manner that minimizes the potential for adverse environmental effects of construction. The Environmental Inspection and Monitoring Coordinator will ensure that erosion and sediment control measures are implemented at all watercourse crossings, as per the contract drawings and in compliance with the conditions specified in the ESA Permit for Redside Dace and Authorizations under the Fisheries Act.

Post-construction monitoring to assess the effectiveness of fish habitat compensation measures at Water Crossing Sites will be undertaken for the Highway 407 East Phase 1 Project in accordance with the conditions of authorizations issued under the Fisheries Act for the Project. In accordance with the conditions of the ESA Permit for Redside Dace (AU-C-001-11), post-construction monitoring will also be conducted to ensure that impacts to the species have been minimized and Overall Benefit Activities are successful and effective for Redside Dace.

4.1.2. Groundwater

Existing groundwater conditions and the impact assessment for the Highway 407 East Phase 1 has been documented in detail in the EA report and the associated Hydrogeology Impact Assessment of the Recommended Design (August, 2009).

The majority of the Highway 407 East Phase 1 corridor (approximately two-thirds) is located on geological soils such as till and clay. Due to their natural properties, these soils act as a barrier, restricting infiltration of surface water to the water table and, as such, provide a natural layer of protection to water bearing aquifer units. There is low potential for adverse effects to the groundwater in areas underlain by till or clay.

The other third of the highway corridor exhibits a blanket of permeable sand deposits at surface. In these areas, infiltration is rapid and the potential exists to affect groundwater. Most private wells near the proposed works in this DCR are shallow and susceptible to changes in groundwater quality and quantity.

For SWM ponds, highway ditching and outlet channels areas where there is high permeability soils at the surface and shallow depth to groundwater, which include parts of Segment A2in this DCR, there may be a potential for contamination of groundwater from highway stormwater runoff.
**Mitigation**

The need for dewatering will be minimized to the extent practical by limiting the depths of temporary and permanent excavations required for construction of the structures described in DCR #5. Where dewatering is necessary, if contaminants are encountered, an *Ontario Water Resources Act* approved treatment system may be required.

Groundwater drawdown is expected to be required to construct some of the structural foundations for culverts and bridges. In some cases, the extent of dewatering may exceed 50,000 litres/day; and therefore, require a Permit to Take Water from the MOE. From the assessment undertaken, a Permit to Take Water is required for the proposed works at Structures M35 and M36 in this DCR. It is expected that where temporary groundwater lowering does occur as part of construction dewatering activities, there will be limited impacts on local domestic water wells. Where a Permit to Take Water is required, it will be secured prior to commencement of dewatering operations.

There is limited potential for accidental contaminant spills during construction to affect the groundwater regime, as there is natural occurring low permeability clay and till layer between the surface water and the deeper groundwater in most areas of the Highway 407 East Phase 1. In addition, 407EDG has developed a spill contingency plan in the event of a spill during construction.

From the preliminary assessment conducted with respect to soil permeability and groundwater regime, the use of clay or geo-membranes for SWM ponds, ditching and outlet channel, as mitigation to address potential groundwater contamination from stormwater runoff during the operation of the highway is not anticipated. However, pending the final assessment of soil permeability and groundwater conditions impermeable liners will be installed, where subsurface and groundwater conditions dictate their use for protection of groundwater and private wells. In Detail Design, the use of permeable sub-base material and groundwater equalization drains for raised fill for the highway is being examined through sensitive wetland areas and unconfined aquifers to address potential interference to the movement of groundwater. From the assessment completed to date, the use of permeable sub-base and groundwater equalization drains to address potential impacts (interference) to groundwater movement is not required for the proposed works in this DCR.

**Monitoring**

A groundwater and well monitoring program is being implemented to confirm that there are no adverse impacts to groundwater aquifers or private or municipal potable water sources related to construction activities, and to identify construction related impacts early so that mitigative actions can be taken, if necessary.
The program includes:

- Pre-construction monitoring;
- Construction monitoring; and
- Post-construction monitoring.

The pre-construction monitoring program is being undertaken by MTO and is designed to establish general water level trends, identify broad potential concerns, and provide the baseline data needed for the Project.

The construction monitoring program will be undertaken by 407EDG and is designed to monitor individual residential water wells and mini-piezometer wells (plastic tube within stainless steel shaft) in order to identify potential adverse impacts on groundwater quantity or quality, and to recommend and implement mitigation measures, where deemed required.

The post-construction monitoring program will also be undertaken by 407EDG, with the results compared to pre-construction data to confirm that no significant effects occurred from construction activities.

4.1.3. Vegetation

Existing vegetation communities for the Highway 407 East Phase 1 have been documented in detail in the EA report and the associated Natural Environment Impact Assessment of the Recommended Design (October, 2009) (Terrestrial). Detailed field surveys were undertaken during the EA process (2003, 2006 and 2007) to identify plant species and characterize vegetation communities for the Project. Subsequent field surveys were carried out by MTO in 2010, 2011 and 2012 to augment the data for vegetation communities within Highway 407 East Phase 1 corridor where access was not previously obtained. 407EDG also confirmed existing conditions and updated the impact assessment for vegetation, based on the Detail Design scheme for the Project in 2012.

All of the vegetation communities surveyed were classified according to the Ecological Land Classification for Southern Ontario (Lee, H. T., et al. 1998) (ELC). A significant amount of the study area is comprised of active or recently retired agricultural lands. Natural environment features largely include remnant tableland woodlands and valleylands. Vegetation communities exhibit a mix of native and introduced species; wildlife populations are similarly comprised of both native and introduced species, with an emphasis of respective resident populations of species that have habituated to the settled environment.

The vegetation communities found within the Highway 407 East Phase 1 corridor include a number of high quality communities. Details of the impacts to these vegetation communities were previously documented in the EA and confirmed in the Detail Design for the Project.
The Highway 407 East Phase 1 also crosses a number of unevaluated wetlands comprised of a variety of wetland types, including willow swamps and thickets, reed canary grass meadow marshes, Manitoba maple swamps along watercourses, as well as cattail and forb shallow marshes in low lying areas adjacent to roadways. Swamp communities tend to be cedar dominated, sometimes intermixed with other species, usually deciduous tree species. Several of the wetland communities identified within the highway lands are generally of lower quality related to species presence.

Over 275 plant species have been identified through field investigations, consultation with regulatory agencies, and public and secondary source data. A number of regional species of concern were identified.

Impacts to vegetation are principally related to the removal of vegetation and natural habitat within the highway ROW, and were documented in DCR #1. Vegetation clearing and grubbing, as described previously in DCR #1 for the proposed earthworks, civil and structural activities, will be undertaken within the entire highway ROW, including areas for SWM ponds, in advance of the roadway and structural works. The purpose of the early vegetation clearing is to allow for the removals to be completed outside the key breeding period for migratory birds from May 1 to July 31. No further vegetation clearing for the works described in this DCR will result in the removal of butternut (Juglans cinerea) trees or vegetation communities (cultural meadow) that are considered habitat for Bobolink (Dolichonyx oryzivorus), Eastern Meadowlarks (Sturnella magna) and Redside Dace (Clinostomus elongatus), all of which are species protected under the ESA. Further details regarding project impacts to these SAR and proposed overall benefit activities to be implemented to assist in their recovery can be found in the Section 4.1.7.

**Mitigation and Compensation**

Mitigation and compensation for vegetation removals within the ROW were documented in DCR #1 and are focussed on restoring/enhancing/creating forest and wetland communities at a ratio of 1:1 (minimum) (i.e., “vegetation compensation”).

Details of the vegetation restoration and enhancement works, including site preparation, species selection, plant community trajectory, monitoring, and reference site selection will be presented in a comprehensive ecologically based “Vegetation Restoration Plans” for the Project. Vegetation Restoration Plans for the Highway 407 East Phase 1, including replacement vegetation to be established within the transportation corridor, will be described in detail in a future DCR for the Project (refer to Table P.2). Vegetation Restoration Plans will be supported, where necessary, by supplemental plans, including Forest Edge Management Plans, an Invasive Species Management Plan and an Adaptive Management and Monitoring Plan.

As per Condition 18 of the MOE Notice of Approval to Proceed with the Undertaking, Vegetation Restoration Plans to provide compensation for the loss of vegetation communities, including
SAR habitat, will be developed by 407EDG in consultation with regulatory agencies (MNR, Environment Canada, TRCA, CLOCA, etc.) and presented at a Public Information Centre event as part of the consultation program for the Project (refer to Section 2.0).

Opportunities to salvage regional plant species of concern have been provided to TRCA and CLOCA in advance of construction.

Mitigation measures that will be incorporated in the construction contract for the proposed works described in this DCR to minimize the impacts to adjacent forest communities or protected zones include:

- Installing temporary erosion and sediment control measures prior to construction, and maintaining them throughout construction, including routinely inspecting and repairing them, as required;
- Vegetation that does not require removal for the purposes of construction will be protected through the installation and maintenance of temporary vegetation protection fencing (e.g., temporary fencing). This includes protection of butternut trees not designated for removal adjacent to the ROW, as per the conditions of the ESA Permit;
- Equipment, materials and other construction activities will not be permitted in zones delineated for protection;
- Enhanced sediment and erosion control measures will be implemented at sensitive areas where SAR habitat is within or abutting proposed work area. This will include placement of double silt fence barrier and straw bale structures at the identified Redside Dace crossings (refer to Section 4.1.1) and use of silt fence and other measures near avian SAR habitat (Bobolink/Eastern meadowlark, Barn swallow);
- Unnecessary traffic, dumping and storage of materials over live tree roots within active construction areas will be avoided;
- Operational procedures and Best Management Practices for handling material and excess material, and spills prevention will be implemented. Vehicular and equipment maintenance and refuelling will be carried out in a controlled manner, and where applicable, at designated maintenance areas. Refuelling will not be permitted within 30 m of any forest, wetland or watercourse; and
- Exposed soil surfaces will be stabilized and re-vegetated as soon as possible following construction, using native groundcover seed mixes and plantings.
4.1.4. Wildlife and Wildlife Habitat

Existing conditions and the impact assessment of wildlife and wildlife habitat for the Project have been documented in detail in the EA report and the associated *Natural Environment Impact Assessment of the Recommended Design* (October, 2009) (Terrestrial).

As part of the commitments in the EA, supplemental environmental work was completed by MTO in 2010 and 2011 to provide environmental inventories where none had previously been undertaken due to previous constraints to property access. Investigations included documentation of significant wildlife habitat, and rare species occurrence.

