

Figure 6. Fisheries Habitat Classification

The Natural Heritage Information Centre (NHIC, a branch of the OMNR) provides a provincial status ranking for the Ecological Land Classification (ELC) vegetation communities of Ontario. None of the vegetation communities recorded on site is considered provincially rare (S1 through S3) by the NHIC.

## 4.2.3 Wildlife

### 4.2.3.1 Amphibians

Surprisingly few amphibians were heard calling from the core natural area in the site vicinity southwest of William Mooney Road, which includes a portion of the Goulbourn provincially significant wetland (PSW). A rather large chorus of Spring Peepers (*Pseudacris crucifer*) were calling from the beaver marsh to the north but none were recorded elsewhere. Green Frogs were observed there in the day and from another pond further north.

### 4.2.3.2 Breeding Birds

Forested areas within the site vicinity were found to support 12 species of area sensitive breeding birds as recognized by OMNR (2000) and these have been discussed in the Biology Existing Conditions Report (AECOM, 2011). The approximate locations of the area sensitive species are all shown on **Figure 5**. A list of area-sensitive bird species recorded in the Study Area is shown in **Table 1** below.

**Table 1. Area-Sensitive Bird Species Recorded at Ottawa Landfill**

Common Name	Scientific Name	On-Site	Site-Vicinity
<b>Forest Area-Sensitive</b>			
American Redstart	<i>Setophaga ruticilla</i>	2	6
Black-and-white Warbler	<i>Mniotilta varia</i>	1	3
Hairy Woodpecker	<i>Picoides villosus</i>	1	
Least Flycatcher	<i>Empidonax minimus</i>		2
Magnolia Warbler	<i>Dendroica magnolia</i>		1
Northern Waterthrush	<i>Seiurus noveboracensis</i>	1	1
Ovenbird	<i>Seiurus aurocapillus</i>		6
Pileated Woodpecker	<i>Dryocopus pileatus</i>		1
Veery	<i>Catharus fuscescens</i>		2
White-breasted Nuthatch	<i>Sitta carolinensis</i>		1
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	1	2
<b>Grassland Area-Sensitive</b>			
Savannah Sparrow	<i>Passerculus sandwichensis</i>	3	5



The old field habitat to the west of William Mooney Road appears to provide potentially suitable habitat to the provincially Threatened Bobolink (*Dolichonyx oryzivorus*). The breeding bird survey was conducted on two dates in early and mid-June at an appropriate time of year when this species would have been present. During the breeding season the male Bobolink is not easily overlooked with its distinct pattern, bubbling territorial song and habit of singing from conspicuous perches. Surveys adequately covered the open field in broad transects roughly 250 m apart. The AECOM ecologist queried the operator of the agricultural field to the west of the existing site as to whether he had seen Bobolink on his land. The operator of the agricultural field noted that he had seen them in the area in the past, but not in the last several years. The fields are in the early stage of succession but woody shrubs are establishing. Bobolinks typically prefer fields with little or no shrubs so it is possible that the regeneration is no longer favourable to this species.

#### 4.2.3.3 Other Fauna

During the December 2006 field visit, a small group of White-tailed Deer *Odocoileus virginianus* was observed in the northwest woods. The conifer trees in this section of the site likely provide good wintering habitat for a small number of deer due to the shelter provided by the trees. The remaining woods appear to be of lower quality for wintering wildlife because they contain few conifer trees (species that keep their needles) to provide shelter, and fewer mature trees to provide cavities for nesting or hibernation.

#### 4.2.3.4 Species at Risk

Eastern Meadowlark and Barn Swallow (*Hirundo rustica*) have been recently listed as Threatened Species federally by COSEWIC (2011) and provincially by COSSARO (2011) because of long term declining trends in their populations. Four territories of Eastern Meadowlark were observed in the regenerating old field habitat on the southwest side of William Mooney Road between the two breeding survey dates on June 3 and June 16, 2011. The habitat appears ideal and the presence of singing birds on the two dates indicates a high probability that they are breeding. Barn Swallows were observed around an abandoned barn on the west side of William Mooney Road. One old mud nest was noted in that barn. Barn Swallows were also observed around a barn at the working farm.

The only plant species at risk encountered in the site vicinity was the Endangered Butternut (*Juglans cinerea*) but none actually occur on-site. Three individual trees occur within the existing landfill site, near the north edge of the dry-fresh birch deciduous forest in the southeast corner. Four other individual trees occur in the forest block southwest of William Mooney Road (see **Figure 4**). All of the Butternuts are more than 500 m from the preferred landfill footprint.



## 4.3 Regional

The study area is situated in the Carp River Watershed which drains into the Ottawa River at Fitzroy Harbour. The landscape is a mosaic of landforms, vegetation communities and human settlement patterns. Soils of the watershed are primarily clay or rock-land and topography is relatively flat. The watershed lies within the Great Lakes – St. Lawrence Forest Region, which represents a transition between the deciduous forests of the south and the predominantly coniferous forests to the north (Robinson Consultants 2004).

### 4.3.1 Landscape Connectivity

Landscape connectivity (which includes the concept of ‘wildlife corridors’) has become recognized as an important part of natural heritage planning. Although there is not unanimous scientific support for corridors, it is generally accepted that a wide range of benefits can be attributed to the maintenance or re-connection of the natural landscape. These benefits may include: increased local species richness and biodiversity, more immigration and movement opportunities for individuals between core natural areas, and greater likelihood of seed dispersal and exchange of other genetic material between populations.

In the fragmented landscape of southern Ontario, connectivity functions are subjectively described. A low connectivity landscape is one where there are relatively small quantities of natural habitat (forest, wetland, thicket, etc.) separated by larger amounts of agricultural lands, urban areas and or roads. A high or very good connectivity landscape is one where the landscape is mostly natural habitat, with minimum quantities of agriculture or development breaking up the landscape and where the roads are not major highways or commuter roads. Larger areas (typically >25 ha) of natural habitat are sometimes identified as core areas.

In 2003, the NHIC, of the OMNR, produced The Big Picture 2002. This project utilized remote sensing imagery, geographic information systems (GIS), and the principles of landscape ecology to produce a digital map of existing and potential cores and corridors in Southern Ontario. Due to the inherent limitations of the automated methodology, the Big Picture 2002 maps should not be used without human interpretation. Nonetheless, it provides a useful tool for objectively assessing the overall connectivity of the landscape and the relative contribution of specific natural communities to that connectivity.

Although The Big Picture 2002 shows the overall landscape connectivity of the region as quite good, the specific connectivity value of the study area appears relatively low (**Figure 7**).



