### Table 6-6 – Summary of Effects on Noise Levels

<table>
<thead>
<tr>
<th>Project Interaction</th>
<th>Potential Effect</th>
<th>Mitigative Factor and Measure</th>
<th>Significance Criteria*</th>
<th>Assessment of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Site Preparation and General Construction Activities, bedrock blasting and Vehicle Use/Transport of Materials | • Noise disturbance to adjacent developed areas;  
• Noise disturbance to sensitive wildlife;  
• Vibration and noise associated with blasting. | • Adherence to the required noise levels, start-up timing as per City bylaws;  
• Blasting plan established to time the blasts to coincide with residential activities, no night time blasts nor on weekends;  
• Noise control plan implementation and monitoring in response to complaints;  
• Install wildlife culverts, guide walls and guide fencing so animals may safely move to new habitats away from the urban environment. | • Nature of Effect: negative, direct;  
• Magnitude – Moderate;  
• Geographic Extent - Low;  
• Duration - One season;  
• Frequency - Once;  
• Permanence – No;  
• Ecological Context – Local, Common in Area. | Not significant with mitigation. |
| Operations                                                                          |                                                                                  |                                                                                                |                                                                                      |                                               |
| Routine operations and maintenance (Vehicle Use)                                     | • Noise disturbance to adjacent developed areas;  
• Noise disturbance to sensitive wildlife. | • Noise within future developed areas will be similar to current levels in other urban areas;  
• Wildlife becomes adapted to increased noise levels. Species unable to adapt will move deeper into the South March Highland forest lands further north;  
• Edge management plantings will reduce road noise once trees mature and the canopy closes. | • Nature of Effect: negative, direct;  
• Magnitude – Low;  
• Geographic Extent - Low;  
• Duration - On-going;  
• Frequency - Continuous;  
• Permanence – No;  
• Ecological Context – Local. | Not significant with mitigation. |

* Magnitude High-potential effect above Bylaw requirement; moderate – effect near requirement; Low – effect expected to be below requirement.

### 6.5 Designated Natural Features

The identification and delineation of Designated Natural Features (DNF’s) was undertaken through the use of background information provided by the following sources:

- MNR’s Kemptville District mapping resource;
- MNR’s Natural Heritage Information Centre;
- City of Ottawa’s Official Plan (2003);
- Official Plan Amendment 16 (2004);
- City of Ottawa’s Greenspace Master Plan (2006); and,
Provincially and municipally significant DNF’s documented in the TFD Study Area are summarized below. Also, see Figure 4 for a map of DNF’s that overlap the Study Area.

6.5.1 Current Baseline Conditions

6.5.1.1 Baseline Conditions: Primary and Secondary Lands

According to the 2005 Provincial Policy Statement (PPS) for Ontario, Woodlands are defined as:

“...treed areas that provide environmental and economic benefits such as erosion prevention, water retention, provision of habitat, recreation and the sustainable harvest of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance.”

The identification and evaluation of Significant Woodland (SW) is a planning authority responsibility. When applied to natural features and functions, the City of Ottawa’s Official Plan defines Significant as:

“...ecologically important in terms of natural features and functions, representation or amount, and contributing to the quality and diversity of a defined natural area or system. In regard to other areas and features [Woodlands], significance is determined through application of criteria or assessment methods in the context of systematic studies...”

The MNR has established criteria for the identification and evaluation of SW’s to assist planning authorities in their SW’s assessment and delineation. These criteria include:

- **Woodland Size** – In general, the larger the woodland size, the greater diversity of flora and fauna it will have and the more resilient it will be to ecological disturbance. It is suggested that woodland size be evaluated in the context of the percent forest cover in the planning area;
- **Ecological Function** – Considers woodland shape, linkages, diversity and proximity to other natural areas;
- **Uncommon Woodlands** – Includes woodlands composed of rare trees or forest community, old-growth, distinctly large size and highly productive tableland woodlands; and,
- **Woodland Economic and Social Values** – Concerns the value of managed woodlands.