Vegetation communities exhibit a mix of native and introduced species; wildlife populations are similarly comprised of both native and introduced species, with an emphasis of respective resident populations of species that have habituated to the settled environment. Generally, lands within Highway 407 East Phase 1 provide habitat for a wildlife assemblage typical of an agricultural/urban landscape.

Field investigations to date indicate that mammal species such as White-tail Deer (*Odocoileus virginianus*), American Mink (*Mustela vison*), Raccoon (*Procyon lotor*), Coyote (*Canis latrans*), Red Fox (*Vulpes vulpes*), and Meadow Vole (*Microtus pennsylvanicus*) are common across the landscape. Bird species tolerant of anthropogenic disturbances were also readily identified within the transportation corridor and include Canada Goose (*Branta canadensis*), Mourning Dove (*Zenaida macroura*), Blue Jay (*Cyanocitta cristata*), American Crow (*Corvus brachyrhynchos*), Black-capped Chickadee (*Poecile atricapillus*) and American Goldfinch (*Spinus tristis*). Amphibian species such as Spring Peeper (*Pseudacris crucifer*), Eastern Gray Treefrog (*Hyla versicolor*), and American Toad (*Bufo americanus*) were encountered in aquatic habitats during field investigations. Supplemental field investigations in 2010, 2011 and 2012 have noted a number of raptors and area-sensitive bird species within the transportation corridor. From the wildlife investigations conducted, it has been identified that over 100 birds, 8 amphibians and reptiles, and 16 mammals are known to be present in the study area.

The wildlife habitat found within the highway ROW and adjacent lands, though somewhat degraded, is suitable for many species of birds, including forest dependant species, grassland specialties, and raptors. Existing habitat is also used as a seasonal migratory stopover location. Breeding evidence and/or breeding habitat for 3 avian SAR has been recorded within or adjacent to the Highway 407 East Phase 1 corridor. Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), and Eastern Meadowlark (*Sturnella magna*) are all listed as Threatened under the ESA, and are subsequently afforded protection under the Act, along with their breeding habitat. The impact of construction on these species is discussed further in Section 4.1.7. To date, no threatened or endangered SAR reptiles, amphibians, mammals, or arthropods have been identified as present within the study area.
**Works in DCR #5**

All clearing activities will have been completed prior to the initiation of the works described herein, as identified in DCR #1. To this extent, there will be no additional habitat removal for any wildlife species for the proposed works described in this DCR.

Construction activities may obstruct the typical movement of wildlife. Secondary effects of construction, such as dust and noise, may reduce the quality of adjacent habitat. Construction may result in wildlife injury or mortality for species that are sensitive to disturbance and/or move too slowly to flee disturbance.

For the work areas identified in DCR #5, the principal habitat adjacent to the cleared corridor is row crops; cultural meadow, cultural thicket, and deciduous forest are smaller remnant components that exist as units within the intensely farmed area. Critical breeding habitat for Barn Swallow, Bobolink, and Eastern Meadowlark has been identified in the vicinity of some of the proposed works in this DCR. A number of mammalian species common to southern Ontario have also been observed in the Highway 407 East Phase 1 study area; including within the vicinity of the works identified in DCR #5. No mammalian species documented in the study area are regulated under the ESA or SAR Act.

Amphibian species such as Spring Peeper (*Pseudacris crucifer*), American Toad (*Bufo bufo*), and Gray Treefrog (*Hyla versicolor*) were noted during auditory surveys at aquatic habitats in the vicinity of some structures identified in DCR #5. The only reptile observed with some frequency during baseline investigations was the Eastern Gartersnake (*Thamnophis sirtalis sirtalis*). No amphibian or reptile species detected within the vicinity of the works addressed in DCR #5 are regulated under the SAR Act or the ESA.

**Mitigation and Compensation**

Any construction project has some potential for wildlife injury or mortality. This can be mitigated through Contractor environmental awareness training with implementation of a wildlife encounter protocol.

The following mitigating measures will be implemented to minimize impact on wildlife during the proposed works in the ROW, as detailed in this DCR.

- To comply with the requirements of the *Migratory Birds Convention Act*, all vegetation clearing will have been completed as describe in DCR #1 for the entire Highway 407 East Phase 1 corridor. Should any additional vegetation require clearing within the highway ROW, it will be completed outside of the general breeding bird window (May 1 to July 31, Environment Canada, Canadian Wildlife Service, Ontario Region);

- For bird habitat protected under the *ESA* (Bobolink, Eastern Meadowlark, and Barn Swallow), vegetation clearing will not be permitted from May 1 to August 31, in
accordance with Section 17(2)(c) ESA Permit for the Project, unless approval has been obtained from the MNR Species at Risk Biologist;

- Erosion and sediment control measures will be implemented to prevent the migration of sediment into adjacent habitats, and a qualified environmental monitor will conduct site inspections to ensure that all protection and mitigation measures are functioning as intended; and

- Wildlife/SAR awareness training will be administered for those personnel working on site, including measures and protocols for encountering wildlife during construction.

To address changes in habitat quality, 2 key mitigation strategies were identified in the EA. The first mitigation priority is to avoid or minimize crossing of wildlife features. Through the route evaluation and selection phase and the EA process, mitigation approaches were implemented, wherever possible, while also balancing other societal values and impacts. The second mitigation focus along the Highway 407 East Phase 1 corridor is to reduce transportation-related wildlife mortality and increase connectivity at key crossing areas along the corridor by providing safe passage for wildlife through the design and placement of wildlife structures and directional funnel fencing.

During the EA, an extensive wildlife movement and linkage analysis was undertaken to identify and recommend the crossing locations and associated highway design features to address specific wildlife movement functions. These locations have been reviewed and confirmed in Detail Design, and no additional wildlife crossings are considered warranted to address wildlife movement at this time.

**Wildlife Movement Considerations for Culverts/Bridges**

Wildlife species vary in their tolerance or adaptability to moving through culverts/bridges under roadways. Although some species may readily move through culverts (such as small mammals, raccoons, skunks, weasels, fox, and some amphibians), others, particularly large mammals, reptiles, and amphibians, may show a greater reluctance. Factors influencing the use of culverts by wildlife including temperature/moisture differentials and reduced ambient light, leading to a “tunnel effect” within the culverts are considered to influence the use of culverts by wildlife. The inclusion of natural substrates and debris within wildlife crossing structures that mimic adjacent substrate composition and condition may encourage passage by wildlife. To this effect, substrate used under dry wildlife passages will be continuous with adjacent substrate profiles.

To encourage wildlife movement at watercourse crossings, the surface layer of substrates at culvert structures will consist of fine material, creating a solid, stable platform and covering any underlying rock. Additional mitigation measures include funnel fencing to guide target wildlife species to wildlife structures and exclude/restrict them from accessing the highway ROW,
provision of escape measures to enable wildlife trapped within the ROW to exit the ROW; and providing additional structure/cover within large culverts and under bridges to facilitate wildlife passage.

Wildlife species are more likely to enter a culvert if they can see the light at the other end. Increasing the span of a bridge or the size of a culvert generally increases the amount of light that enters the structure, thereby reducing the tunnel effect. Openness Ratio (OR), which is the cross-sectional area of a structure (square metres) divided by the distance wildlife must travel through or under (in metres), is a measure of the tunnel effect of a structure that may influence use by various wildlife species.

The minimum target OR for wildlife at each crossing structure was identified during the EA process, and has been carried forward in the culvert/bridge designs. For crossings identified to accommodate the movement of large animals, the minimum OR is 0.6, with a minimum clearance height of 3.0 m, and for crossings identified for small animals, a minimum OR is 0.05.

**Wildlife Passage Structures**

Wildlife passage systems have been designed and will be implemented at all structure watercourse crossing locations identified in this DCR. At watercourse culvert crossing locations, structures have been designed with a low flow channel to allow for fish passage and a suitably raised dry ledge for the movement of wildlife.

Other additional required design mitigation elements at these locations, consisting of directional funnel fencing, escape measures and landscape plantings (i.e., strategic selection and placement of plantings at wildlife structures/crossings and along barrier/funnel fencing to assist in crossing, in relation to structure screening, cover/refuge, food, and extent) will be presented and described in detail in a future DCR, and will be constructed in the latter stages of the Project. The following structures proposed in this DCR will accommodate wildlife passage (Refer to figures in Section 1 for the locations).

**Lynde Creek Tributary ‘A’ Culvert (Water Crossing Site 16, Structure M22)**

This arch culvert will carry the Highway 407 East Phase 1 mainline over Lynde Creek Tributary ‘A’. This structure has a 14.6 m bottom width and a vertical clearance of 3.0 m (following installation of culvert treatment) to facilitate wildlife movement. Based on the ultimate design, the OR is 0.65; designed to be suitable for use by small animals.

**Lynde Creek Tributary ‘G’ Bridges (Water Crossing Site 19, Structure M35 - EB and WB)**

The single-span bridge Structure M35 – EB will carry the eastbound lanes of the Highway 407 East Phase 1 mainline, as well as the on-ramp from West Durham Link to eastbound Highway 407 East Phase 1, over Lynde Creek Tributary ‘G’. This structure has a 47.4 m bottom width
and a minimum vertical clearance of 3.0 m (variable, conservative) to facilitate wildlife movement. Based on these dimensions, the OR is 6.69.

The single-span bridge Structure M35 – WB will carry the westbound lanes of Highway 407 East Phase 1 mainline over Lynde Creek Tributary ‘G’. This structure has a 47.4 m bottom width and a minimum vertical clearance of 3.0 m (variable, conservative) to facilitate wildlife movement. Based on these dimensions, the OR is 10.9.

These twinned structures are designed to be suitable for use by small and large animals.

**WDL E-S Ramp over Lynde Creek Tributary ‘G’ (Water Crossing Site 19, Structure M36)**

This single-span structure will carry the off-ramp from westbound the Highway 407 East Phase 1 mainline to the West Durham Link over Lynde Creek Tributary ‘G’. This structure has a 47.1 m bottom width and a minimum vertical clearance of 3.0 m (variable, conservative) to facilitate wildlife movement. Based on these dimensions, the OR is 11.72; suitable for use by small and large animals.

**Lynde Creek Tributary ‘H’ Bridges (Water Crossing Site 20, Structure M37 – EB and WB)**

The single-span bridge Structure M37 – EB will carry the Highway 407 East Phase 1 mainline over Lynde Creek Tributary ‘H’. This structure has a 33.5 m bottom width and a minimum vertical clearance of 1.0 m (variable, conservative) to facilitate wildlife movement. Based on these dimensions, the OR is 2.58.