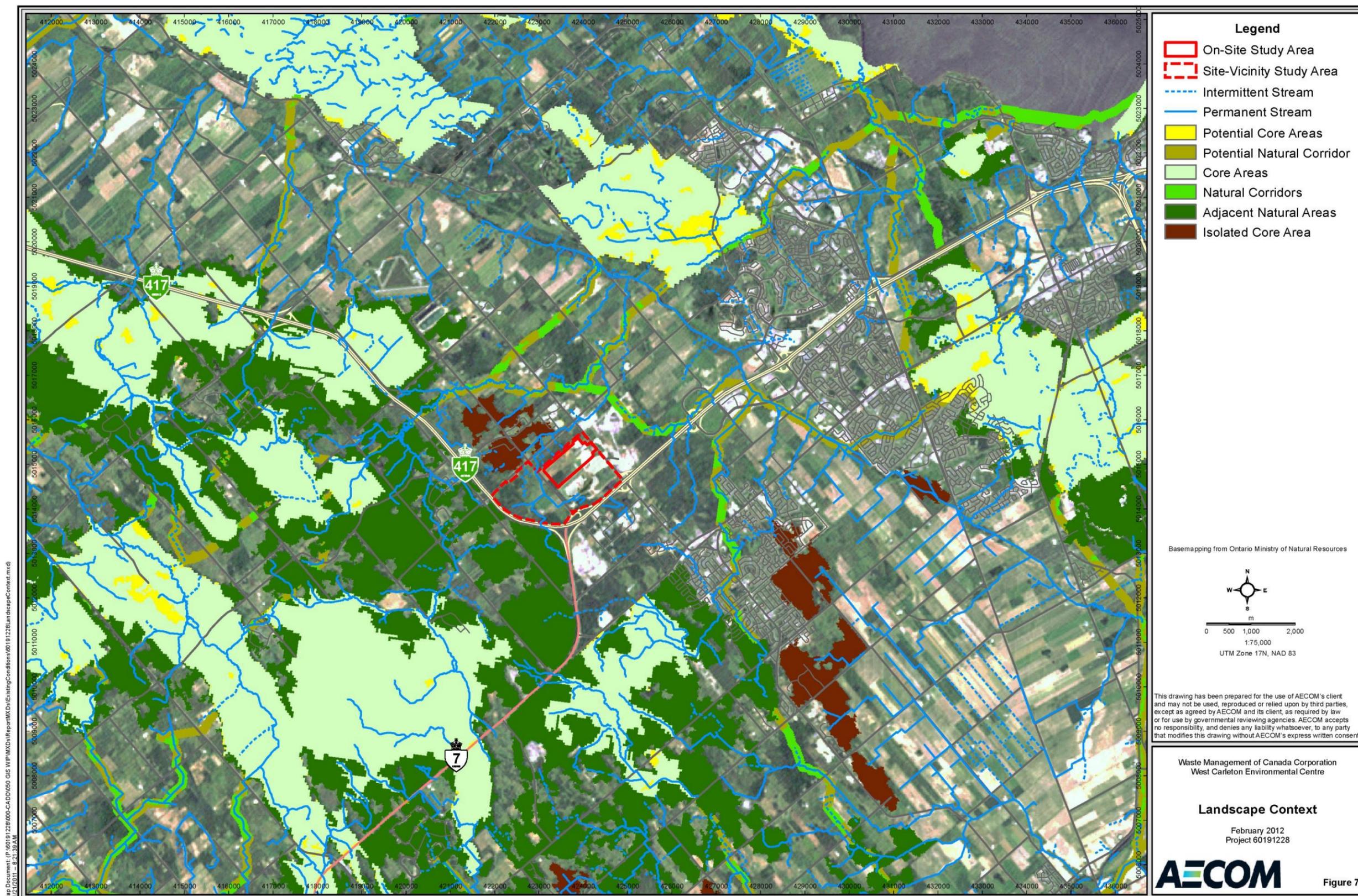


Figure 7. Landscape Context

Highway 417 to the south, forms a significant obstacle and cause of mortality for wildlife that attempt to cross. The highway bisects the Goulbourn PSW where there is a natural interface for about 1.5 km. Traffic is nearly continuous but some wildlife are likely able to move across particularly at night when traffic is less. Certainly the largest contiguous block of core forest and wetland habitat lies on the southwest side of Highway 417. The adjacent industrial area northeast of Carp Road effectively isolates the site to the east. There is a potential wildlife corridor along the north branch of Huntley Creek just to the north of Richardson Side Road. Forest cover remains, but is fragmented by residential development and a series of roads, but habitat linkage is fairly good in that direction.

## **5. Significance of the Environment Potentially Affected**

The significance of the existing environment that will be potentially affected by the preferred landfill footprint is evaluated in the context of the criteria identified in the Provincial Policy Statement (PPS).

### **5.1 Significant Habitat of Endangered and Threatened Species**

In the PPS “Endangered and Threatened” species are those species listed or categorized as an “Endangered Species” or “Threatened Species” on the OMNR provincial species at risk list.

#### **5.1.1 Butternut**

AECOM identified one such species, Butternut (Endangered), in the site vicinity but they are more than 500 m from the preferred landfill footprint. Three individual trees occur within the existing landfill site, near the north edge of the dry-fresh birch deciduous forest in the southeast corner. Four other individual trees occur in the forest block southwest of William Mooney Road (see **Figure 4**).

Among the other WCEC facilities listed in section 1.3, an organics processing plant is proposed on the south side of the existing landfill. The footprint would result in minimal amount of tree removal; however it would be situated close to three Butternuts that occur in the woodlot on the south side of it. It will be important to ensure that no grading or other disturbances occur within 30 m from the trunks of these trees.



Butternut occurs on a variety of sites; it is commonly found in riparian habitats, but is also found on rich, moist, well-drained loams, and well-drained gravels, especially those of limestone origin (COSEWIC 2003). Butternut is usually found as scattered individuals or in small groups in mixed hardwood stands or in fence lines and open fields in Ontario (COSEWIC 2003). Seeds are dispersed by gravity, water, squirrels and other small rodents (COSEWIC 2003).

Butternut was listed as 'Endangered' on the *Species At Risk Act* (SARA) in 2003. SARA is federal legislation and does not apply to this project; however, Butternut is also listed as 'Endangered' on the provincial *Endangered Species Act* (ESA). As such, it is afforded protection under the ESA.

### **5.1.2 Eastern Meadowlark and Barn Swallow**

Eastern Meadowlark and Barn Swallow have been recently listed as Threatened Species federally by COSEWIC (2011) and provincially by COSSARO (2011) because of long term declining trends in their populations. Consequently they are protected under the *Endangered Species Act*.

Barn Swallows most frequently nest on human-made structures such as buildings (especially barns) and bridges, and they forage widely over open habitats in their quest for aerial insects. A Barn Swallow nest was observed in an abandoned barn about 200 m from the preferred landfill footprint. The expansion is not anticipated to impact Barn Swallows using the barn.

There are no buildings on most of the expansion footprint that are potentially suitable for nesting Barn Swallows. The existing Laurysen Kitchens building is located on the extreme eastern edge of the preferred landfill footprint that is currently used for operations by another company. It was not specifically searched for presence of Barn Swallow nests as the species was not listed provincially at the time of field investigations and we did not have permission. It is unlikely that the building was used by nesting Barn Swallows since it is well maintained and there is a lot of human activity around it.

Eastern Meadowlark is an open country bird that nests in relatively extensive oldfields, meadows and hayfields which are dominated by grasses and forbs. It will use meadows with some shrub cover but does not inhabit thickets. Four occupied territories were noted during breeding bird surveys all southwest of William Mooney Road in the series of fields that are in the early stages of succession following abandonment of former farmland. The nearest territory was approximately 200 m from the edge of the preferred landfill footprint. If those fields are allowed to continue succeeding, they will likely form thickets in 10 years or so and then become unsuitable as Eastern Meadowlark habitat. The landfill expansion area consists of cultivated cropland that does not provide suitable habitat. Any field habitat that occurs is quite sparse and degraded or not extensive enough to support nesting Eastern Meadowlark.



## 5.2 Significant Wetlands

The Ontario Wetland Evaluation System was developed by the OMNR (1993). It was implemented in response to an increasing concern for the need to conserve wetland habitats in Ontario. The wetland evaluation system aims to evaluate the value or importance of a wetland based on a scoring system that takes into consideration four principal components - biological, social, hydrological, and special features. Based on scoring, a wetland can fall into one of two classes, Provincially Significant or Locally Significant. The Province of Ontario, under the PPS protects wetlands that rank as Provincially Significant. The PPS states that “*Development and site alteration shall not be permitted in significant wetlands*”.

Two units of the Provincially Significant Goulbourn Wetland have been mapped by OMNR in the core natural area in the west portion of the On-Site study area. The wetland area is much more extensive to the southwest on the other side of Highway 417. In the study area the wetland consists of deciduous swamp, thicket swamp and marsh surrounding a beaver flooded area. The ELC vegetation surveys indicated that contiguous wetland vegetation (mainly mixed and deciduous swamp) extends further to the north and west. This additional contiguous area should be treated as part of the PSW since OMNR requires that wetland boundaries be refined with field investigations when there is a development application.

OMNR typically identifies part of the wetlands using aerial photography without ground truthing, therefore boundaries need to be refined. Typically a 30 m natural buffer is applied to a PSW boundary and an Environmental Impact Study (EIS) is required where development is proposed within 120 m of a PSW to show that there will be no detrimental effects to the wetland function. The nearest area of potential PSW lies at least 400 m from the nearest point of the preferred landfill footprint. Consequently it is well beyond the 120 m limit that requires study to determine suitable buffers.

There are several non-regulated features in the northeast portion of the On-site study area which include an on-line wetland and its associated woodland edge and three off-line wetlands of non-natural origin located in the old aggregate pit to the north of the current Laurysen Kitchens property. These four wetlands lie at the centre of an amphibian breeding area (see **Section 4.2.4** for further detail).

The origin of this on-line wetland is not evident since there is no obvious surface water flow into the area. The wetland may simply result from a high water table in the area, or it may also rely on groundwater infiltration and discharge along the relict beach ridge directly to the east.



It should be noted that the Mississippi Valley Conservation Authority (MVCA) confirmed that this small pocket of wetlands are not included on any of their mapping schedules and are not regulated by the MVCA. Although not regulated, they may provide important functions in regard to recharge functions or habitat.<sup>2</sup>

### 5.3 Significant Woodlands

The Natural Heritage Reference Manual (OMNR 2010) provides a number of criteria for the identification and evaluation of significant woodlands. Under the *Planning Act*, the Province provides guidelines in identifying significant woodlands, but it is the responsibility of the planning authority (i.e., the local or regional municipality) to complete the identification, evaluation, and designation of these features.