The City of Ottawa has defined and identified Significant Woodlands (SW’s) and other significant natural features (e.g., significant wetlands) in their Greenspace Master Plan (Ottawa, 2006) as Primary Natural Lands (PNL’s). Other than these areas, all other woodlands will be removed during the future development scenario, primarily through the Richcraft Development and the KNL Developments. The Richardson’s Ridge development has recently cut part of the forest lands and are in the final stages of site plan approval.

The primary core landscapes also include the South March Highlands Candidate Area of Natural and Scientific Interest identified by the Ministry of Natural Resources and most are ranked as high and medium significance in the Natural Environment System Strategy (NESS) (Ottawa, 2006). Woodlands that are rated as high or moderate by the Urban Natural Areas Environmental Evaluation Study (UNAEES) are identified as having a primary role and are designated PNL’s.

Other natural areas of varying quality play a supportive role to overall landscape biodiversity by buffering or joining more primary landscapes and providing linkages (Ottawa, 2006). These areas, which could include non-significant woodlands, are termed Secondary Natural Lands (SNL’s).
Primary Natural Lands and SNL’s were identified in and adjacent to the TFD Study Area (Figure 4). In general, PNL’s correspond to the mixed and deciduous woodland communities of the South March Highlands ANSI (Figure 4); however, PNL’s and SNL’s extend into contiguous wooded areas outside of the ANSI designated land area.

**Methods**

Ecological Land Classification (ELC) fieldwork carried out in 2009 documented 11 wetland communities, some of which are present as inclusions and complexes. In general, all communities within the urban boundary area will be impacted by future residential development. Trillium Woods, Richardson Ridge forest and the Kizel Drain wetland is the exception.

A Black Ash Mineral Deciduous Swamp wetland community is found in the TFD Study Area ranging from small inclusions to >0.5ha units in depression areas within the larger sugar maple-ironwood deciduous forest community, and includes a complex of Red Maple Mineral Deciduous Swamp community. Ash swamps in the Study Area are typically associated with floodplain areas. The canopy of the ash swamp community is dominated by black ash, with abundant red maple and yellow birch present. Other associates of this wetland type include white elm, eastern white cedar, and basswood.

A Freeman’s Maple Mineral Deciduous Swamp community is present, being dominated by Freeman’s and silver maple with occurrences of red maple, black ash, white elm and yellow birch. The understory contains sparse quantities of red elderberry, raspberry and glossy buckthorn. The ground layer contains an abundance of sensitive fern, stinging nettle, sedges and mosses. This wetland community is inundated late into the growing season.

Willow Mineral Deciduous Thicket Swamp, consisting mainly of dense shrub thicket with hydrophilic flora and dominated by sandbar willow. Other common associates include white elm, black ash, red-osier dogwood, narrow-leaved meadowsweet and glossy buckthorn. Groundcover present has a high abundance of sensitive fern. This wetland community is dominates the area adjacent to the rail line in the vicinity of the proposed road right-of-way.

Cattail Mineral Shallow Marsh is present, dominated by cattail, and also containing cyperus-like sedge and occurrences of wild calla, fox sedge, bulbiferous water hemlock, blue vervain, water-shield and water plantain. The marsh is fringed by a speckled alder deciduous swamp community inclusion. This large marsh is located approximately 130 meters west of the 2nd line and 220 meters north of the TFD alignment in the northeast end of the study area.

Areas of Reed Canary Grass Graminoid Mineral Meadow Marsh and Mixed Graminoid Mineral Meadow Marsh communities can be found in different parts of the Study Area Meadow, with these communities typically found in transition zones from wetland to upland communities. The Reed Canary Grass Graminoid Mineral Meadow Marsh community is dominated by reed canary grass and complexed with other graminoid meadow marsh species (e.g. soft stem bulrush, sedges) and hydrophilic herbaceous species (e.g. boneset, spotted Joe-pye-weed, jewelweed, etc.)