The single-span bridge Structure M37 – WB will carry the Highway 407 East Phase 1 mainline over Lynde Creek Tributary ‘H’. This structure has a 33.5 m bottom width and a minimum vertical clearance of 1.0 m (variable, conservative) to facilitate wildlife movement. Based on these dimensions, the OR is 2.58.

These twinned structures are designed to be suitable for use by small animals.

**WDL Ramps S-W and S-E Birdge over Lynde Creek Tributary ‘D’ (Water Crossing Site 41B, Structure W30)**

Structure W30 will carry northbound WDL over Lynde Creek Tributary ‘D’. This structure has a 24.13 m bottom width and a vertical clearance of 8.0 m (variable, conservative, not including slope) to facilitate wildlife movement. Based on these dimensions, the OR is 8.7; suitable for use by small and large animals.

**Monitoring**

To measure the effectiveness of terrestrial wildlife passage structures in maintaining habitat connectivity and safely passing wildlife under the highway, post-construction monitoring of these structures will occur at strategic locations across the Highway 407 East Phase 1 corridor. The purpose of Wildlife Monitoring is to document the use of crossing structures by wildlife. Based
on the results of other such monitoring initiatives, it is reasonable to expect that the passage structures, in combination with mitigation fencing, would generally attract and safely convey animals across the highway corridor.

As part of fulfilling the EA commitment for the Project, 407EDG will implement a 7-year post-construction monitoring program for 20 designated wildlife crossing structures that provide linkages for different target wildlife species (e.g., large mammal crossing, small mammal crossing only) and represent different structure types (e.g., single-span bridges, box culverts, arch culverts, etc.).

Techniques for wildlife monitoring at designated wildlife crossing structures will include:

- Wildlife cameras;
- Small mammal trapping;
- Pitfall trapping;
- Snake coverboards;
- Winter track surveys; and
- Visual encounter surveys.

Post-construction monitoring will occur across 4 seasons annually during years 1-5, then once during each of the 4 seasons during years 10 and 15.

A post-construction Wildlife Monitoring Plan has been developed to identify the locations, methods, and frequency of monitoring requirements during the post-construction phase.

It is anticipated that monitoring results will confirm the nature and extent of use of wildlife passage structures by target species after the initial development stage. However, these results may not be useful in any discussion of the actual conveyance impacts on the local wildlife community, owing to the absence of any comprehensive baseline population data for comparison. The post-construction monitoring database will serve as a barometer of the level and frequency of use by animals at each passage structure.

A 5-year post-construction monitoring program will also be undertaken for the avian SAR, as a condition of the ESA Permits for the Project (refer also to Section 4.1.7). For Bobolink and Eastern Meadowlark breeding bird surveys will be conducted in each of the 5 years during the period between May and July in each habitat Restoration Areas created. For Barn Swallow, the monitoring will include an assessment of the use of nesting structures by Barn Swallows, including surrounding habitat areas around the nest structures.
4.1.5. Surface Water Protection/Erosion and Sediment Control

The proposed construction zone(s) described in this DCR will be exposed to overland runoff, groundwater seepage and precipitation, therefore requiring comprehensive water management and control.

An Erosion and Sediment Control Plan (ESCP) has been developed that incorporates the detailed water management strategies that will be implemented throughout the various stages of construction of the proposed works included in this DCR. For Segment 2, perimeter water management strategies will include drainage ditches constructed in order to convey water to temporary collection ponds or to nearby temporary settling ponds located within the footprint of future Stormwater Management (SWM) ponds (Ponds 16E1, 16E2, 41W, 42E, 42S, 43NE, 18W, 20W, 20E) to allow settlement of suspended sediment, with water ultimately released through controlled means to adjacent existing drainage features. Where SWM ponds for retention and treatment of surface runoff are not readily available, or feasible based on the initial grading works, site-specific sediment traps will be constructed in accordance with MTO Best Management Practices (BMPs) and applicable Ontario Provincial Standard Specifications. As indicated in the description of mitigation measures for the protection of fisheries resources, the use of permanent and/or temporary SWM ponds as part of the construction phase erosion and sediment control strategy will be assessed for each individual structure site before construction commences.

Drainage associated with areas outside the highway footprint or adjacent to temporary road diversions will be controlled through the work site/roadside ditching. Once constructed to final design, exposed surfaces, particularly at municipal road crossings, will be covered with topsoil and seeded in accordance with the Landscape Plan. Temporary seed and mulch cover will also be applied to stabilize minor disturbed areas to address potential erosion from the proposed construction activities.

The potential impacts on existing surface watercourses, including the transport of sediment from soils exposed during grading and excavation activities will be limited by controlling runoff from the work area. BMPs for water management to control clean water from entering the work area, such as berms and perimeter ditches, will be used throughout the site. Where diversion of clean water cannot be implemented, control measures such as rock check dams, straw bale flow checks and silt fence barriers will be employed to remove sediment prior to release of water from the site. Where applicable, such as on steeper slopes, erosion control blanket will be used to limit erosion from exposed work surfaces.

Site-specific ESCPs have been developed at the structural and stream realignment sites and will include detailed staging and sequencing plans and water management strategies.
A surface water monitoring plan has been completed by MTO to establish baseline water quality data for the required post-construction monitoring program to be conducted by 407EDG, which includes sampling at 4 sites – East Duffins Creek, Carruthers Creek, Lynde Creek and Oshawa Creek West. A SWM Plan has been developed for the purpose of mitigating potential effects associated with the quantity and quality of stormwater runoff from the operating highway facility being discharged to local watercourses. The SWM Plan will be implemented in accordance with the applicable MTO and MOE design standards to provide quality treatment quantity control and erosion management.

**Mitigation**

The ESCP addressing works under this DCR outlines the specific measures that will be implemented to control erosion and sedimentation. This includes staging details, drawings and implementation of MTO BMPs for the construction of the bridges, culverts, stream realignments, and other earthworks associated with the proposed works. The ESCP has been developed in accordance with the MTO document *Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects* (February, 2007). The plan includes the following elements:

- Erosion and sediment control objectives;
- Critical areas of concern;
- Water management, erosion control and sediment control protocols;
- Description of selected BMPs;
- Training and communication protocols;
- Definition of responsibilities and accountability;
- Monitoring and maintenance programs; and
- Contingency plans.

For the work outlined in this DCR, it is anticipated that the following BMPs will be utilized:

- Water management measures, including diversion ditches and/or berming, surface grading and cut-off ditching;
- Temporary settling ponds and or use of filter bags for treatment of pumped water from excavations required for construction of structures, stream realignments and other grading works. Where practical, temporary ponds will also be constructed in the location of future SWM ponds to accept and treat overland drainage; and
• Installation of temporary erosion and sediment control measures, such as silt fence barriers, rock check dams and application of seed and mulch to exposed soil surfaces, including use of enhanced measures such as double silt fence with straw bales to address SAR (Redside Dace) protection and conditions of ESA permits.

The overall water management strategy for the proposed work will also include scour protection measures – rip rap armouring, energy dissipaters, temporary sediment traps and basins and check dams (straw bales and/or rip rap) utilized in road diversion ditches, outlet channels and pump discharge locations to minimize erosion. Ditches will also be stabilized, where applicable, through the placement of rip rap scour protection, rolled erosion control blanket or application of seed and mulch.

Where appropriate, erosion on exposed soil surfaces will be controlled through the application of measures such as benching, slope texturing and application of seed and mulch. The timeline for completing seeding or other equivalent measures to stabilize disturbed areas will be dependent on the status of work and the overall project schedule. Whenever possible, disturbed areas will be stabilized as soon as possible upon completion of works or during periods of inactivity. Until stabilized, the area will be managed in accordance with the ESCP and other environmental management plans.

An inspection and maintenance program has been developed for water management and erosion and sediment control measures. Measures will be inspected on a frequent basis, with particular attention prior to and following rain events and periods of snow melt. The inspection program will identify measures requiring maintenance/repair to ensure optimal performance, including removal of any accumulated silt/sediment.

To ensure that there are no indirect effects to watercourses or wetlands due to spills, the following measures will be adhered to during construction:

• Site-specific spill contingency plans, which encompass the key elements of avoidance of spills, capture of spills, equipment needs for spill response; and training of personnel for spill response, including restricting refuelling at least within 30 m of watercourses;

• All machinery and equipment will be maintained in good working order and free of chronic or continuous leaks;

• Spill kits will be available at all field site offices and on specific equipment (e.g., refuelling trucks, foreman trucks, etc.);

• All spills will be reported and cleaned up immediately and contaminated materials disposed of as per current MOE guidelines and policies;

• Personnel will always be present during refuelling operations to monitor the refuelling activities; and
Chemical toilets will be placed more than 30 m from watercourses.

4.1.6. **Designated Environmentally Significant Features**

In total, there are 8 Environmentally Significant/Sensitive Areas, 1 Area of Natural and Scientific Interest and 1 Provincially Significant Wetland within and/or adjacent to the Highway 407 East Phase 1 corridor. The Environmentally Significant/Sensitive Areas have been identified by regulatory agencies, for their respective jurisdictions, as fulfilling certain criteria for ecological significance/sensitivity. These areas are as follows:

**Area of Natural and Scientific Interest (ANSI)**
- Duffins Creek Valley Regional Life Science Area;

**Environmentally Significant/Sensitive Areas**
- Byer-Saddler Area;
- West Lynde Creek Valley;
- Upper Lynde Creek to Chalk Lake;
- Lynde Valley, Iroquois Beach;
- Lynde Creek Valley;
- Westerly Creek Valleys;
- West Branch of Oshawa Creek; and
- East Branch of Oshawa Creek.

**Provincially Significant Wetlands**
- Lynde Creek Coastal Wetland Complex

**Works in DCR #5**

There is one Environmentally Significant Area (West Lynde Creek Valley) that intersects with the proposed works in DCR #5. Structures and associated grading works that fall within this designated environmentally significant feature include: Structures M35 and M36.
Mitigation/Compensation

The mitigation and compensation measures for the attributes of Environmentally Significant/Sensitive Areas features have been considered and assessed in this DCR as part of discussions in Section 4.1.3 Vegetation, Section 4.1.4 Wildlife and Wildlife Habitat and Section 4.1.7 SAR.

4.1.7. Species at Risk

Five SAR protected under the ESA were identified within the Highway 407 East Phase 1 corridor during baseline (EA) and supplemental investigations: Bobolink (*Dolichonyx oryzivorus*), Eastern Meadowlark (*Sturnella magna*), Barn Swallow (*Hirundo rustica*), Redside Dace (*Clinostomus elongatus*), and Butternut (*Juglans cinerea*). Advanced clearing of the Highway 407 East Phase 1 corridor and mitigation of impacts on terrestrial and avian SAR were described in DCR #1; to this extent, the structural works identified in DCR #5 will not involve the removal of any Butternut or any avian SAR designated habitat. DCR #5 describes work that will occur within regulated Redside Dace habitat at 3 sites (Watercourse Crossing Site Nos. 41B (17/41), 19 and 20).