The Ottawa Official Plan OPA 76 (2009) has identified Significant Woodlands in their jurisdiction based on meeting the following criteria: a contiguous woodland patches that contain mature woodlands greater than 80 years, forest interior greater than 100 m from an edge and are within 5 m of a water feature. Significant Woodlands in the study area are mapped in Annex 14 of the OP and are shown on **Figure 5**. Note that the Significant Woodland includes the forest block associated with the Goulbourn Wetland, the southern portion of the woodlots in the existing landfill, and the small woodlot adjacent to the north edge the preferred landfill footprint. According to the PPS the function of the significant woodland must be maintained.

The Carp River Watershed Plan (Robinson Consultants 2004), which includes the study area, also maps woodlands as part of Greenland strategy to protect watershed functions. Their designation is based on woodlands that are at least 50 years of age. The woodlands mapped are similar to the Significant Woodland of the OP but include the central woodlot in the landfill but not the woodlot on the immediate north side of the preferred landfill footprint.

The Carp River Watershed Plan recognises the Goulbourn PSW and immediately adjacent forest land as a “Category 1” area and therefore recommend that it should receive a high level of protection.

### 5.4 Significant Valleylands

Valleylands perform important ecological functions (e.g., diverse habitats in valleylands due to microclimate variations) as well as impart cultural importance.

No significant valleylands were identified in the study area.

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2. Letter from Matt Craig, Manager Planning and Regulatory Services, submitted to AECOM as part of the Terms of Reference Work Plan review, dated June 14, 2010.



## 5.5 Significant Wildlife Habitat

Significant Wildlife Habitat (SWH) is covered in Section 2.3.1 of the Natural Heritage Policies of the PPS. The four principle components are identified and described in the Significant Wildlife Habitat Technical Guide (OMNR 2000). These are:

- a) Seasonal Concentrations of Animals;
- b) Animal Movement Corridors;
- c) Rare Vegetation Communities or Specialized Habitats; and
- d) Habitat of Species of Conservation Concern.

A summary of SWH components represented on the property is shown in **Table 2** below.

**Table 2. Summary of Significant Wildlife Habitat in Study Area**

SWH Component	Location in Study Area	Type	Meets SWH Criteria?
<b>Seasonal Concentrations of Animals</b>	On Site	Bank Swallow Colony; Deer Wintering Habitat	Yes No
<b>Animal Movement Corridors</b>	On-Site, Site-Vicinity, Regional	Huntley Creek	No
<b>Rare Vegetation Communities or Specialized Habitats</b>	On-Site and Site-Vicinity	Amphibian Breeding Ponds; Area-Sensitive Birds;	Yes No
<b>Habitat of Species of Conservation Concern</b>	None found	None found	None

The following sections provide an assessment of existing conditions against the four component parts of Significant Wildlife Habitat under the PPS (OMNR, 1999). Note that “Habitat of Species of Conservation Concern” does not include Threatened or Endangered Species.

### 5.5.1 Seasonal Concentrations of Animals

Some species of animals gather together from geographically wide areas at certain times of year. This could be to hibernate or to bask (e.g., some reptiles), over-winter (e.g., deer yards) or to breed (e.g., colonial birds). Maintenance of the habitat features that result in these concentrations can be critical to sustaining local or sometimes even regional populations of wildlife.



Approximately 100 Bank Swallow holes were observed on a steep exposed earthen bank within the existing landfill property, and the south edge of the preferred landfill footprint. Bank Swallow is a colonial nesting species. The location is important since there are a large number of breeding individuals that will forage over a large distance away from the site and therefore it is a concentration. The birds are dependent on an earthen cliff face that is steep and high enough to prevent access by predators, yet subject to an optimal level of erosion that maintains a face, but not so rapid as to erode out nests. A colony of Bank Swallows of this size would likely qualify as Significant Wildlife Habitat (OMNR 2000).

In December 2006 a small group of White-tailed Deer was observed in the northwest woods. The conifer trees in this section of the site likely provide good wintering habitat for a small number of deer due to the shelter provided by the trees. There is much more extensive conifer forest west of Highway 417 which would make better habitat. None of the study area has been mapped as a deer wintering area by OMNR and therefore it is not regarded as significant.

### **5.5.2 Animal Movement Corridors**

Landscape connectivity (often referred to as “wildlife corridors”) has become recognized as an important part of natural heritage planning and a wide range of benefits have been attributed to the maintenance or re-connection of the natural landscape. In essence, corridors allow animals to move between areas of high habitat importance. Examples of corridors include wooded areas connecting forest patches, river valleys, streams and shorelines. Conservation of distinct habitat types to protect species is not effective unless the corridors between them are also protected.

Through air photo interpretation, a review of potential linkages among the on-site, site vicinity and regional study areas and other adjacent core areas was assessed. These linkages would be the routes that have the best opportunity for wildlife movement and dispersal of vegetation.

Within the preferred landfill footprint there is undoubtedly some movement of wildlife between the woodlot associated with the existing landfill and the woodlot north of the preferred landfill footprint. However this is no corridor of connecting vegetation since active cropland occurs between the two wooded areas. Therefore this corridor would not constitute significant wildlife habitat for animal movement corridors. Furthermore, the preferred landfill footprint will not prevent wildlife from moving between the woodlots that will remain on the north and south sides of it. Wildlife will still be able to move on the west side of it.



### 5.5.3 Rare Vegetation Communities or Specialized Habitats

Rare vegetation communities apply to the maintenance of biodiversity and of rare plant communities (rather than individual rare species). Specialized habitat conditions can include woodlands supporting amphibian breeding ponds or woodlands supporting interior-sensitive birds.

Within the study area there are no rare vegetation communities; however, there are two types of specialized habitats: amphibian breeding ponds and woodlands/grasslands supporting area-sensitive birds.

The area on the north side of the existing landfill and within the preferred landfill footprint contains several permanent ponds, and intermittent ponds that are used by breeding amphibians. Only the Green Frog (*Rana clamitans*) and, to a lesser extent Northern Leopard Frog (*Rana pipiens*), remain in the permanent ponds through the summer. Other species breed in the ponds but spend most of the active season in the adjacent woodlands or old field habitat. Therefore the proximity to ponds and woodlands is important to maintain functional amphibian habitat.

The forested and grassland habitats in the site vicinity support eleven species of area sensitive breeding birds as recognized by OMNR (2000). The approximate locations of the area sensitive species are all shown on **Figure 5**. Three species of forest area sensitive birds were recorded in the landfill expansion area. Since some area sensitive breeding birds are present in nearly every woodlot that is greater than a few hectares and since much more extensive forest tracts are present in Ottawa, we do not believe that the site qualifies as SWH under this criterion. The larger forest areas on the south side of the existing landfill and southwest of William Mooney Road are more extensive and support more area sensitive species but still are not significant in the regional context.

### 5.5.4 Habitats of Species of Conservation Concern

This category is quite complex and includes species that may be locally rare or in decline, but that have not reached the level of rarity that is normally associated with Endangered or Threatened designations. The Significant Wildlife Habitat Technical Guide (OMNR, 2000) suggests that the highest priority for protection be provided to habitats of the rarest species (on a scale of global through to local municipality); and that habitats that support large populations of a species of concern should be considered significant. Apart from the Endangered and Threatened species already discussed in Section 5.1, none of the other species were identified as regionally or locally significant.



## 5.6 Significant Areas of Natural and Scientific Interest

MNR identifies two types of ANSIs (life science and earth science) on the basis of scientific surveys. Because these identified ANSIs are a critical complement to provincial parks and conservation reserves, such ANSIs represent important natural features that are not found in protected areas. No significant ANSIs were identified in the study area.

## 5.7 Fish Habitat

The protection of fish and fish habitat is a federal responsibility and is administered by Fisheries and Oceans Canada (DFO). In Ontario, under the federal *Fisheries Act*, federal and provincial governments and other agencies (e.g., conservation authorities) collaborate in the review of projects that may affect fish and fish habitat. PPS policy and definitions for fish and fish habitat require that the federal *Fisheries Act* and provincial requirements serve as the basis for protection of fish and fish habitat.

No fish habitat was identified in the study area.

## 5.8 Significant Features Summary

The only features that were identified following the criteria of the Provincial Policy Statement are Significant Woodlands for the woodlot on the north side of the preferred landfill footprint, and Significant Wildlife Habitat in the form of the nesting Bank Swallow colony and the wetlands that provide amphibian breeding habitat. Habitat for Threatened species occurs nearby, but not within the preferred landfill footprint. OMNR should be contacted during Detail Design because of the presence of the two Threatened Species in close proximity to the preferred landfill footprint to determine whether additional investigations or permits are warranted.

# 6. Impacts on the Terrestrial Environment

The significance of the existing environment that will be potentially affected by the preferred landfill footprint is evaluated in the context of the criteria identified in the PPS.

As noted in the Alternative Methods Report (AECOM 2011) there are no permanent or intermittent streams within the preferred footprint. As such, there are no predicted changes in water quality, aquatic habitat or aquatic biota. The nearest fish habitat is seasonal habitat associated with an intermittent agricultural channel (Tributary C) located approximately 250 m



away from the preferred landfill location on the west side of William Mooney Drive. Consequently, the following discussion of potential effects pertains to the terrestrial environment.