A Broad-leaved Sedge Organic Shallow Marsh is found to the north of the road alignment within 100 metres. Broad-leaved sedges such as lake sedge dominate this community. Surrounding the sedge community is a complex of glossy buckthorn deciduous thicket swamp with speckled alder, narrow-leaved meadowsweet and gray dogwood associates.

A White Elm Mineral Deciduous Swamp community is present, marking a transition zone between the willow thicket swamp community and the hardwood upland community. The canopy of this community is dominated by stunted white elm. The shrub understory contains narrow-leaved meadowsweet, sandbar
willow and dotted hawthorn and a dense groundcover of mainly hydrophilic goldenrod species, reed canary grass and Kentucky bluegrass is present.

**6.5.1.2 Baseline Conditions: South March Highlands Candidate Provincially Significant Life Science Area of Natural and Scientific Interest (ANSI)**

A map of the significant physical and natural features in the study area is shown in Figure 4.

The South March Highlands area is a Candidate Provincially Significant Life Science Area of Natural and Scientific Interest (ANSI) approximately 895 hectares in size (NHIC, 2009) and covering more than half of the Study Area (Figure 4). Approximately 182 ha of the ANSI will be removed by the draft plan approved KNL Developments subdivision in the future. Unique parts of the ANSI such as Trillium Woods, the Richardson Ridge Woodlot and the Kizel Drain wetland complex will remain as part of the 40% rule established for the property by the OMB (1983), otherwise the existing forests and wetlands immediately adjacent to Terry Fox Drive will be removed for residential development.

The Urban Natural Areas Environmental Evaluation Study (UNAEES) completed by the City of Ottawa has designated the ANSI as Primary and Secondary Natural Lands.

The ANSI has been identified for it’s unique physical characteristics and high biological diversity. The portion of the ANSI outside of the urban boundary, northwest of the Terry Fox Drive roadway, has also been designated as a Natural Environment Area by the City of Ottawa. The South March Highlands are located on the Carp Ridge, a large Precambrian Rock Inlier that has a high rolling terrain with irregular drainage, thin soils and a complex regionally unique geology.

The South March Highlands are quite biologically diverse. Brunton (1992, 2004 and 2008) produced a series of reports detailing the natural heritage features of the area. Brunton’s Natural Environment Assessment report on the area (1992) lists 440 plant species that have been identified. Of these plant species, 64 are listed as Regionally Significant (with 5 considered Regionally Rare and 12 considered Regionally Uncommon), 50 are considered Locally Significant and 6 are classed as Provincially Rare. Of the 6 Provincially Rare species, only butternut (*Juglans cinerea*) and American ginseng (*Panax quinquefolius*) are listed on Ontario’s Endangered Species list (Brunton 1992, 2004 and 2008). Brunton (2008) considered American ginseng as possibly extirpated from the South March Highlands Conservation Forest zone. **Appendix J** provides a full list of the plant species that have been observed in the Study Area by Dillon including the observations of significant species.
Figure 4: Designated Natural Features

Project Name: Terry Fox Drive EA
Map Created By: BC/SFG
Map Checked By: ST
Date Created: July 14, 2009
Date Modified: April 1, 2010
File Name: I:\GIS\091518 - Terry Fox Drive Final\Mapping\Part B Figures - CEAA 113009

Legend

- Provincially Significant Wetlands
- Other Wetlands
- Provincially Significant Candidate Area of Natural & Scientific Interest (ANSI)
- Supporting Natural Lands (e.g. Significant Woodlands)
- Supporting Natural Lands (e.g. Other Woodlands)
- Wintering Areas (Deer Yard)
- Local Wetlands
- Woodlands
- Grading Limit Footprint
- TFD Right of Way
- Road Centreline
- Railway
- Hydro Lines
- Floodplain Cut Area
- Future Land Development

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Of the significant species listed by Brunton, Dillon documented the following in the Study Area during the 2009 field season:

Five species listed as Regionally Significant:
1. Water-shield (*Brasenia schreberi*) (S5)*;
2. Hairy wood rush (*Luzula acuminata*) (considered Regionally Rare) (S5);
3. Long-leaved chickweed (*Stellaria longifolia*) (considered Regionally Rare) (S5);
4. Cleavers (*Galium aparine*) (considered Regionally Uncommon) (S5); and,
5. White wild licorice (*Galium circaezans*) (considered Regionally Uncommon) (S5).