Mitigation and protection measures and Overall Benefit Activities to support the recovery of the above species were developed and Section 17(2)(c) Permits under the ESA have been secured for all species. ESA Permits stipulate that detailed site-specific habitat restoration, enhancement and protection plans must be prepared for MNR review and approval prior to the commencement of construction activities. 407EDG and MTO will also implement a post-construction monitoring program for each of the habitat restoration/enhancement plans developed for the Project. Additionally, an Environmental Awareness Training Program has been developed, whereby personnel working within the Highway 407 East Phase 1 corridor receive orientation on the ESA in general, the ESA Permits and conditions applicable to the Project, and also are trained on procedures to follow in the event of an encounter with an identified SAR.

The following sections describe the environmental mitigation and protection measures for the proposed works in this DCR to address potential effects to SAR, as well as a general overview of the Overall Benefit Activities to be undertaken by MTO and 407EDG for SAR.

**Bobolink/Eastern Meadowlark**

Bobolink and Eastern Meadowlark are both ground-nesting medium-sized songbirds that inhabit grasslands, including agricultural fields. Both populations have experienced a rapid decline owing to the loss of grassland habitat in their range, coupled with fledgling mortality resulting from early haying. The ongoing threat of habitat loss and degradation in the province of Ontario has resulted in the listing of both of these species as threatened under the ESA.
Bobolink/Eastern Meadowlark habitat has been delineated throughout the Highway 407 East Phase 1 corridor; vegetation removal previously identified in DCR #1 will result in fragmentation of this delineated habitat. While Bobolink/Eastern Meadowlark habitat within the ROW will have been removed during clearing activities identified in DCR #1, some construction works on the structures identified in this DCR are adjacent to habitat falling outside of the ROW.

**Mitigation and Overall Benefit Activities**

Best management practices and procedures to control dust and erosion and sedimentation will be implemented to minimize any potential effects to Bobolink/Eastern Meadowlark and their habitat during construction. During construction, if Bobolink or Eastern Meadowlark is observed in any areas not identified in the ESA Permit, works occurring in those areas will be stopped immediately and the MNR SAR Biologist will be contacted for appropriate direction.

As part of the conditions of the ESA permit for Bobolink/Eastern Meadowlark, detailed site-specific mitigation plans (e.g. noise, dust) have been prepared to minimize construction effects on adjacent habitat.

**Barn Swallow**

The Barn Swallow is a medium-sized insectivorous songbird whose population has experienced large declines in North America over the past 30 years. Owing to uncertainty surrounding the cause of their decline, and a drop in populations of avian species with similar life strategies, the Barn Swallow has been listed as threatened under the ESA.

All Barn Swallow nests within the ROW were removed during the demolition of building/structures as part of the pre-construction activities for the Project. This included the demolition of 40 buildings/structures, which supported a total of 501 Barn Swallow nests. Clearing activities undertaken, as previously described and documented in DCR #1, will result in the fragmentation of Barn Swallow nesting and foraging areas; as such, construction activities for some works identified in this DCR are adjacent to Barn Swallow habitat.

**Mitigation and Overall Benefit Activities**

To protect foraging habitat and nesting areas adjacent to the Highway 407 East Phase 1 corridor, best management practices and procedures to control dust and erosion and sedimentation will be implemented to minimize any potential effects to Barn Swallow during construction. If a Barn Swallow nest is observed in any areas not identified in the ESA Permit during construction, then any works occurring in those areas will stop immediately and the MNR SAR Biologist will be contacted.
As part of the conditions of the ESA permit for Barn Swallow (AC-C-005-012), detailed site-specific mitigation and overall benefits plan have been finalized with the MNR in order to minimize construction effects on adjacent habitat. This included: preparation of detailed erosion, sediment and dust control plans prior to commencing work within about 500 m or more of Barn Swallow nest locations; no removal of Barn Swallow nests within the breeding period from May 1 to August 31; and details on the construction, installation and maintenance of nesting structures with 750 nesting cups; and planting plans for establishing foraging habitat.

**Redside Dace**

The Redside Dace is a small minnow (cyprinid family) with characteristic bright red sides during the spring that fade over the summer. Redside Dace are particularly sensitive to urbanization, introduced predators and intensive agricultural practices. Abundance has declined in many areas throughout its range in southern Ontario, and the species has subsequently been classified as endangered under the ESA. Three watercourses in this DCR have been classified as regulated habitat for Redside Dace: Lynde Creek Tributary ‘D’ - Watercourse Crossing Site 41B associated with Site 17/41, Lynde Creek Tributary ‘G’ – Watercourse Crossing Site 19 and Lynde Creek Tributary ‘H’ – Water Crossing Site 20. All design and construction at these sites will follow the approved design drawing (refer to Appendix A) and be undertaken in accordance with the conditions of the ESA Permit (AU-C-001-11) for the Project.

**Mitigation and Overall Benefit Activities**

As part of the conditions of the ESA permit for Redside Dace, detailed site-specific mitigation plans have been prepared, including comprehensive ESCP, construction staging, groundwater management, and plans for SWM ponds and outfalls. The habitat area of Redside Dace (watercourse meander belt, plus 30 m) has been defined in consultation with the MNR to ensure protection of the species and will be delineated by double silt fence barriers with straw bales, as well as other sediment control devices (e.g. bio-logs) where necessary.

All in-water works will be conducted within the applicable operational construction timing window (July 1 – September 15 of any given year) to protect fish during their spawning and nursery periods. Equipment or machinery will not be permitted in the watercourse during wet periods; and temporary dewatering procedures will be implemented, as required.

Mitigation is designed to minimize adverse effects on Redside Dace and its habitat. The ESA permit includes the requirement that additional activities be implemented to achieve an overall net positive benefit to the species, above and beyond “no net loss” or an exchange of “like-for-like”. As a result, site-specific Overall Benefit Activities have been developed to achieve an overall net positive benefit to Redside Dace and its habitat. The Overall Benefit Activities for the sites included in this DCR were previously summarized in Section 4.1.1. As per the conditions
of the ESA permit, Detail Design Packages for each Redside Dace regulated area will be submitted to the MNR for review and approval before construction begins.

Monitoring of watercourses that are designated as Redside Dace habitat will occur annually, up to and including the year 2022. A Fisheries Contract Specialist will monitor during construction to ensure that all environmental mitigation and design measures are properly installed and/or constructed and maintained. Post-construction annual reports will document the site conditions, success of the mitigation measures, and any recommended remedial actions.

**Butternut**

The Butternut is a member of the Walnut family, normally found scattered at low density in forests. The main threat to Butternut is a fungal disease dubbed “Butternut Canker” – caused by infection of the tree by the fungal agent *Sirococcus clavigignenti-juglandacearum*, which results in girdling and subsequent death of the tree. Due to the existing disease prevalence and the continued spread of Butternut Canker in Ontario, the Butternut is listed as endangered under the ESA.

All Butternut documented within the Highway 407 East Phase 1 ROW were removed during the clearing works, as identified in DCR #1. This included those butternut identified in the EA and well as an additional 132 Butternut within the ROW in Segment A2, as a result of supplemental investigations completed in the Detail Design phase. Where feasible, 407EDG has also examined opportunities, in consultation with the MNR, for transplantable butternut trees within the ROW to be transplanted to suitable sites outside the ROW. To date, approximately 200 butternut trees have been identified for transplanting to suitable sites within the Project Lands.

**Mitigation and Compensation**

Butternut trees not designated for removal adjacent to the ROW are protected with fencing to restrict construction access to these sites. Butternut trees of suitable size within the ROW will be salvaged and transplanted to suitable sites on the Project Lands, where feasible, in consultation with the MNR. If undocumented Butternut trees are detected during construction activities in any location not listed in the ESA, works occurring in those areas will stop immediately and the MNR SAR Biologist will be contacted.

The Overall Benefit Activities outlined in the ESA Permit to compensate for the loss of Butternut trees as a result of construction activities include provisions for archiving seeds in cooperation with the MNR, planting of 600 Butternut and 1,200 companion trees (oak, maple, white pine) in suitable habitat adjacent to the ROW on land owned by the Province, and completing a long-term monitoring program to ensure survival of planted Butternut and the health of companion trees. Further details of the Butternut replacement planting plan to be developed and implemented for the Project will be described in a future DCR.
4.2. Socio-Economic Environment

The existing socio-economic environment for Highway 407 East Phase 1 has been documented in detail in the EA report and the associated *Socio-economic Impact Assessment of the Recommended Design* (October, 2009). In general, the socio-economic environment associated with the transportation corridor is composed of agricultural, rural residential and open space land uses, with future urban and employment land uses identified specifically in the Highway 407 East Phase 1 corridor and WDL area.

Generally, with the introduction of the Highway 407 East Phase 1, there will be potential improvements of travel times for residents within Durham Region and beyond. There will be increased ease of access for businesses in the area of the highway for the delivery of products and supplies. The highway ROW may also serve to stimulate further development opportunities in areas bounded by the corridor in conjunction with future proposed development in the urban settlement areas.

4.2.1. Provincial and Municipal Policies and Plans

The existing socio-economic conditions of the environment as they relate to the Highway 407 East Phase 1 Project are important when contextualized from a policy perspective.

The public planning policy documents relevant to this undertaking include Provincial Policies and Plans, Regional and Area Municipal Policies and Official Plans, including:

- *Straight Ahead – A Vision for Transportation in Canada*;
- *Central Ontario Strategic Transportation Directions*;
- *Provincial Policy Statement, 2005*;
- *Oak Ridges Moraine Conservation Plan*;
- *Greenbelt Plan*;
- *Growth Plan for the Greater Golden Horseshoe*;
- *Metrolinx Regional Transportation Plan*;
- *Central Pickering Development Plan*;
- *Durham Region Official Plan*;
- *Growing Durham Study*;
- *Durham Transportation Master Plan*;
Area Municipal Official Plans:
  o City of Pickering;
  o Town of Ajax;
  o Town of Whitby;
  o West Whitby Study; and
  o City of Oshawa.

4.2.2. Community Value Plan

The Community Value Plan (MTO, August, 2010), which was created during the EA process, was developed by inviting community members living adjacent or in close proximity to the Highway 407 East corridor to share their knowledge of the area and actively participate in the identification of cultural, social, historical, and/or environmental values or concerns that defined their community.