## **6.1 Significant Habitat of Endangered and Threatened Species**

None of the Endangered or Threatened species occur within the immediate area of the preferred landfill footprint. The Butternuts are more than 500 m from the Preferred Alternative Landfill Footprint. They are sufficiently well removed from any of the activities involved with the expansion that there are not anticipated to be any impacts and no additional mitigations are required.

### **6.1.1 Eastern Meadowlark and Barn Swallow**

The nearest territory of Eastern Meadowlark was approximately 200 m from the edge of the preferred landfill footprint and on the opposite side of William Mooney Road. There is not likely much movement of the birds across the road. It is possible that increased traffic may cause a greater avoidance of the roadside. The most important consideration for maintaining the birds is that the fairly extensive block of old field habitat remains.

The abandoned barn used by nesting Barn Swallows is about 200 m from the preferred landfill footprint and also on the opposite side of William Mooney Road. The expansion is not anticipated to impact Barn Swallows using the barn or foraging activities of the birds, consequently there are no anticipated impacts and no mitigation is required.

As long as the breeding habitat of the Threatened species lie more than 120 m from any proposed developments or land alteration there are no issues. If nesting habitat is located on-site or within 120 m OMNR Species at Risk Biologist should be contacted and informed to provide direction. Both species are so newly listed, and at the same time so widespread that OMNR has not determined how they will deal with them.

## **6.2 Significant Wetlands**

The nearest area that is potentially part of the Provincially Significant Goulbourn Wetland lies at least 400 m from the nearest point of the preferred landfill footprint. Consequently it is well beyond the 120 m limit that requires a study to determine suitable buffers. It is also a sufficient distance that no impacts to the functions and features of the wetland are anticipated. No mitigation or special precautions are required.



## 6.3 Significant Woodlands

The small woodlot adjacent to the north edge the preferred landfill has been identified as Significant Woodland in the Ottawa Official Plan OPA 76 (2009). This woodlot lies within approximately 5 m from the proposed perimeter access road, and approximately 20 m from the edge of the landfill. The woodlot will be maintained in its entirety but the access road is so close that some minimal tree cutting may be required. In addition there may be an increase in edge effects from the nearness to the overall landfill. There also may be some changes in surface drainage. Most of the woodlot is actually a Green Ash swamp but the fringe area is early successional poplar woodland and therefore it is young and fairly resilient to edge effects because of its age and species composition.

Among the other WCEC facilities listed in section 1.3, a proposed greenhouse would result in the removal of 3.25 ha of maple-ash-poplar mineral deciduous swamp (SWD3a on Figure 5), that is part of the designated Significant Woodland on the south side of the existing landfill. Although wetland, it is not part of the Goulbourn PSW. The greenhouse footprint would reduce that total woodlot by about one third from approximately 9.5 ha to 5.92 ha.

## 6.4 Significant Wildlife Habitat

### 6.4.1 Seasonal Concentrations of Animals

The Bank Swallow nesting colony is considered Significant Wildlife Habitat and the function should be maintained. The colony is situated on an active earthen cliff face between the existing landfill and preferred landfill footprint. The colony has some resilience to human presence since it was functioning near where heavy equipment was operating at least occasionally. However a stormwater pond, the main landfill access road and public garbage drop-off are all proposed very close the location, therefore there will be more intensive human activity. Grading of the face is required with the current plan. Even if the cliff face remained intact, it is unlikely that the colony would tolerate the noise, dust, and vibration from construction, and trucks hauling garbage, and the birds would likely abandon the site. The Bank Swallows would need to relocate to another similar feature, and WM will explore potential locations on owned or optioned property nearby.

### 6.4.2 Rare Vegetation Communities or Specialized Habitats

Within the study area there are no rare vegetation communities; however, there are the presence of specialized habitats in the form of amphibian breeding ponds on the preferred landfill footprint. In total 3.99 ha of wetland habitat that supports in total, five species of



breeding amphibians will be removed consisting of a combination of cattail shallow marsh and open water aquatic (pond). There are other wetlands in the vicinity where all of the amphibians are breeding (including on the south side of the existing landfill, the swamp woodlot immediately on the north side of the preferred landfill footprint and in the Goulbourn PSW southwest of William Mooney Road). Consequently the overall function of amphibian breeding will remain. However the loss of this area of breeding habitat is likely to result in the reduction of the amphibian population in the immediate site vicinity.

The amphibian breeding areas to be removed are either the direct result of, or have been altered by, human land use activities. The wetlands consist of marsh and open water pond in an early successional stage that contain low botanical diversity. As a result they are relatively easy to recreate, as a means of maintaining the function buy shifting the location instead of eliminating it.

## **7. Effects and Mitigation**

Identified potential effects and recommended mitigation or compensation measures associated with the Preferred Alternative Landfill Footprint were reviewed to ensure their accuracy in the context of the preliminary design of the Preferred Alternative Landfill Footprint, based on the more detailed understanding of the Aquatic and Terrestrial environment developed through the additional investigations. With this in mind, the confirmed potential effects, mitigation or compensation measures, and net effects are described in further detail in the sections below.

### **7.1 Potential Effects on Natural Environment**

#### **7.1.1 Construction Effects**

This section outlines the project-related impacts on vegetation and wildlife based on typical construction works.

##### **7.1.1.1 Vegetation**

Vegetation clearing (and associated habitat removal) required to accommodate the landfill and all associated facilities is the primary direct effect related to construction. The direct removal of forest vegetation often has the secondary effect of creating new forest edges that expose the retained vegetation to the effects of increased light, noise, wind, sun and salt spray. While the creation of the edge is a direct construction effect, the edge effects that influence the retained vegetation are considered indirect effects that will occur following construction. The edge



effects would apply to the woodlot on the south side of the preferred landfill footprint that will be partially removed, as well as the woodlot on the north side where the perimeter access road will be within 5 m of the feature.

In addition to the effects described above, the construction of the landfill may result in the following adverse effects:

- Vegetation clearing/damage beyond the working area.
- Release of construction-generated sediment to adjacent vegetation areas.
- Spills of contaminants, fuels and other materials that may reach natural areas.

While these are noted as possible adverse effects that may occur during construction, they can largely be avoided and/or mitigated through the standard mitigation measures outlined below. The vegetation clearing required to accommodate the landfill footprint is a permanent vegetation removal.

#### **7.1.1.2 Wildlife**

Construction can have a number of direct effects on wildlife. For example, construction may displace individual species and/or their habitat, or obstruct their movement. These construction effects can have secondary effects by fragmenting habitat and isolating populations.

Direct construction effects are generally associated with:

1. habitat loss or modification;
2. wildlife injury or mortality; and
3. effects on animal movement.

#### **1. Habitat Loss or Modification**

Loss of wildlife habitat may result in loss of species, fragmentation of habitat and of wildlife populations, reduction of wildlife habitat quality, and loss of active nests of migratory birds, by:

- removal of vegetation or features used for shelter, feeding and/or breeding; and/or
- physical destruction and/or severing of habitat areas.

Construction of the landfill will result in the direct removal of some terrestrial forest, field and wetland vegetation and therefore displace the wildlife that live in those habitats.



## **2. Wildlife Mortality or Injury**

Construction typically involves the clearing of existing vegetation and the removal of overburden (grubbing). All activities require the operation of heavy machinery. These activities have some potential for wildlife injury or mortality within the construction zone.

Wildlife species vary in their vulnerability to construction-related mortality. Three factors largely determine the potential for wildlife to be affected:

- wildlife sensitivity to human disturbance;
- wildlife ability evade or avoid disturbance; and/or
- the timing of construction activities.

Species that are sensitive to disturbance and are capable of departing areas of increased human activity (i.e., most mammals and birds) are less likely to be affected by construction. Species that avoid humans through mechanisms other than flight and/or move too slowly to flee disturbance (such as small mammals and amphibians) are at greater risk from construction activity.

Timing also determines the vulnerability of wildlife to construction-related mortality. The greatest potential for adverse effects is during the spring and summer, when migratory birds are present in the Study Area, when most species (particularly mammals and birds) are rearing young in nests, burrows or dens, and when all species are most active, thus increasing their potential to enter into the construction zone.

Wildlife vulnerability to construction is reduced during the fall and winter because migratory birds have left the Study Area, young-of-the-year have dispersed from nests, burrows and dens, and remaining species are generally less active and thus less likely to move into the construction zone.

## **3. Effects on Animal Movement**

Terrestrial wildlife species will vary in their response to crossing the construction zone. Most tolerant species will continue to cross, but will likely adapt their movements to non-construction periods. Less mobile species may be deterred at some locations, and may seek other routes. Adjustments and changes can be anticipated during the construction period.