*S Rank is a ranking of Provincial significance

Seven species listed as Locally Significant:
1. Northern maidenhair fern (*Adiantum pedatum*) (S5);
2. Plantain-leaved sedge (*Carex plantaginea*) (S5);
3. Blue beech (*Carpinus caroliniana*) (S5);
4. Dotted hawthorn (*Crataegus punctata*) (S5);
5. Three-way sedge (*Dulichium arundinaceum*) (S5);
6. Bottlebrush grass (*Elymus hystrix*) (S5); and,
7. Christmas fern (*Polystichum acrostichoides*) (S5).

Three species considered Provincially Rare, both being federally and provincially listed as *Endangered*:
1. Butternut (S3);
2. American ginseng (S3); and,
3. Western Chorus Frog (S3).

Dillon found five additional species listed by Brunton as being Uncommon in the city of Ottawa, including:
1. Broad-leaved Toothwort (*Cardamine diphylla*) (S5);
2. Rough Bedstraw (*Galium asprellum*) (S5);
3. Wild Blue Phlox (*Phlox divaricata*) (S4);
4. Common Clearweed (*Pilea pumila*) (S5); and,
5. Blue-stem Goldenrod (*Solidago caesia*) (S5).

In addition, Dillon found other species considered significant by the City of Ottawa (Ottawa, 2006), but not listed in Brunton’s reports, including:

Nine species considered Uncommon:
1. Lakebank Sedge (*Carex lacustris*) (S5);
2. Few-nerved Wood Sedge (*Carex leptonervia*) (S5);
3. Grey Dogwood (*Cornus foemina ssp. racemosa*) (S5);
4. Morrow's Honeysuckle (*Lonicera morrowii*) (SE3);
5. Moneywort (*Lysimachia nummularia*) (SE5);
6. Swamp Black Currant (*Ribes lacustre*) (S5);
7. Wild Red Raspberry (*Rubus idaeus ssp. melanolasius*) (S5);
8. Black Raspberry (*Rubus occidentalis*) (S5); and,

One species considered Regionally Significant:
1. Swamp Buttercup (*Ranunculus hispidus var. caricetorum*) (S5).

Two introduced species considered Rare:
1. Black Locust (*Robinia pseudo-acacia*) (SE5); and,
2. Common Comfrey (*Symphytum officinale ssp. officinale*) (SE5).

The South March Highlands also possesses a rich fauna with approximately 75 breeding bird species and a total of 143 bird species that have been recorded in the area. Brunton’s lists 20 significant bird species as occurring in the South March Highlands. Of these significant species, Dillon observed 11 during 2009 fieldwork. Refer to Appendix L for a full list of bird species observed by Dillon during fieldwork, including potential significant species:
1. Golden-winged warbler (Provincially listed as Special Concern) (S4B, SZN);
2. Cooper’s hawk (Listed by Brunton as having Provincial Significance) (S4B, SZN);
3. Black-throated green warbler (Regionally Significant) (S5B, SZN);
4. Scarlet tanager (Regionally Significant) (S5B, SZN);
5. Great blue heron (Regionally Significant) (S5B, SZN);
6. Pileated woodpecker (Regionally Significant) (S4S5);
7. Ovenbird (Regionally Significant) (S5B, SZN);
8. Pine warbler (Locally Significant) (S5B, SZN);
9. Common raven (Locally Significant) (S5);
10. Willow flycatcher (Locally Significant) (S5B, SZN); and,
11. Hermit thrush (Locally Significant) (S5B, SZN).