Enhancement measures for preserving community values were subjected to an evaluation process to review their potential for success in protecting identified values and to ensure measures are feasible and warranted.

Mitigation and enhancement measures were identified for implementation within the Highway 407 corridor. Examples of enhancement measures to be employed included the following:

- The provision of earth noise berms, instead of noise walls, to enhance the visual appearance of this mitigation measure for those who reside nearby;
- The choice of vegetation typically used in landscaping designs could be altered to reflect the communities’ values (through plant choice, design/layout, etc.);
- Public artwork or a structural facade to match the aesthetic design goals of a community environment (e.g., the agricultural environment in the east);
- Bridge designs that include design elements reflecting the community in which they are located; and
- Signage to recognize specific cultural or historic resources.

As outlined in the provincial EA report, the CVP will be further developed and completed by 407EDG during the Detail Design phase for the Project and implemented during construction. Further details of the CVP for the Project will be described in a future DCR (refer to Table P.2).
4.2.3. Land Use

The Highway 407 East Phase 1 Project lies entirely within the Region of Durham and comprises portions of each of the following municipalities:

- City of Pickering;
- Town of Ajax;
- Town of Whitby; and
- City of Oshawa.

Most of the municipalities have adopted Official Plans that recognize the positive economic impact of the highway.

The ROW of the Highway 407 East Phase 1 contains both Greenbelt Lands and marginally encroaches into the Oak Ridges Moraine. Under current legislation, transportation infrastructure is permissible within the Greenbelt and the Oak Ridges Moraine designated lands.

Land Use Commitments

As part of the Project, the following measures have, or will be, implemented by the Province in accordance with land use policy direction in the Project area:

- Government retention of surplus lands within the Greenbelt;
- Gifting of some surplus Greenbelt lands to Conservation Authorities or other government agencies (MNR, municipalities) to develop parklands or natural areas;
- Priority to prime agricultural Greenbelt lands to ensure/promote continued agricultural practices:
  - Pooling of remnant agricultural parcels to sustain viable agricultural practices; and
  - Address agricultural needs with respect to access and linkages.
- Potential monitoring and research opportunities for various wildlife and vegetation species;
- Enhanced mitigation/compensation on surplus Greenbelt lands for SAR; and
- Providing access to designated natural/cultural heritage areas by maintaining recreational trails and linkages.

MTO considered the provincial and municipal policies and plans in Section 4.2.1, including the Greenbelt Plan, in the EA and preliminary design stage of the Project and adopted the following approach to ensure compliance and to minimize, wherever possible:
- The amount of Greenbelt lands, and particularly Natural Heritage Systems, traversed and/or occupied by the highway facility;
- Negative impacts and disturbances to the existing landscape, including, but not limited to, impacts caused by light intrusion, noise and road salt; and
- Negative impacts and disturbances on key natural heritage features, key hydrogeologic features and related landforms. This includes their related functions, and where reasonable, maintaining or improving connectivity of these features.

In the Detail Design phase of the Project, 407EDG will honour and carry forward the commitments and approach adopted in the preliminary design to conform to the applicable provincial, federal and municipal policies and guidelines. 407EDG is also bound by Condition 17 in the MOE Notice of Approval to Proceed with the Undertaking, which stipulates that the proponent shall consider specific elements of the Greenbelt Plan (2005) pertaining to preservation of key natural heritage features. Additionally, construction operations will have regard and due consideration for local municipal by-laws that identify mitigation measures for noise and dust control during construction.

**Land Use in DCR #5**

Land uses for the highway segments addressed in this DCR are primarily agricultural, the exception being the nearby communities such as Kinsale and Macedonian Village. Generally, for the highway segments addressed in DCR #5, the highway corridor does not impact any land uses designated as commercial or institutional. The potential impacts to community character and barrier effects for the hamlet of Kinsale and 2 small clusters of rural residential properties located in close proximity to the route will be minimal as access will be maintained through crossings of the corridor proposed for the majority of the crossing roads. No encroachment on or severance of any established or proposed settlement areas will occur. The majority of the directly affected lands are vacant.

There will be 2 road closures at Halls Road and at Country Lane and local traffic will be affected, deviating from the current use. Generally however, the location of the 407 East transportation corridor will improve travel times for residents and businesses in the general vicinity of the corridor, and will also improve access to transit for residents in the Region. Emergency response times may be improved for the area due to ease of access to the highway corridor via interchanges proposed at Baldwin Street, Thickson Road, Thornton Road and Simcoe Street along the Highway 407 East Phase 1 corridor, and improved connectivity north-south between the Highway 407 East Phase 1 corridor and existing Highway 401 via the WDL.
Mitigation and Compensation

Project Wide

Mitigation and compensation measures for impacts related to land use were primarily addressed by MTO in the EA and preliminary design phase for the Project. MTO has essentially completed the acquisition of property required for implementation of the Project. Many of the related purchase agreements included commitments by MTO to reduce the types of impacts cited above. On a project-wide basis, the following provides a summary of the key land use issues and commitments to mitigation and compensation.

Proximity Effects

MTO developed planning and design frameworks to reduce proximity effects, such as noise and dust. Much of the mitigation related to reducing proximity effects (e.g. aesthetic screening, noise mitigation) will be presented in the Landscape Plan and CVP for the Project to be described in detail in a future DCR. Construction related nuisance issues, such as dust, noise and temporary traffic delays for the proposed works in this DCR will be addressed using standard Best Management Practices and mitigation as detailed in subsequent Sections 4.2.4, 4.2.5 and 4.2.6.

Agricultural and Other Commercial Operations

During construction, efforts will be made to maintain access to or otherwise minimize disruption to agricultural operations, including equipment movement along local municipal roads crossing the project corridor. Agricultural tile drainage systems will be maintained, where feasible, through incorporation in the highway drainage design (discharge to roadside ditches).

Mitigation and compensation measures for farms and other commercial operations with direct or indirect impacts may include, but are not limited to, salt resistant plantings in wind breaks; ensuring best practices for salt application; replacement/reinstatement of fencing, signs, gates and driveway entrances (main farm, field, commercial); and, during construction, use of best management practices to control noise, dust and stormwater runoff that may affect abutting agricultural operations.

Recreational Trails

Existing formal/registered and informal recreational trails (in linear open space/valley corridors) will be directly affected by construction throughout the Highway 407 East Phase 1. In order to maintain public safety, access on such trails will be restricted during construction. Following construction, the formal/registered trails at East Duffins Creek in Segment A1 (Water Crossing Site 9 - Structure W13, TransCanada Trail); and re-routes of the TransCanada Trail which follows Paddock Road, west of the Greenwood community will be required to preserve
continuity and north/south connection of this trail through the transportation corridor. Details of the provisions to accommodate these trails will be presented in a subsequent DCR.

**Well/Septic System Displacements**

Well and/or septic system displacements as a result of the Project were identified in the EA and preliminary design stage, and no further displacements attributable to construction of the Project are anticipated. Mitigation for displacement of wells was addressed through MTO property agreements and included the relocation of wells.

**Works in DCR #5**

Mitigation/compensation measures for property impacts were addressed on an individual property/land owner basis in the EA and preliminary design phase in accordance with MTO policy and directives. Mitigation and compensation measures for those properties with direct impacts included:

- Property acquisition at fair market value in accordance with Ministry policy and directives;
- Maintenance or relocation of access; and
- Reinstating fencing along highway ROW limit at select abutting properties.

Berming, landscaping and signage are recommended where feasible within the ROW of the highway.

Plantings will be used to mitigate visual impact and provide a solid landscape screen of the north/south side(s) Highway 407, East Phase 1 including:

- South of Highway 407 both sides of Kinsale Road;
- Highway 407/ north end of the West Durham Link Interchange;
- North/south of Highway 407 west of Country Lane; and
- Road closure at Country Lane.

There is a plan to provide Heritage Streetscape plantings at the bridge approaches to compensate for the loss of roadside vegetation at the following municipal road crossings of the Highway 407 East Phase 1 corridor:

- Lake Ridge Road overpass; and
- Coronation Road overpass.

Proposed tree and shrub plantings, from a visual aesthetic and ecological restoration perspective, will be presented in more detail in a future DCR for the Project.
4.2.4. Traffic Staging and Management

As previously noted in Section 3.6, construction staging, traffic management, permanent road closures and detours are currently being 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.

The WDL and the Highway 407 East Phase 1 mainline are connected via a direction interchange in Segment A2. Lake Ridge Road, Kinsale Road, Coronation Road and Highway 7/Winchester Road are all municipal arterial roads affected by the Project.

Lake Ridge Road

Lake Ridge Road is a major municipal road crossing the Project in Segment A2. This road will maintain its original alignment. Traffic along Lake Ridge will be diverted to a temporary on-site route until the new underpass and alignment is complete. Temporary lane closures will be required in order to connect the temporary diversion to the existing alignment and once construction of the crossing is complete, to connect the new alignment to the existing one.

Kinsale and Coronation Road  Kinsale Road and Coronation Road are both minor municipal roads crossing the Project in Segment A2. Both roads will be temporarily closed to through traffic in order to allow for construction of the new structures and road alignments. During this period traffic will be assigned to a detour via Highway 7, Lake Ridge Road and 7th Concession Road.

Highway 7/Winchester Road

Highway 7 is a provincial highway crossing the Project in Segment A2. The alignment of this highway will not change. This section of Highway 7 will be widened in order to create left-hand and right-hand turn lanes (completion of construction expected in Fall 2012). The majority of work will not interfere with existing traffic; however, periodic night–time lane closures may be required for tie-in purposes.

Country Lane and Halls Road, which also intersect the Project footprint in Segment A2, are scheduled for permanent closure.

Mitigation

Where temporary traffic on-site detours and diversions and lane shifts are required, pavement markings and signage will be installed prior to diverting traffic in accordance with the Temporary Conditions Traffic Management Manual (April 2002) in order to guide traffic safely through the work zones identified in this DCR. Once construction at each location is complete, and prior to diverting traffic to the new alignment, temporary line painting and signage will be replaced by permanent line painting and signage (completed as per the Ontario Traffic Manual, March
2001). Any temporary lane closures will be carried out during non-peak traffic flow periods, which is typically at night. Any daytime closures are subject to MTO/IO/municipal approval(s).

To maximize certainty for road users and service providers, the management strategy to facilitate continuous traffic operations through the construction zones will focus on advance notification of changes to lane configuration and road network access at various stages of construction. As a result, motorists/service operators will be apprised of potential traffic congestion/constraint areas and be able to select designated detour routes or other alternate routes.