## **7.1.2 Operation and Maintenance Effects**

### **7.1.2.1 Vegetation**

The operation and maintenance of the landfill may also result in secondary effects to the adjacent vegetation features that are retained. The potential secondary effects to wetland, forest and other adjacent vegetation that may occur during the operation and maintenance of the landfill are outlined below:

- Spills of contaminants, fuels and other materials that may reach natural areas;
- Damage from excessive or improper application of herbicides and pesticides for vegetation management requirements;
- Damage to adjacent natural vegetation from roadway maintenance activities such as salting and sanding, structure/culvert repairs, etc.;
- Increased light, noise, wind and sun exposure within the newly created edges of adjacent forest communities. These effects often lead to vegetation dieback, changes in the ground flora composition, windthrow, and/or spread of invasive species;

These potential effects to vegetation and habitat features resulting from the operation and maintenance of the landfill can be managed through implementation of standard and site-specific mitigation measures, as outlined in Section 7.2 below. However, some of these effects may be unavoidable and can only be partially mitigated (e.g., loss of vegetation vigour).

### **7.1.2.2 Wildlife**

Operational and maintenance activities could result in secondary effects to wildlife including: mortality when wildlife moves from adjacent habitats into active areas. Noise, vibration, lighting and human presence may cause some wildlife to avoid immediately adjacent habitats.

## **7.2 Standard Mitigation to Minimize Impacts**

### **7.2.1 Mitigation During Planning and Design**

During the landfill alternatives evaluation stage, the focus of the terrestrial ecosystems work was to ensure that terrestrial features (particularly significant and sensitive) were comprehensively identified and integrated during the development and evaluation of alternatives to select the recommended design. The terrestrial ecosystem-related objective was to ensure that alternatives avoided or minimized impacts to terrestrial features, and particularly sensitive and



high quality features, to the extent possible while still meeting the technical planning design objectives and requirements. As an example of this, the preferred Landfill Option was selected to avoid intrusion into provincially significant wetlands (PSWs), which are the larger and more extensive habitat blocks.

Where impacts to terrestrial ecosystem features cannot be avoided through planning or design, additional mitigation measures applied during construction and operation/maintenance are applied to further minimize negative effects. In situations where appropriate mitigation measures are not available, or significant net adverse effects will remain following the application of mitigation, compensation may be applied to offset the negative effect through replacement of the feature/function elsewhere. Preliminary concepts for compensation may be focused on lands that are (or will be) under public ownership.

## **7.2.2 Construction Mitigation**

During construction, environmental protection and mitigation involves: implementation of standard construction practices; conformance with commitments made during the environmental assessment process; and recognition of additional control measures that may be identified through good construction environmental practice.

This chapter outlines a suite of mitigation measures that are recommended for incorporation in the subsequent design phases and future contract documents. These mitigation measures range from Best Management Practices (BMPs) to site specific strategies, which may be superseded by refined measures or techniques as time passes. Current measures and Best Management Practices available at the time of construction should be implemented.

These measures are provided at this stage to reflect the expectation of the types of mitigation measures that should be incorporated to reduce the residual effects across the Study Area.

### **1. Clearing and Grubbing**

Mitigation measures will be applied during clearing and grubbing activities to minimize removal of native vegetation; minimize impact to retained features, maintain water balance and avoid native soil disturbance. Examples of measures that should be applied where applicable include:

- a) Vegetated areas bordering the working area will be protected with temporary tree protection and sediment fencing as determined in the final grading plan. Equipment, storage of materials, and other construction activities will not be



- permitted in these zones. Consideration should be given to ensuring fencing does not create a wildlife movement barrier;
- b) Tree removal will be restricted to the working area. Vegetation removals associated with clearing, site access and staging will occur outside the key breeding bird period identified by Environment Canada for migratory birds (typically April 21 to July 31 for this area) to ensure compliance with the *Migratory Birds Convention Act, 1994* (MBCA) and Migratory Bird Regulations (MBR);
  - c) If works must be conducted during the breeding bird season, a nest survey will need to be conducted by a qualified avian biologist prior to commencement of works to identify and locate active nests of species covered by the MBCA. This will include the development of a mitigation plan to address any potential impacts on migratory birds and their active nests;
  - d) Tree grubbing will be restricted to the required construction activity zone. Where possible, tree stumps will be cut flush to the ground and grubbing avoided to minimize soil disturbance, particularly in erosion prone areas;
  - e) Trees will be felled in a manner that avoids damaging other standing vegetation and trees will be felled away from any watercourse where it is safe to do so;
  - f) Cut and grubbed material will be disposed of through chipping. Where possible, cut material may be piled and re-used for wildlife habitat. Wood chip material may also be used in the edge plantings (at the identified edge management and landscape areas). This material will help retain soil moisture, promote colonization of native species and prevent weed spread;
  - g) Forest topsoil that can be re-spread within 6 months of initial storage will be used wherever practical and feasible at forest edge planting sites and stormwater management facility margins. This will be a practical measure to re-cycle substrates, maintain soil moisture, and provide a good growing medium for plantings;
  - h) After clearing, the edges of the cleared area shall be checked and any trees damaged will be repaired or removed. An arborist is to inspect damage to trees; and
  - i) Adhere to permits, acts, guidelines: Permit to Burn (if required), *Migratory Birds Convention Act and Regulations*.



## 2. Sediment and Erosion Control

Mitigation measures will be used for erosion and sediment control to prohibit sediment from entering adjacent water bodies, wetlands and forested areas. The primary principles associated with erosion and sediment control (ESC) protection measures are to a) minimize soil mobilization; b) minimize the duration of soil exposure; c) retain existing vegetation where feasible; d) keep runoff velocities low; and, e) trap sediment as close to the source as possible.

It is recommended that ESC measures developed during subsequent design phases follow the most current standard industry practices available. For example, the *Greater Golden Horseshoe Area Conservation Authorities' Erosion and Sediment Inspection Guide* (2008) provides comprehensive direction for selection, deployment and inspection of ESC techniques. The following list summarizes the basic principles and performance guidelines that will be employed during the development of detailed design and contract documents and drawings.

- a) Erosion and sediment control measures will be installed prior to construction and maintained within their effective limits throughout the construction and until the restoration of disturbed vegetation, rock revetments or similar are successfully completed;
- b) Erosion and sediment control structures will be designed, installed, maintained, and removed according to *Ontario Guidelines on Erosion and Sediment Control for Urban Construction Sites* (1987);
- c) Earth stockpiles shall be enclosed with appropriate sediment and erosion control fencing;
- d) Runoff from material stockpiles or site de-watering will be filtered through an appropriate device (temporary settling facility, filter bag, etc.) before release;
- e) Sediment control structures will be regularly inspected, and checked after storms and repaired as required. The structures will be cleaned out when accumulated sediment reaches half the design height;
- f) Re-stabilize and re-vegetate exposed surfaces as soon as possible, using native vegetation seed mixes and plantings or other appropriate cover, in consultation with agencies, and;
- g) Adhere to permits, acts, guidelines: *Ontario Water Resources Act* and *Federal Fisheries Act*.



### **3. Grading**

Mitigation measures will be used during grading to minimize the overall grading footprint and keep gradients low. The primary principles associated with grading mitigation measures are similar to those described above for clearing/grubbing and sediment and erosion control.

- a) The design completed in subsequent design phases will ensure that drainage from any unstabilized surface is captured and adequately filtered prior to discharge to natural areas, including receiving drainage features;
- b) Erosion and sediment control measures will be designed and then installed on site prior to any grading;
- c) In dust sensitive areas, dust suppression methods (water, calcium chloride or other as appropriate) will be used as required to control off-site migration of particulates; and
- d) Adhere to permits, acts, guidelines: Dust suppressant license required from MOE for use of registered dust suppressants other than water.

### **4. Equipment Maintenance and Materials Management and Disposal**

Mitigation measures will be used during equipment maintenance activities and material management to avoid release of chemicals and other materials from construction equipment and construction areas into natural areas and watercourses. These include:

- a) Refuelling will not be permitted within 30 m of any woodland, wetland or watercourse, or the top of bank areas; and
- b) Adhere to permits, acts guidelines: Fuels and hazardous materials shall be stored and handled in compliance with Ontario Regulation 347 of the EPA, the Gasoline Handling Act, Ministry of Consumer and Commercial Relations.

#### **7.2.3 Site Specific Mitigation and Enhancement**

As noted under the standard mitigation measures, the following mitigation measures are recommended for incorporation during subsequent design phase and future contract documents. These measures may be superseded by refined measures or techniques. The most current measures and BMPs available at the time of construction should be implemented. These measures are provided at this stage to reflect our expectation of the types of mitigation measures that should be incorporated to reduce the net effects.