Nineteen mammalian species, the locally significant including black bear (*Ursus americanus*) and white-tailed deer (*Odocoileus virginianus*), inhabit the South March Highlands (Brunton, 1992). Dillon observed white-tailed deer during 2009 fieldwork. Refer to Table K-1 in Appendix K for a full list of mammals species observed by Dillon during fieldwork, including potential species.

Four reptiles species, including the federally and provincially Threatened Blanding’s turtle (*Emydoidea blandingii*) and the federally and provincially Special Concern Eastern milk snake (*Lampropeltis triangulum triangulum*), and nine amphibian species, including Western Chorus Frog (*Pseudacris...*)
triseriata) were made in the South March Highlands (Brunton 2008). Observations of Blanding’s turtle and eastern milk snake were made in the Study area during 2009 fieldwork. Refer to Table K2 in Appendix K for a full list of amphibian and reptile species observed by Dillon during fieldwork, including potential species.

Vegetation communities found in this natural area contain interior forest habitat with mature deciduous and mixed upland forests, mixed deciduous and coniferous lowland forests, granite-gneiss based escarpment forests and beaver pond complexes. Late succession sugar maple stands north of Old Carp Road may constitute the tallest and oldest maple grove in the Ottawa area, with stands of a comparable age making up less than 5% of forested lands in the Ottawa-Carleton Region (Brunton, 1992). Several other natural features are located within the South March Highlands ANSI providing significant wildlife habitat (e.g. winter deeryard, significant wood lands etc.). The dominant forest communities observed during Ecological Land Classification (ELC) fieldwork conducted in 2009 consisted of Dry-Fresh Sugar Maple-Ironwood Deciduous Forest and Fresh-Moist White Pine-Hardwood Mixed Forest, with smaller areas of Dry-Fresh White Ash-Hardwood Deciduous Forest, Fresh-Moist Elm-Mixed wood Deciduous Woodland and Fresh-Moist Bur Oak Deciduous Forest.

6.5.1.3 Baseline Conditions: South March Highlands Provincially Significant Wetlands Complex

The South March Highlands Provincially Significant Wetland (PSW) Complex is 114 hectares in size and is made up of 37 individual wetlands that lie within the South March Highlands Candidate ANSI. One part of the individual wetlands complex, an area of 3.7 ha, will be removed by the KNL Development, identified as PSW #2 on Figure 4. Terry Fox Drive will remove 0.30 ha of PSW#2 and about 0.4 ha will remain outside of the road alignment. A stormwater pond to control quantity runoff volumes from Terry Fox Drive was planned for this area, accounting for 1.2 ha, but this impact has been avoided by the City.

The Urban Natural Areas Environmental Evaluation Study (UNAEES) completed by the City of Ottawa has designated the various units of the PSW Complex as Primary Natural Lands.

The PSW is 48.7% swamp and 51.3% marsh habitat. Dominant vegetation forms include tall shrubs, deciduous trees, narrow leaved emergent, robust emergent, submerged vegetation and dead conifer communities. This wetland system is hydrologically connected to Shirley’s Brook, and other small watershed systems within the vicinity including the Carp River to the southwest (Huizer and Atkinson, 1988).

A total of 61 species of bird have been observed in the wetland complex with 44 considered possible to probable breeders. In addition, 10 species of amphibian and 5 species of reptile have been recorded in the wetland complex. Furthermore, 135 plant species have been recorded here (Huizer and Atkinson, 1988).