In all cases, portable variable message signs and other signage will be installed at strategic locations to provide advance notice to motorists of temporary diversions, detours and road closures. In addition, notification will be achieved through timely advertisement of construction conditions and traffic management measures (e.g. time and location of closures, with available detour route(s) before and during construction). 407EDG is also committed to providing direct written notification to municipal and provincial authorities, including policing and emergency service providers, and will employ standard procedures in this regard.

4.2.5. Noise and Vibration

An assessment of potential noise impacts from the Project was documented in detail in the EA report and the associated Noise Impact Assessment of the Recommended Design (October, 2009). Based on the Detail Design scheme for the Highway 407 East Phase 1, 407EDG completed an assessment to confirm noise impacts and mitigation measures identified in the EA.

As a result of the noise impact assessment conducted in the EA, 2 noise barriers are recommended for the Highway 407 East Phase 1, one along the mainline of the highway at the Village of Brooklin, and one along north side of Highway 401 at the south end of the WDL in the Town of Whitby. The latter replaces an existing barrier on Highway 401 that will be removed to accommodate realignment of the highway. These were described on a preliminary basis in DCR #3 and will be further described in DCR #6.

Construction Noise and Vibration

The heavy equipment used for the proposed works in this DCR can generate significant amounts of noise and may also cause ground-borne vibrations. This noise and vibration may be a source of disturbance to nearby residences and other sensitive receptors. If activities occur at night-time, and the noise is sufficiently loud, it can disrupt sleep patterns of residents in a community.

Both surface and subsurface construction activities can cause vibrations. Most construction areas involve surface (or near-surface) vibration sources and receptors. In the case of
subsurface activities such as pile driving, vibrations may also occur within a few metres of the point on the surface directly above the source. Since the current construction plans in do not include any blasting activities, and the most significant other source of construction vibration is expected to be pile driving from structural related works. Other equipment, such as dozers, pavement breakers, rollers, compactors, etc., can also cause localized vibrations.

Increased noise levels are temporary and will vary as the staged construction implementation moves along the highway corridor. Both surface and sub-surface activities may cause ground vibrations, with the most significant potential source being pile driving. From the assessment completed, it is concluded that pile driving for building bridge foundations is expected to generate significantly more noise than any other construction activity. In a daytime environment that is already subject to existing background ambient noise, readily audible noise levels can occur at distances up to about 500 m from construction activities. This audible noise may be experienced at greater distances in the case of pile driving and for all activities in quiet rural environments. Noticeable vibrations will generally be localized (i.e. within tens of metres).

Based on the assessment of pile drivers, it was predicted that damage to a residential building would result from a separation distance of approximately 7 m. As the closest receptors to pile driving within the boundaries of the works in this DCR are estimated to be in excess of the separation distance where damage may occur, the vibration levels due to pile driving are anticipated to be above the threshold of perception, but below the damage threshold for a residential building.

**Mitigation**

In general, the following mitigation measures will be employed by 407EDG and its subcontractors to address potential noise effects of the proposed construction activities in this DCR:

- Equipment will be kept in good repair with effective muffling devices;
- Separation distances between staging areas and noise receptors will be maximized to the greatest extent possible; and
- Loaded trucks will be routed away from residential streets, where possible.

Contractors will be required to adhere to municipal Noise By-Law requirements for the City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa, all of which prohibit operation of construction equipment over night (after 7 or 8 pm and before 7 am on weekdays, with further restrictions on weekends in some jurisdictions). However, it may be necessary to conduct some construction activities outside the hours prescribed in the municipal by-laws. In such cases, noise by-law exemptions will be sought from the area municipalities within which the work is occurring.
Construction Monitoring

Environmental Inspection and Compliance Monitors will conduct routine inspections during construction to verify that the mitigation measures specified in this DCR are implemented.

Potential noise and vibration issues will be investigated prior to commencement of any pile driving near vibration sensitive receptors based on site-specific soil conditions, which may vary throughout the study area. Preconstruction surveys of receptors susceptible to vibration damage may also be undertaken, where deemed required. Surveys will include photographs and the condition of structures prior to the construction activity. In some cases, an independent third party may conduct a peer review to verify that vibration emissions are below the residential damage threshold of the subject receptor.

407EDG will investigate and address all complaints related to noise associated with construction activities in this DCR, which may involve further mitigation opportunities. Response to noise and vibration complaints from the general public, municipalities and others will be handled in accordance with the 407EDG Complaint Protocol for the Project, which is based on standard MTO practice for addressing such complaints. If any construction equipment emits noise at levels above the limits in the applicable MOE Model Municipal Noise Control By-Laws (NPC's), 407EDG will comply with the limits where reasonably possible.

The MTO Construction Noise, Vibration and Air Quality Impacts Framework sets out Residential Area and Quiet Zone sound emission standards (Power ratings for construction equipment) of 83 a-weighted decibels (dBA) (for equipment rated at less than 75 kilowatts (kW)) and 85 dBA (75 kW and larger) as per MOE NPC-115. It also generally adopts the sound emission limit of NPC-118 (95 dBA) for heavy vehicles.

4.2.6. Air Quality

An assessment of potential air quality impacts from the Project was documented in detail in the EA report and the associated Air Quality Impact Assessment of the Recommended Design (October, 2009).

As part of the EA, a detailed air quality assessment of potential impacts during operation of the highway was undertaken to examine vehicular emissions of carbon monoxide, oxides of nitrogen, particulate matter (total suspended particulates including sizes smaller than 10.0 and 2.5 micrometres in diameter), and a selection of key hydrocarbons (benzene, 1,3-butadiene, and aldehydes). Credible worst-case predicted concentrations at residences and other sensitive receptors were within applicable criteria for these contaminants (with the exception of total suspended particulates), and the overall significance of predicted impacts was rated as minor. As such, no mitigation measures for the Project were recommended to address operational air quality impacts.
Construction and Air Quality

Although emissions from the construction phase will be short term, they may be large enough to exceed the applicable threshold. The most common construction activities that may generate emissions include site preparation, earth moving, roadway surfacing, construction of structures and demolition of existing structures. Fuel combustion from mobile heavy-duty diesel and gasoline-powered equipment, portable auxiliary equipment, and worker commute trips; and fugitive dust from soil disturbance are other major sources of potential air pollution during the construction phase.

The most common air quality concern with construction is dust, which consists of particles in the size range of 0 to 44 micrometres, referred to as Particulate Matter. Particulate Matter is generated by mobile construction equipment (trucks, bulldozers, loaders, etc.), by equipment that handles soil, aggregates and other bulk material (loaders, excavators, conveyors and stackers), and by the action of the wind. Construction dust is dominated by larger particles. In addition to Particulate Matter, combustion gases exhausted by the diesel engines of construction equipment will also emit oxides of nitrogen, carbon monoxide, hydrocarbons and a small amount of sulphur dioxide. Emissions of sulphur dioxide are expected to be small because of low sulphur diesel fuels mandated by federal regulation.

During construction activities, the number of pieces of equipment operating at any 1 location is much smaller than the volume of traffic on a busy roadway. As such, levels of oxides of nitrogen are not likely to be significantly higher than can be found near busy roadways. At residences and other sensitive receptors, worst-case predicted concentrations were predicted to be within applicable criteria for these contaminants.

Construction of the Highway 407 East Phase 1 is expected to take place over approximately 3 years, from 2013 to 2015. Construction activities will likely occur in staged sections over the 3-year period, with some locations completed while others remain active, so long-term exposure is not a concern.

Mitigation

The operation of heavy equipment during construction activities will generate dust and exhaust emissions. Impacts from fugitive dust will be minimized through various measures, including careful planning of works and by applying the appropriate control methods, or Best Management Practices, as described in Environment Canada’s Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (March, 2005).
As with any construction site, the emissions will be of relatively short duration and are unlikely to have any long-lasting effects to the surrounding area. The following mitigation measures will be considered to address potential air quality effects during construction:

- Conduct regular cleaning of construction sites and access roads to remove construction debris and reduce dust generation;
- Apply dust suppressants (e.g., water via tanker truck) on unpaved haul roads and other traffic areas susceptible to mobilization of dust from equipment/vehicles. No chemical dust suppressants will be used in areas where these products may harm plants, wetlands, fish and other sensitive organisms;
- Covering fine-grained materials when transporting them on-site, as well as ensuring external suppliers are implementing such measures for delivery of materials to the site;
- Clean paved municipal street/road crossings of highway where tracking of soil, mud or dust has occurred;
- Minimize trucks and other vehicles from tracking soil, mud or dust onto paved municipal streets or roads;
- Cover soil, sand and aggregate stockpiles, as necessary, to mitigate potential fugitive dust; and
- Comply with on-site speed limits and, as appropriate, further reduce speed when travelling sites with unpaved surfaces to reduce dust creation.

**Construction Air Quality Monitoring**

407EDG will investigate and address all complaints related to dust or emissions associated with construction activities which may involve further mitigation opportunities. Response to complaints from the general public, municipalities and others will be handled in accordance with 407EDG Complaint Protocol for the Project.

To satisfy Condition 15 of the MOE Notice of Approval for the Project, MTO prepared a Construction Noise, Vibration & Air Quality Impacts Framework that detailed the monitoring of local air quality conditions during construction activities adjacent to sensitive land uses. In the Framework, the communities of Brooklin and West Whitby (along the WDL) were considered to be the most sensitive to construction activities and are, therefore, the proposed locations in the air quality monitoring program.

The air quality monitoring will consist of continuous monitoring of particulates smaller than 10.0 and 2.5 micrometres in diameter, and oxides of nitrogen. Wind speed and direction will also be monitored at these locations. Particulates smaller than 10.0 and 2.5 micrometres in diameter will be measured hourly with a Beta Attenuation Monitor and 24-hour averages will be
calculated. Oxides of nitrogen will be measured hourly with an API Chemiluminescence Monitor and 24-hour averages will also be calculated.

The monitoring plan will include a full quality assurance and control protocol that includes but is not limited to field and lab blanks or automatic daily calibrations of the Beta Attenuation Monitor for particulates smaller than 10.0 and 2.5 micrometres in diameter, automatic daily calibrations of the device measuring oxides of nitrogen and chain of custody for all samples plus a random series of quality assurance tests of all equipment on a quarterly basis.

Monitoring began before construction to establish a baseline and will continue for a minimum of 1 year during construction, with the need for continued monitoring being dependent on the results from the first year. Ambient air quality monitoring for the Project at the designated monitoring stations started in April 2012, and included 1 month of baseline monitoring, prior to the scheduled commencement of construction in March 2013. 407EDG will determine if construction activities are potentially contributing significantly to any exceedances from the monitoring, and will investigate measures to mitigate contaminant emissions. Monitoring results will be reported quarterly and will meet the requirements of the MOE Operations Manual for Air Quality Monitoring in Ontario (March, 2008).