### **7.2.3.1 Edge Management Strategies**

Edge management measures will be implemented to protect newly created forest edges where the adjacent retained habitat is large enough to warrant this measure. These measures will mitigate effects of increased sun, wind and change in humidity and shade at new vegetation edge. Measures will include retaining a narrow zone where no root grubbing will occur (in order to stimulate suckering of cut trees), removing hazard trees and installing edge plantings using appropriate native species. The final edge management design will be reviewed with appropriate agency staff (e.g., OMNR) during subsequent design phases and will be finalized at that time when grading limits are identified in the field.

Key edge management principles that will be developed further during subsequent design phases are as follows:

1. Temporary vegetation protection fencing will be installed at the edge of the clearing limits where the edge of a forest community is removed. This fencing will delineate the clearing limits and prevent further intrusion into the adjacent forested habitat;
2. Tree removal will be restricted to the working area. Wherever possible, vegetation will be retained in areas not requiring grading or other works. Grading requirements will be reviewed during subsequent design phases to facilitate that objective;
3. Trees along the newly created edge will be flush cut (not grubbed) to stimulate suckering regeneration;
4. Wood chip material will be applied in the edge plantings (at the identified edge management areas) that will be developed during subsequent design phases. This material will help retain soil moisture and prevent weed spread;
5. Hazard tree management will be undertaken along the new edge as required;
6. Buffer plantings will be installed to help increase shade and reduce wind in retained vegetation, and;
7. Pre-stressing of forest edges in selected areas should be implemented if the construction schedule allows it (i.e., at least two years advance of when new forest edge is required). Pre-stressing involves advanced thinning of the future forest edge, prior to construction, to promote dense young shrub and tree growth in the understorey. This dense growth will help buffer the retained vegetation from the edge effects.



### **7.2.3.2 Bank Swallow Nesting Habitat**

Since the earthen cliff currently used by nesting Bank Swallows cannot be retained, a suitable habitat should be created. First it would be useful to determine if other suitable sites exist within about 2 km of the colony, and failing that a plan should be prepared to create a suitable earthen bank. Either ground could be excavated to form a bank or a pile of soil or sand can be imported and formed to provide a steep face. The artificial nesting site should be created before the existing site is graded. If removed, the cliff face needs to be excavated outside of the breeding season (late April to late July) when no nesting birds are present. Active bird nests are protected under the Migratory Birds Convention Act.

### **7.2.4 Operation and Maintenance Mitigation**

Many of the mitigation measures outlined in the previous sections will also work towards minimizing the Operation and Maintenance effects. For example, edge management measures and buffer plantings will reduce the effects to the retained adjacent habitats caused by the operation and maintenance of the landfill.

### **7.2.5 Compensation Measures**

#### **7.2.5.1 Habitat Restoration/Creation/Enhancement**

The landfill will result in the permanent removal of approximately 21.31 ha of natural vegetation communities comprised of meadow (11.40 ha), forest (5.92 ha), and wetland (3.99 ha).

The opportunity to offset vegetation removals through restoration/creation and/or enhancement has been identified by the Project Team during the preparation of the EA and opportunities will continue to be explored by WM and plans developed, as appropriate and feasible, in subsequent design phases.

The term *restoration* refers to the return of habitat to a former condition (for systems that have been altered), for example, restoration of a wetland by dismantling agricultural tile drainage systems and returning hydrology, vegetation community and habitat to approximate original wetland conditions.

The term *creation* refers to establishment of a new habitat condition where it did not previously exist.

The term *enhancement* refers to activities intended to rehabilitate or improve an existing and degraded system where specific functions and/or values are enhanced beyond the existing



condition. Enhancement may involve providing additional plantings within or adjacent to existing habitat to enhance the overall quality of the feature. However, enhancement may also be achieved through other means such as invasive vegetation species management and removal.

Once the EA is approved and WM completes the property acquisition process, surplus portions of other properties will be identified /confirmed. These parcels will then be reviewed by the Project Team, including ecologists and landscape architects, to further identify/refine locations/opportunities that are feasible and economically practical for mitigating/offsetting the removal of forest/wetland vegetation within the Study Area. These opportunities would be reviewed and plans developed in consultation with OMNR and MVCA.

In some cases, agencies have identified other lands (public lands elsewhere in the watershed) that may be ideal candidates for focused restoration/enhancement effort. WM will also continue to explore opportunities on properties managed/owned by OMNR, the City of Ottawa and MVCA. Confirmation of these opportunities and detailed plans should be developed in consultation with the agencies during subsequent design phases.

Given the confidential and sensitive nature of advanced willing seller/willing buyer negotiations and future property acquisition by WM (once the EA is approved), and recognizing that there are other land interests and pressures (e.g., agricultural production or urban development), there is a high level of uncertainty about 'how much' land could be allocated to habitat restoration/ creation/ enhancement. However, the Project Team has identified 'suggested' areas for potential future consideration and this will form the basis of developing restoration/ creation/ enhancement plans during subsequent design phases.

Based on this preliminary analysis, the Project Team has determined that it should be possible to partially offset permanent natural meadow, forest and wetland vegetation removals/habitat loss.

It should be noted however, this ratio does not necessarily imply "like for like" replacement. Restoration/creation/enhancement are tools by which removal of forest/wetland vegetation /habitat may be offset, although in many cases over a period of many years to account for vegetation establishment and maturation. Re-creating biologically complex forests and wetlands is not realistically feasible. However, habitat creation can embody a number of design principles targeted at initiating forest (or other habitat) development through a combination of terrain preparation, nodal plantings, seedbank salvage, natural seeding from nearby sources, quick cover initiation, and protection from herbivores. In addition, restoration, creation or enhancement at a new site can restore or create new functions and values which are equal to or exceed, overall, those at the original site. However, this does not mean that the original landscape functions are replaced at the new site.



Guiding principles that will be used in the selection and planning of restoration/enhancement candidate sites will include the following, recognizing that these will continue to evolve through subsequent design phases, in consultation with the agencies:

- Proximity to or continuity with designated natural features including PSWs, ESAs, and municipally designated land uses such as Greenlands and Environmental Protection Areas;
- Proximity to or continuity with Conservation Areas and Provincial Parks;
- Proximity to or continuity with existing and targeted natural heritage systems as applicable;
- Consistency with the goals/recommendations and management targets identified in the various Fisheries Management Plans and Watershed Plans. These can be discussed and prioritized in consultation with the agencies;
- Restoration/enhancement plans should be developed with consideration of appropriate goals for each site. Some examples include:
  - ▶ riparian tree and shrub plantings to enhance fish habitat conditions;
  - ▶ increasing the vegetated width of valleys (including adjacent tablelands);
  - ▶ adding vegetated areas between valleys and other natural areas, and improving wildlife movement corridors;
  - ▶ creation of ponded wetlands that are suitable for amphibian breeding
  - ▶ increasing forest size and interior forest potential by planting adjacent lands or gaps with compatible species; and
  - ▶ improving existing habitat quality through invasive species management.
- Including one or more vegetation community types in a restoration plan may be encouraged at certain locations to complement the variety of site conditions (including drainage conditions) present and to create more diversity in habitat;
- Restoration 'modes' will be discussed with the agencies to determine the most practical and appropriate techniques to be applied at each site (or portions thereof). For example, criteria may be developed and applied to determine what sites will be passively restored (natural succession) or actively restored (plantings and managed succession), and where combinations of these approaches are warranted.

In conclusion, WM has committed to a restoration/creation/enhancement strategy to offset removals of natural forest and wetland in the landfill footprint that will be developed co-operatively with applicable agencies through detail design, and implemented through the construction phase.



### 7.2.5.2 Compensation and Restoration Concepts

A commitment to prepare a Compensation and Restoration Plan is provided in Section 9.2 below. Two conceptual compensation/restoration options were developed by the Project Team during preparation of the EA. Each scenario offers advantages and disadvantages; therefore the ultimate development of a Compensation and Restoration Plan will require careful analysis of available land resources, achievability of compensation/restoration goals and financial/management considerations. Conceptual compensation options are summarized in **Table 3** below.