Common snapping turtle (Chelydra serpentina), recently (September 19, 2009) listed under Ontario’s Endangered Species Act as a Species of Special Concern, was documented during the South March Highlands Wetland evaluation, but was not observed during 2009 fieldwork. Blanding’s turtle, a federally listed species-at-risk, is listed in the 1988 wetland evaluation data and was also observed during 2009 fieldwork. Of the other significant wildlife species noted in wetland evaluation data Dillon documented two during 2009 fieldwork: swamp sparrow (Melospiza georgiana) listed as Regionally Significant in the wetland evaluation; and blue-spotted salamander (Ambystoma laterale) listed as Provincially Significant in the wetland evaluation. Refer to Appendix L and Table K2 in Appendix K for a full list of bird, mammal and herptile species observed by Dillon during fieldwork, including potential significant species occurrences).
Of the 135 plant species identified in the South March Highlands Wetland Evaluation, Dillon observed 132 in the TFD study area during 2009 fieldwork. One plant species identified in the wetland evaluation data is considered Regionally Significant, the silvery sedge (Carex canescens), which was observed by Dillon during fieldwork. Two other plant species listed in wetland evaluation data and observed by Dillon are considered Uncommon by the City of Ottawa including common clearweed (Pilea pumila) and three-way sedge (Appendix J).

The boundaries of the wetlands that were provided by the MNR are indicated on Figure 4, with the exception of specific wetland units within the urban boundary (east of the TFD ROW). These wetland units are excluded from the PSW complex by previous OMB hearings (Ref: Annex R26 to Official Plan Amendment No. 76, City of Ottawa) as noted in the summary (Appendix M).

### 6.5.1.4 Baseline Conditions: South Kizel Drain Wetland Complex

The Urban Natural Areas Environmental Evaluation Study (UNAEES) completed by the City of Ottawa has designated the South Kizel Drain Wetlands Complex as Primary Natural Lands within the urban envelop. The South Kizel Drain is a non-provincially significant wetland complex that covers 22 hectares and is made up of 5 individual wetlands. The wetland complex is 63% swamp and 37% marsh habitat with dominant vegetation forms including deciduous trees, dead deciduous trees, low shrubs, dead shrubs, tall shrubs, robust emergent and narrow-leaved emergent communities. Thirty-two species of plant have been recorded in the South Kizel Drain wetland. Eleven species of bird, 5 mammals, 1 amphibian and 1 reptile have also been recorded here (Paquette and Hueston, 1994).

The South Kizel Drain Wetland Complex will be preserved in its’ entirely within the future planning area but lies well outside the grading limits of the proposed Terry Fox Drive. Therefore, no impacts to this wetland will occur as a result of the Terry Fox Drive road-works, but this wetland complex will remain as a significant feature on the landscape of the area. One forested wildlife corridor linkage with the South Kizel Drain complex is a small unclassified wetland south of the Carp Ridge which drains towards the Carp River. This small wetland will be impacted by the roadway as described in Section 6.4 below.

### 6.5.1.5 Baseline Conditions: Deer Wintering Areas

As defined in the Significant Wildlife Habitat Technical Guide (OMNR, 2000), deer wintering areas (deer yards) are winter refuge habitats that consist of core areas made up primarily of coniferous tree species (i.e. pine, hemlock, cedar and spruce) with a canopy cover of 60% or greater. Shrubs and small trees present in the understory provide a food source for deer. Areas surrounding the core yard are usually mixed or deciduous forests. Depending on the severity of the winter and the amount of snow depth, deer may be confined to core areas or may use surrounding forested areas and farmland.

The MNR has defined the wintering areas (deer yard) in the Study Area (Figure 4), covering an area of 925 ha. Though little of the Study Area is strictly coniferous forest, ELC mapping (Section 6.4.1.1) shows that a white pine hardwood mixed forest community covers 1.8 km of the Terry Fox road alignment and much of the future development area found between the railway tracks and the 2nd Line road allowance. This will be entirely removed by the KNL Development. Other deciduous upland and swamp forests cover much of the rest of the TFD Study Area, particularly from stations 14+000 to 16+500, west of the First Line road allowance. These areas will be removed almost entirely by the Richcraft development. A 25 m wide Open Space buffer and small woodlot (Appendix M) will be reserved for recreational uses, but will no longer provide wintering habitat for deer.

The most ideal deer yard habitat in the Study Area may be found in the mixed forest community; although there may be core yard areas throughout the South March Highlands Candidate ANSI/PSW and beyond. Though coniferous patches can be found throughout the South March Highlands, western sections along
the Hazeldean Escarpment contain most of the coniferous forest habitats, with large contiguous areas of coniferous forest being rare (Brunton, 2008).