4.2.7. Property Contamination and Waste Materials Management

Contamination Management

An assessment of potential site contamination and potential impacts resulting from construction activities was documented in the EA report and associated Waste Management and Contamination Impact Assessment for the Recommended Design (August, 2009).

Environmental Site Assessments were conducted by others working on behalf of the MTO as part of the property acquisition phase of the Highway 407 East Phase 1. As a result of these assessments, a number of properties were identified within the Highway 407 East Phase 1 ROW as exhibiting known or potential impacts to soil and/or groundwater at those sites. As such, contaminated soil, groundwater and/or sediment may be encountered during construction activities. To better define the likelihood of this occurrence, and as general practice, 407EDG undertook further investigative activities in the form of Supplemental Phase II Environmental Site Assessments, per Ontario Regulation 153/04, in order to confirm and/or delineate impacts at those sites. In addition, Designated Substance Surveys (DSSs) were also conducted at selected buildings, and other structures, requiring demolition. DSSs were only conducted on buildings/structures identified as being located within the work area associated with this DCR that were suspected to potentially contain designated substances (e.g. asbestos and lead). These DSSs, and assessments, were conducted to gain a better understanding of the materials and environmental issues at each of these sites.
In general, the contamination management strategy associated with the Highway 407 East Phase 1 addresses:

- Properties within the footprint of the highway and associated facilities with potential for contamination based on the nature of their land use activities.
- Regional potential contamination issues/areas, including oil/gas pipelines, hydro and rail corridors, road salt application, and agricultural operations.
- Management and removal of designated substances (asbestos, lead, etc.) and hazardous materials in structures designated for demolition within the highway ROW.

In addition to property-specific contamination, regional contamination and designated substances that may be impacted by the footprint of the Highway 407 East Phase 1 ROW, highway support/ancillary facilities will be constructed that represent potential sources of contamination resulting from their operations and maintenance during the lifespan of the Highway 407 East Phase 1.

**Property Contamination in DCR #5**

There are no properties associated with this DCR, identified as having the potential for soil and/or groundwater contamination impacts based on the site screening activities and investigative activities conducted during the EA and Detail Design phase for the Project.

**Mitigation Measures for Contaminated Materials**

407EDG will be responsible for identifying and removing any contaminated materials present, within the highway, ROW where deemed necessary. For those properties where Phase II Environmental Site Assessments are completed, 407EDG will be responsible for ensuring that the ROW lands required to construct the Highway 407 East Phase 1 (footprint) are remediated to acceptable MTO/MOE standards. This will include, but not be limited to, the following:

- Preparation of Site Investigation Plans, if required, to identify any further investigative work that needs to be conducted;
- Preparation of Remedial Action Plans in accordance with applicable health, safety and environment regulations for each contaminated property to address soil, groundwater and/or sediment containing contaminants at levels above the applicable standards, including recommendations for monitoring, and/or remedial/mitigative measures, where applicable. These plans will guide site-specific management and/or remediation activities as necessary at the sites; and
- Implementation of the Remedial Action Plans for each property where mitigation and monitoring measures are required, including the preparation, implementation, completion and documentation of the successful Remedial Action Plans. This includes conducting
any specialized requirements, contingency plans, obtaining the necessary approvals or any other work necessary to remove contaminated materials/waste and remediate the properties to acceptable environmental conditions.


Contaminated soil and groundwater from excavation and investigation activities will be managed according to MOE requirements. Waste characterization and classification will be conducted in accordance with *Ontario Regulation 347*, and applicable designated substances will be managed pursuant to regulations made under the *Occupational Health & Safety Act*. Stockpiled contaminated soil will be removed from the site in a timely and efficient manner. Any temporary stockpiled contaminated material remaining onsite will be managed to prevent the release of dust, odours or sediment.

Contaminant management activities, if required, will be conducted ahead of construction, where possible, to minimize impacts to the environment and to the local community.

In general, mitigation measures to be implemented in the initial development of the Highway 407 East Phase 1 will result in the remediation of any soil contamination and, therefore, improve soil quality, resulting in a positive net effect.

**Excess and Waste Materials Management**

407EDG will be responsible for ensuring that all waste and other materials are identified and classified under *Ontario Regulation 347*, as necessary, and are managed in an environmentally acceptable manner, recycled and/or processed, and disposed of according to current legislation and accepted industry practice.

The management of construction waste includes the transfer of waste material, including excess earth and contaminated materials, to an approved disposal or recycling site. Excess materials, such as bituminous pavement, concrete, masonry, manufactured and natural wood, etc. will be managed in accordance with *Ontario Provincial Standard Specification 180* (November, 2011), *MTO Excess Earth Best Practices and Recommendations for Design and Construction* (June, 2010) and the MOE’s *Guideline for Management of Excess Material in Road Construction Projects* (July, 1994). Excess earth generated by the works will be managed with the primary objective of reducing the amount of excess earth generated and ensuring that excess earth is managed in accordance with all environmental laws.

Materials deemed to be contaminated will be managed in accordance with *Ontario Regulation 347* and Remedial Action Plans that outline the results of assessment work completed for the properties within the ROW and prescribing how contaminated sites and contaminated materials (if encountered) are to be managed.
Mitigation for Waste Materials

Wherever possible, excess materials generated will be reused on the site for haul roads and laydown areas (bituminous pavement and concrete) and in the landscaping and erosion and sediment control plans (chipped natural wood). Where these materials cannot be reused, they will be managed by disposal as non-hazardous solid industrial or commercial waste in accordance with all environmental laws.

It is 407EDG’s objective to minimize the volume of excess earth generated by the Project through the application of best management practices and design principles and construction methodologies that minimize excess earth generation. The management of excess earth off the Highway 407 East Phase 1 site will be completed in accordance with all applicable environmental approvals, standards, regulations, guidelines, policies, practices and laws and, more specifically, the MTO Excess Earth Best Practices and Recommendations for Design and Construction (June, 2010).

As previously noted, contaminated sites (known or identified during construction) will be assessed in accordance with Ontario Regulation 153/04 to identify the location and concentrations of contaminants present in the soil and/or water at properties within the footprint of the Highway 407 East Phase 1 Project. These assessment findings will be utilized in the development of a RAP for the site, if required, with material exceeding the applicable criteria ultimately removed for off-site disposal at an approved facility. Confirmatory sampling in accordance with regulatory expectations and industry standards will be completed following all remediation works.

In addition to the above, the following waste management measures will be implemented, as required, for these materials, if generated.

- Recyclable materials and materials not accepted at landfills (paper, cardboard, drink containers, wood, scrap steel, paint, metal and tires) will be collected separately for recycling.
- There will be no burning of wastes generated on the site.
- Non-recyclable non-hazardous construction wastes will be removed from site for disposal at an approved waste disposal site.
- Waste oils and lubricants will be stored in a labelled tank or drum and disposed of at a disposal facility approved for receiving liquid industrial wastes. All wastes will be properly manifested for transport and disposal.
Solvents, acids and caustic liquid waste will be collected separately, stored for removal, and disposed of by a waste management company specializing in liquid and hazardous wastes.

4.2.8. Landscaping

The process of identifying potential impacts and various net effects on the landscape was undertaken in a progressive and iterative manner as the landscape composition proceeded through MTO’s Community Value Plan (CVP) for the Project and Preliminary Design processes, as documented in the EA report and associated Landscape Composition Impact Assessment for the Recommended Design (June, 2009). In general, the landscape composition design plates illustrate a comprehensive collection of all physical treatments being recommended by the various factor-specific disciplines. Discipline-specific designs were done for all standard mitigation associated with terrestrial, aquatic, and wildlife habitat, forest edge management, mitigation to impacted heritage properties, and all other relevant factor-specific environmental disciplines. Site-specific buffer and vegetative screening mitigation measures associated with residential properties have been identified in the environmental impact assessment reports prepared during the EA phase.

The specific composition of materials, detailing, and design of the various elements will be determined in full during the Detail Design phase of the Project and addressed in the Landscaping Plan, Vegetation Restoration Plans, and the finalization of the CVP in a future DCR, and will be presented at a PIC to solicit public input (refer to Table P.2). It is 407EDG’s intent to implement the above plans in the latter stages of the construction of Highway 407 East Phase 1, with the exception of the Vegetation Restoration Plans, which will be implemented in a progressive manner at valley and stream corridor areas, and in association with fulfillment of habitat compensation requirements as a condition of ESA Permits for the Project.

Key elements of the Landscape Plan will include:

- Stormwater Management Landscapes;
- Landscape Screening;
- Snowdrift Mitigation;
- Enhanced Grading and Plantings;
- Gateways;
- Bridge Architecture/Aesthetics;
- Wildlife Passage Structures;
- Forest Edge Buffer Plantings and Edge Management;
Enhancements to the landscape composition of the corridor, in accordance with the CVP, will form a significant part of the Landscape Plan. Notable elements identified in the CVP include the development of gateway features and signage; enhanced corridor landscaping and aesthetics screening; enhanced plantings for SWM facilities; local heritage strategies (commemorative plantings, signage and adaptive re-use of material); interpretative trails/pathways/signage; enhanced grading and planting; and Aboriginal commemorative landscape and bridge architectural elements. This will be explored further in a future DCR.

4.3. Cultural Environment

4.3.1. Archaeological Resources

Archaeological Assessments were conducted as part of the EA for the Project, as documented in the Archaeological Impact Assessment Report for the Recommended Design (June, 2009).

Historically, the study area for the Project was largely farmland, settled in the late-18th to mid-19th century, and is characterized by a grid pattern of the late-18th century land survey into 200-acre lots and a system of concession and sideline roads. Crossroads, hamlets and villages arose across this grid, often where milling was possible. Within the Highway 407 Phase 1 area, the historical communities of Brougham, Greenwood, Kinsale and Brooklin in Ontario County all indicate a high potential for encountering historical, Euro-Canadian archaeological resources.

Moreover, the presence of several primary and secondary watercourses in the ROW indicates potential for the discovery of Aboriginal archaeological remains in undisturbed locations.