**Table 3. Conceptual Compensation and Restoration Options**

<b>On-Site: Conceptual Option #1</b>	<b>Off-site: Conceptual Option #2 (west of William Mooney Road)</b>
<ul style="list-style-type: none"> <li>• Restorable area relatively small and constrained by landfill and private property;</li> <li>• Poor to moderate opportunity to integrate restoration goals with existing natural features and other project goals;</li> <li>• Post-construction monitoring required (5 years minimum);</li> <li>• Lower land acquisition costs;</li> <li>• Moderate potential for land use changes or resource management on adjacent properties to negatively affect restoration;</li> </ul>	<ul style="list-style-type: none"> <li>• Restorable area larger but still constrained by private property;</li> <li>• Good opportunity to integrate restoration with existing natural features and land uses as well as achieve other project goals (visual screening);</li> <li>• Post-construction monitoring required (5 years minimum);</li> <li>• Higher land acquisition costs;</li> <li>• Moderate potential for land use changes or resource management on adjacent properties to negatively affect restoration;</li> <li>• Some restoration techniques require long-term maintenance (i.e., biannual mowing of grasslands)</li> </ul>

The following considerations should be incorporated into the development of the Compensation and Restoration Plan:

- Clearly identify in the Compensation and Restoration Plan: Goals and Objectives, Restoration Strategy and Plan, Management Strategy, and Monitoring Program;
- Prepare a Compensation and Restoration Plan to at least partially offset permanent forest, wetland and meadow vegetation removals/habitat loss as adjacent lands are secured during the subsequent design phases. The plan will be prepared in consultation and agreement with OMNR and MVCA;



- Develop buffers to address areas disturbed/affected during construction and/or operations and maintenance;
- Identify opportunities to strengthen existing hedgerows, enhance existing riparian corridors, create amphibian breeding habitat, re-create forest habitat, re-create Bank Swallow colony habitat, create woodland linkages, maintain/manage existing grassland habitat for area-sensitive birds;
- Identify opportunities to improve or create vegetated riparian corridors which could include installing cattle exclusion fencing;
- Identify a suite of target species with a variety of habitat requirements to measure restoration success of restored forests, wetlands, and meadows. Candidate species could include: Eastern Meadowlark, Green Frog, Northern Leopard Frog and Baltimore Butterfly; and,
- Identify opportunities to install buffer plantings between the landfill and adjacent natural areas.

## 7.3 Net Effects

### 7.3.1 Vegetation

A total of 21.31 ha of vegetation (forest, meadow and wetland) will be permanently removed as a result of landfill construction. A summary of vegetation removed by the landfill is provided in **Table 4** below. Vegetation removals are reported by Ecological Land Classification community type.

**Table 4. Summary of Vegetation Removals**

ELC Community Type	Total Vegetation Removed
<b>Forest</b> (FOC, FOD, FOM, CUP, CUW)	<b>5.92 ha</b>
<b>Wetland</b> (SWT, MAM, MAS, SAS)	<b>3.99 ha</b>
<b>Cultural Meadow</b> (CUM)	<b>11.40 ha</b>
<b>Total Vegetation Removed</b>	<b>21.31 ha</b>

A total of 1.2 ha of interior forest habitat (>100 m from forest edge) will be permanently removed as a result of construction. A summary of impacts to interior forest habitat by the landfill is provided in **Table 5** below. The interior forest removed by the landfill includes the amounts of existing, removed and remaining interior forest specific to the ELC units intercepted by the landfill.



**Table 5. Interior Forest Habitat Removed**

ELC Units	Summary of Interior Forest Areas Affected by the Landfill		
	Existing Interior Forest (ha)	Interior Forest Removed (ha (%))	Interior Forest Remaining (ha (%))
<b>FOC4-1</b>	0.3	0.3 (100%)	0.0 (0%)
<b>FOM7-2</b>	1.1	0.9 (82%)	0.2 (18%)
<b>Totals</b>	<b>1.4</b>	<b>1.2 (86%)</b>	<b>0.2 (14%)</b>

With the habitat restoration/creation/enhancement that is proposed and described in Section 7.5.2, there will be a no net loss of the amount of forest, field and wetland habitat. However there may be a considerable lag in time between the time the vegetation is removed and when a similar functioning structural stage is achieved. Meadow will be easiest to create since it is an early successional stage that forms in a few years after land is abandoned. Seeding prepared ground with appropriate forbs and grasses will allow appropriate vegetation to colonize.

Wetland can only be created on a suitable location with a high water table. Establishing the desired water depth and appropriate hydroperiod will require careful attention to groundwater conditions and excavating accordingly. It should contain variable water depths and contain a mix of emergent and submergent plants.

Forest may in theory be easy to establish by planting appropriate species of trees and shrubs. However a true forest ground cover may be more difficult to establish as hardy field plants will dominate initially. The trees will take many decades to be large enough before they provide a forest structure comparable to the forest that will be removed.

### 7.3.2 Wildlife

The vegetation compensation plan should also result in no net loss of wildlife habitat over the long term but it may take many years before the recreated vegetation will be able to provide a similar habitat function for wildlife. Wildlife will then have to find this newly available habitat.

#### 7.3.2.1 Amphibians

Approximately 3.99 ha of wetland communities comprised of cattail marsh (MAS2-1) and ponds (SAS1-3 and SASa) will be permanently removed following construction of the landfill. This will result in the loss of amphibian habitat. If the wetland can be created on-site, than it may be possible for amphibians to utilize newly created breeding habitat when they find their traditional breeding location no longer exists. The new wetland may be turbid and rather sterile with minimal plant cover for the first year and therefore it may be a couple years before the wetland becomes productive for amphibians.



### 7.3.2.2 Breeding Birds

The breeding bird territories that were observed on the existing landfill site in 2011 will be at least temporarily displaced by the habitat removal. Field habitat will likely have sparse cover for the first year after creation and therefore be unsuitable for grassland birds until at least two years.

It will be much longer for the created forest habitat to become habitat for forest adapted breeding birds, particularly those that are area sensitive. The young plantings will first form a thicket like habitat that will be colonized by a different suite of breeding birds. However overall, In general however, thicket breeding birds are declining at greater rate than forest breeding species and therefore providing habitat for thicket species in the interim is a reasonable goal. The thicket breeders will eventually be replaced by forest species in several decades.

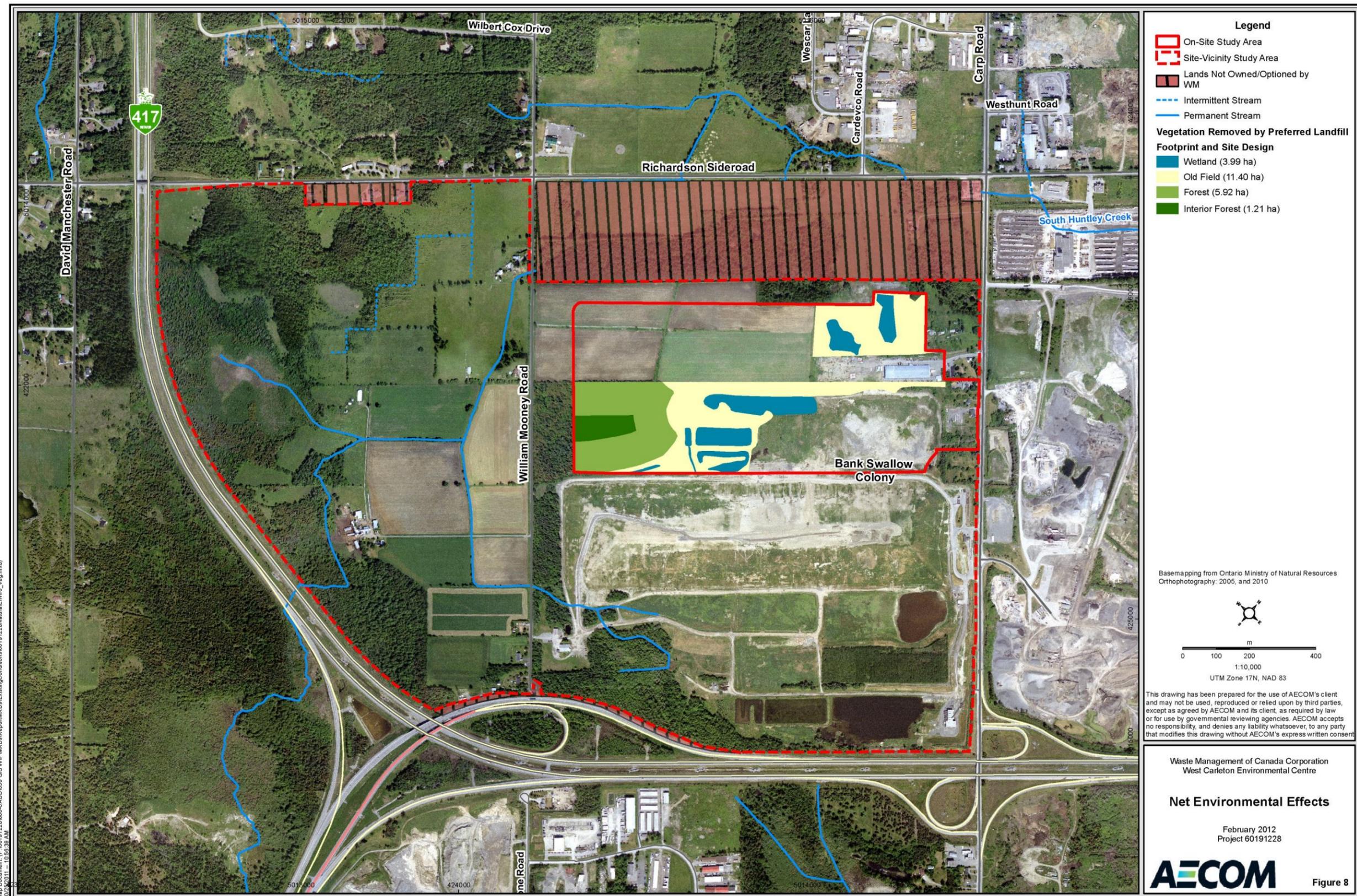
### 7.3.3 Summary of Net Effects

A summary of net effects is shown in **Table 6** below and on **Figure 8**.