Any activity which involves land disturbance, including but not limited to, vegetation clearance, agricultural tillage, soil compaction, drilling, earthmoving, land filling, alteration of soil moisture regimes, etc., has the potential to negatively impact potential archaeological sites. Since construction involves many types of land disturbance, all archaeological sites within the footprint of the highway are potentially at risk.
Mitigation for Archaeological Resources

Many environmental activities, including building demolitions, implementing Remedial Action Plans, fieldwork and mitigation/compensation strategies, will be undertaken only when the archaeological fieldwork has confirmed the absence of archaeological material within a proposed impacted area. Should an archaeological site be known to exist, prior to any impacts from soil disturbance, the provisions of the Ontario Heritage Act will be followed and the site assessed for cultural significance and subjected to Stage 2, 3, and/or 4 Archaeological Assessment/Mitigation.

Stage 1 and 2 Archaeological Assessments of Aboriginal and Euro-Canadian sites within the Highway 407 East Phase 1 corridor have been completed by MTO. Several Stage 3 and 4 Archaeological Assessments have also been completed, with reports provided to the Ministry of Tourism, Culture and Sport (MTCS) for review and concurrence.

A Stage 3 assessment typically involves the test excavation of an archaeological site in order to clarify its location, extent, artefact distribution and density, age, cultural affiliation, and archaeological integrity. Information pertaining to these assessment criteria is gleaned through the excavation of a series of 1.0 m squares placed across the site on a checkerboard grid, typically at 5.0 m intervals, and the analysis of any recovered archaeological materials. The results of Stage 3 assessment determine whether or not the site meets the criteria for recommending Stage 4 mitigation.

At the end of Stage 4, the site will have been either protected from further threat or subjected to comprehensive archaeological excavation and analysis. In either case, no further archaeological investigation would be required. All artefacts recovered by licensed archaeologists in the course of archaeological assessment and mitigation work are held in trust for the people of Ontario as stipulated by the Ontario Heritage Act. Non-portable artefacts include classes of settlement features, such as post moulds, hearths, storage pits, refuse pits, and refuse middens, which are common to both pre-contact Aboriginal and historic Euro-Canadian archaeological sites. The latter may also include structural remains, such as stone foundation walls.
The 2 options for Stage 4 mitigation are under the direction of a licensed archaeologist and are outlined below:

- **Status Quo (“Avoidance/Protection”)** - The preferred Stage 4 mitigation strategy, avoidance and protection, is considered a neutral effect, as it simply maintains the *status quo* for any given archaeological site.

- **Salvage** - Salvage excavation uses scientifically controlled procedures in order to recover the majority of the portable artefacts, record any associated non-portable artefacts (i.e. settlement features such as hearths, post moulds, pits, etc.), and document the spatial information that links the portable and non-portable artefacts into a meaningful whole.

There are no archaeological sites in the Highway 407 East Phase 1 corridor that MTO or 407EDG have agreed to avoid through redesign; therefore, all significant archaeological sites that are recommended to proceed to Stage 4 will be mitigated through full excavation.

MTO has committed to undertaking all Stage 3 and Stage 4 mitigations required for Aboriginal archaeological sites prior to commencement of construction. MTO retains the obligation and responsibility for Aboriginal consultation on the Highway 407 East Phase 1. MTO has negotiated provisions for the participation of Aboriginal community members on the archaeological excavations of Aboriginal sites. Archaeological and cultural rights have been a primary point of discussion and negotiations with the Aboriginal communities.

407EDG is responsible for undertaking all Stage 3 and 4 archaeological assessments for Euro-Canadian (Historical) sites, that have not previously been assessed by MTO in the 2011 and 2012 field seasons.

**Mitigation for Unknown Archaeological Resources**

Should previously unknown or unassessed deeply buried archaeological resources be uncovered during construction, there may be potential for a new archaeological site and, therefore, under the *Ontario Heritage Act*, the site is subject to further investigation. In these circumstances, 407EDG will cease alteration of the site immediately and engage a licensed archaeologist and report the incident to the appropriate agencies.

An Archaeological Sensitivity Training Plan has been prepared by 407EDG to address their obligations under the *Ontario Heritage Act* with respect to the discovery of deeply buried archaeological or human remains, which may be uncovered during the course of construction or preparation activities. It is intended to aid its contractors in identifying archaeological or human remains, clarify legal obligations, and provide training on best practices procedures to follow should such circumstances occur.
In the event that human remains are encountered during construction, 407EDG will immediately cease construction and contact the MTCS and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Government Services, Consumer Protection Branch.

**Archaeological Sites in DCR #5**

Aboriginal and Euro-Canadian archaeological sites have been documented in Segment A2 associated with this DCR, generally where the proposed works are located. 407EDG will obtain concurrence from the MTCS for any archaeological assessment work completed prior to any mitigation or construction activities, including demolitions or pre-construction grading, being undertaken. For archaeological work undertaken by MTO (Aboriginal sites), 407EDG will ensure that MTCS concurrence is received prior to construction in those areas.

**4.3.2. Built Heritage Resources and Cultural Landscapes**

It has long been intuitively understood that certain places have a special, distinguishable character based on the unique integration of such aspects as topography, fauna, settlement patterns, human industry and architecture. The concept of cultural heritage is perhaps most profound in the field of heritage preservation. It has been appreciated that certain urban nodes, such as the historic cores, districts or precincts within some cities and towns deserve recognition for their heritage character, which is a sense of place that transcends the individual resources of which the area is composed.

The response to cultural heritage is often initially intuitive; it is necessary to ensure that such areas, rather than simply being picturesque, have true heritage significance and have retained their essential integrity. In order to do this, and thereby justify the preservation of such places in the face of many competing modern demands, it is necessary to develop a process for their examination, and criteria through which they can be identified and delineated. The construction of the Highway 407 East Phase 1 will result in direct and indirect impacts to cultural heritage resources. The primary direct impact will be the displacement of cultural heritage resources in whole or part within the highway ROW. The displacement and disruption impacts were identified in the *Cultural Heritage Resources Impact Assessment Report of the Recommended Design* (June, 2009) prepared as part of the EA for the Project.

**Effects on Cultural Heritage Resources**

**Displacement**

Displacement occurs when built heritage resources within the footprint of the transportation corridor are to be removed (through demolition, or removal and relocation to a new site). Displacement impacts are permanent and irreversible.
Disruption

Disruption occurs when built heritage resources or cultural landscape are adjacent to the footprint of the transportation corridor. Disruption impacts are due to air, noise, dust or visual intrusion related first to construction of the corridor and then to operation of the corridor. Disruption impacts can also be caused by the proximity of the corridor to resources in predominantly agricultural landscapes. Disruption impacts are also permanent, but can be mitigated by the construction of berms, landscape screenings, etc.

Furthermore, disruption of historic circulation patterns will occur when sideline roads are severed, and interchanges are introduced within the transportation corridor. This change would have an adverse effect on the traditional land use and cultural heritage landscape, bisecting presently contiguous fields.

Mitigation

Cultural Heritage Evaluation Reports (CHERs) are prepared to determine the level of cultural heritage value or interest for each individual built heritage property. There were 42 CHERs completed by MTO for the Highway 407 East Phase 1. A CHER includes a methodology, historical context and construction, existing conditions, heritage evaluation, statement of Cultural Heritage Values, recommendations, photos and a summary of salvageable elements. There were 6 CHERs completed for properties in Pickering, 26 CHERs completed for properties in Whitby and 10 CHERs completed for properties in Oshawa.

A Cultural Heritage Landscape Report was also completed by MTO for the Highway 407 East Phase 1. This report documented 25 landscape units that will be impacted either directly or indirectly by the implementation of the highway. The report provides photographs and mapping analysis of all identified cultural heritage landscapes units, such as roadscapes with notable heritage features, agricultural complexes, valleylands, and cemeteries located in Pickering, Whitby and Oshawa.

Adaptive reuse of a built heritage resource refers to using all or portions of a heritage building or structure for another purpose while preserving its primary heritage attributes. Examples of adaptive reuse options include: reconstructing all or portions of outbuildings to be used in other locations throughout the highway corridor; and reusing fragments of structures (such as stone walls or walkways) for monument installations or gateway features to support the CVP.

The Heritage Reports identify and list specific heritage features of the heritage properties to guide the provincial and municipal heritage salvage process. Materials can be sensitively removed from the heritage properties and reused in a variety of ways. From the provincial perspective, the salvage materials from the heritage properties will be incorporated and reused in different design elements as part of the facility, or at commemorative sites on or near the
highway lands. Municipalities may use heritage materials for other heritage buildings and features within the municipality, where opportunities exist.

The Province has first priority in the salvage of materials for reinstallation, relocation, adaptive reuse or commemorative purposes on or near the Project lands. Municipalities and municipal heritage committees and others have second priority and have been given the opportunity to salvage building materials directly through 407ECGP’s demolition building subcontractor to address safety and liability issues.

**Cultural Heritage Resources in DCR #5**

Relocation of built heritage resources is not being pursued due to lack of response to MTO offers to purchase and relocate such resources. Salvage actions are completed for the Project and opportunities were provided for municipalities to use materials (i.e. house stones).

The salvage and re-use of materials for commemorative interpretative purpose, referred to as the mitigation plans, will be finalized by 407EDG and the final recommended measures will be incorporated in the CVP and detail design drawings (Landscape Plan) for the Highway 407 East Phase 1 to be presented in a future DCR (refer to Table P.2).

**First Nations Commemorative Installations**

Engagement with First Nations began at the start of the EA study and has been ongoing. MTO retains responsibility for First Nation communications and consultation. MTO is committed to a continued, open dialogue with First Nation communities to provide updates on the project status and discuss First Nations commemorative installations along the highway, such as the Simcoe Street Bridge, which was previously documented in DCR #2. There are no additional First Nations commemorative installations proposed for the structures identified in DCR #5.

4.4. **Summary of Environmental Effects, Proposed Mitigation and Commitments to Further Work**

Conditions included in the MOE *Notice of Approval to Proceed with the Undertaking* (June, 2010) have been addressed in the Detail Design and will be implemented during the construction phase of the Project.

How the EA commitments have been addressed during the Detail Design for the works described within this DCR is summarized in Appendix C – Summary of Environmental Effects, Proposed Mitigation and Commitments to Further Work. This appendix includes the following tables:

- Summary of EA Commitments and Compliance Monitoring;
- EA Commitments and Assurances;
Environmental Effects Monitoring Commitments and Assurances; and
Requirements of MOE Conditions of Notice of Approval to Proceed with the Undertaking.

The following commitments will be met prior to construction.

- Obtain all applicable permits, approvals, and authorizations required for the works associated with this DCR;
- Completion of plans cited in this DCR (e.g., Environmental Management Plans, Erosion and Sediment Control Plans);
- Archaeological clearance in areas of construction associated with this DCR; and
- Continued consultation with stakeholders, interested parties and regulators, as required.