**Table 6. Potential Effects, Proposed Mitigation and Compensation Measures, and Resulting Net Effects**

ID Number	Potential Effect	Mitigation/ Compensation	Net Effect
1.	<ul style="list-style-type: none"> <li>Removal of 4 ha of amphibian breeding habitat</li> </ul>	<ul style="list-style-type: none"> <li>Creation or enhancement of 4 ha of wetland habitat that is suitable for amphibian breeding at location near preferred landfill footprint that is yet to be determined.</li> </ul>	<ul style="list-style-type: none"> <li>No net loss of wetland habitat that can provide amphibian breeding habitat but may take several years to become effective.</li> </ul>
2.	<ul style="list-style-type: none"> <li>Removal of 5.9 ha of forest habitat including 1.2 ha of interior forest</li> </ul>	<ul style="list-style-type: none"> <li>Creation or restoration of forest habitat on lands owned by WM, or at location near preferred landfill footprint that is yet to be determined.</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in overall forest cover but some offset by forest creation (no net loss expected). Habitat will take many years to become effective forest.</li> </ul>
3.	<ul style="list-style-type: none"> <li>Removal of 11.4 ha of old field habitat</li> </ul>	<ul style="list-style-type: none"> <li>Creation or restoration of old field habitat where possible on lands owned by WM.</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in overall field cover but some offset by restoration (no net loss expected).</li> </ul>
4.	<ul style="list-style-type: none"> <li>Partial barrier to wildlife movement</li> </ul>	<ul style="list-style-type: none"> <li>Establish some natural vegetation between preferred landfill footprint and William Mooney Road.</li> </ul>	<ul style="list-style-type: none"> <li>Wildlife will be able to continue moving from woodlots north and south of the preferred landfill footprint.</li> </ul>
5.	<ul style="list-style-type: none"> <li>Loss of Bank Swallow Colony from construction disturbance</li> </ul>	<ul style="list-style-type: none"> <li>Avoid construction around active colony as much as possible and develop plan to create an exposed earthen cliff elsewhere in vicinity that can function as suitable nesting colony. If cliff is to be removed it must be done outside of the breeding season.</li> </ul>	<ul style="list-style-type: none"> <li>Ideally similar sized active Bank Swallow nesting colony at suitable location in site vicinity.</li> </ul>





**Figure 8. Net Environmental Effects**

## 8. Monitoring and Commitments for the Undertaking

To ensure that the mitigation measures identified in section 7.2.5 are implemented as envisioned, a strategy and schedule was developed for monitoring environmental effects. With these mitigation or compensation measures and monitoring requirements in mind, commitments have also been proposed for ensuring that they are carried out as part of the construction, operation, and maintenance of the landfill.

### 8.1 Monitoring Strategy and Schedule

A monitoring strategy and schedule was developed based on the Biology Impact Assessment carried out for the Preferred Alternative Landfill Footprint to ensure that (1) predicted net negative effects are not exceeded, (2) unexpected negative effects are addressed, and (3) the predicted benefits are realized.

#### 8.1.1 Environmental Effects Monitoring

##### 8.1.1.1 *Vegetation*

The monitoring program may include the following parameters: species identification prior to planting, plant survivorship post planting, site inspection and plan review, decline of invasive species, regeneration of native species, species composition, change in vegetation structure and/or cover, and change in floristic quality. Monitoring programs will vary depending on the issue being monitored and in terms of parameters, duration and outcome (i.e., to direct adaptive management, trigger the required replacement of dead planted material, etc.). Vegetation monitoring programs will be developed in greater detail during subsequent design phases.

##### 8.1.1.2 *Species at Risk*

Although no species at risk are known to occur within the study area, two threatened species were recorded within approximately 200 m from the preferred landfill footprint. There is some potential that Barn Swallow nests within one of the buildings on site. Monitoring should be conducted to determine if the species is present. In addition the Eastern Meadowlark habitat is in fairly close proximity and therefore some monitoring of that species is appropriate. The two species are newly designated and therefore OMNR has not yet developed any guidelines around them. It will be important to maintain contact with OMNR.



### 8.1.1.3 Amphibians

Monitoring during construction should be carried out to ensure the proper capture and transfer of amphibians from the wetlands to be eliminated to local alternative locations. Donor locations should be identified prior to transfer activities.

### 8.1.1.4 Summary of Monitoring Requirements

A summary of monitoring requirements is shown in Table 7 below.

**Table 7. Proposed Monitoring Requirements**

ID Number/ Potential Effect	Proposed Monitoring Requirement	Associated Licences, Permits or Authorizations
1	Vegetation monitoring during clearing, planting and restoration	None required
2	Species at Risk, if applicable, during clearing and restoration	<i>Endangered Species Act</i>
3	Bank Swallow colony during construction if in breeding season	None required
4	Frog salvage monitoring during elimination of wetland pockets	Wildlife Scientific Collectors Permit

### 8.1.2 Development of an Environmental Management Plan

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

## 8.2 Commitments

The following commitments as shown in **Table 8** have been proposed for ensuring that the identified mitigation or compensation measures and monitoring requirements are carried out as part of the construction, operation, and maintenance of the undertaking:



**Table 8. Summary of EA Commitments**

ID	Summary of Commitments for Mitigation and Further Work
<b>a</b>	<ul style="list-style-type: none"> <li>• Maintain communications with OMNR regarding species at risk w.r.t. Eastern Meadowlark and Barn Swallow if these are found to occur on-site, and adhere to applicable permits, acts, guidelines in detailed design and construction</li> </ul>
<b>b</b>	<ul style="list-style-type: none"> <li>• Develop edge management plan during subsequent design phases and finalize in consultation with OMNR or MVCA when grading limits are established. This will include establishing buffers to address areas affected during construction and/or operations.</li> </ul>
<b>c</b>	<ul style="list-style-type: none"> <li>• Survey Bank Swallow colony to determine if it can be retained within the landfill expansion plan and develop guidelines as appropriate</li> <li>• Develop compensation plan to create nesting cliff if retention of existing cliff not feasible.</li> </ul>
<b>d</b>	<ul style="list-style-type: none"> <li>• A Restoration/Enhancement Plan will be completed during the detailed sign stage. The Plan may include some, or all, of the following:               <ol style="list-style-type: none"> <li>1. Offset permanent forest, wetland and meadow vegetation removals/habitat loss as adjacent lands are identified and secured during the subsequent design phases.</li> <li>2. Prepare a Vegetation Compensation and Restoration Plan to compensate for and offset removals of forest, wetland and meadow habitat in consultation with OMNR and MVCA. and, during subsequent design phases.</li> <li>3. Clearly identify in the Compensation and Restoration Plan the intended Goals and Objectives, Restoration Plan, Management Strategy, and Monitoring Program.</li> <li>4. Identify opportunities to strengthen existing hedgerows, enhance existing riparian corridors, create amphibian breeding habitat, re-create forest habitat, re-create Bank Swallow colony habitat, create woodland linkages, maintain/manage existing grassland habitat for area-sensitive birds, install cattle exclusion fencing along watercourses, create vegetated buffers between the landfill and adjacent natural areas, as well as achieve other project goals (visual screening).</li> <li>5. The plan should include guidelines for physical site characteristics, desired species, plant salvage, seedbank salvage, amphibian salvage, and timing of procedures.</li> <li>6. Identify a suite of target species to measure restoration success; e.g., Eastern Meadowlark, forest breeding birds, Green Frog, Spring Peeper, Baltimore Butterfly, etc.</li> <li>7. Monitoring plan to gauge the success of vegetation restoration/enhancement efforts. This would include measuring vegetation survival, establishment and degree of invasion by non-native species.</li> <li>8. Corrective management applied where needed that could include invasive species control, additional plantings, vegetation suppression, deepening of ponds etc.,</li> <li>9. Continue to explore opportunities for developing additional restoration plans during subsequent design phases, as appropriate and feasible.</li> </ol> </li> </ul>



## 9. **Biology (Aquatic & Terrestrial) Approvals Required for the Undertaking**

Tree clearing should adhere to applicable City of Ottawa By-Laws or related approval requirements. A Wildlife Scientific Collectors Permit is required through OMNR to capture, contain and release amphibians from one site to another. No other approvals or permits should be required assuming that the Endangered Species Act does not apply.

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