6.5.2 Effects Assessment

Designated Natural Features (DNF’s) such as ANSI’s, PSW’s, PNL’s, SNL’s and Wintering Yards will be impacted by the TFD extension. Figure 5 shows the DNF’s that will be directly affected by the road footprint and the areas of the corresponding impact of the road alone. Construction will begin by clearing the trees from these areas and dredging the organic soils (peat) from the wetlands.

On an interim basis, most of these natural features will remain inside the arc following road construction, but as the land is developed as planned over the next decade, they will be ultimately removed as noted herein. Portions of DNF’s impacted areas fall into the grading limit of the TFD ROW, resulting in an official land-use conversion from Designated Natural Feature to Urban Area. This has been previously approved by City Council as part of the Official Plan Amendment process and by order of the Ontario Municipal Board. Considering the adjacent, approved land development as a mitigative factor in the assessment of this project, most effects to Designated Natural Features from building Terry Fox Drive will be incremental to that already approved as acceptable.
Figure 5: Designated Natural Features Affected by Construction

Project Name: Terry Fox Drive EA
Map Created By: SG
Map Checked By: AZ
Date Created: Sept 29, 2009
Date Modified: April 1st, 2010
File Name: \dillon.ca\DILLON_DFS\Ottawa\Ottawa CAD\cad\2009\09-1518 Ottawa - Terry Fox Drive Final Design\Design_GIS\MXDs\Edits for Fisheries and INFC

Legend
- Provincially Significant Wetlands Removed
- Other Wetlands Removed
- Primary Natural Lands Removed
- Supporting Natural Lands Removed
- ANSI to be Removed
- Wintering Area (Deer Yards) Removed
- Provincially Significant Wetlands (PSW)
- Local Wetlands
- Woodlands
- Realigned Shirleys Brook
- Grading Limit Footprint
- TFD Right of Way
- Road Centreline
- Railway
- Hydro Lines
- Floodplain Cut Area
- Future Land Development

South March Highlands (Provincially Significant Wetlands Complex)
PSW-06
PSW-03
PSW-05
PSW-02
PSW-01
Kizel Wetlands Complex
South March Highlands
(Terry Fox Drive
First Line Road Allowance

Shirleys Brook

<table>
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</table>

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6.5.2.1 Effects Assessment: Primary and Secondary Lands

The TFD extension will bisect the City of Ottawa’s designated Primary Natural Lands (PNL’s) that principally contain significant woodlands, and to a much lesser extent, provincially significant wetlands. In the future, most of these primary areas will be removed during land development within the arc of the roadway. An additional 10.2 ha of the PNL’s (core natural lands) will be removed within the grading limit of the TFD ROW (Part B) (Figure 4) beyond that of the current baseline. Approximately 1.0 ha of Secondary Natural Lands (SNL’s) consisting of other woodland linkage areas and non-provincially significant wetlands will be removed in the grading limit footprint. The areas remaining along the roadway will be converted over time from interior forest conditions to edge communities, which provides habitat to a different group of flora and fauna species, including white tailed deer, which may be drawn to the forest edges for winter feeding and salt licks. Likewise, small meso-mammals such as porcupine, skunk, raccoon and opossum may forage along the edge of the roadway. The new edge habitat created may therefore result in a high incidence of road kills throughout the South March Highlands section of the road.

Mitigation for the incremental conversion of 10.20 ha of PNL’s and 1.0 ha of SNL’s in the South March Highlands ANSI will be to better define the edge habitat and buffer the remaining areas from road noise, salt impacts, wind blown litter and increased encroachment by the new human residents.

Interim measures will be necessary until the land development proceeds to remove the remaining forest lands. While forest areas still remain on both sides of the road, deer and other animals will want to migrate across the roadway to reach feeding or over-wintering habitats on the other side.

As the urban boundary encroaches further into PNL’s and SNL’s, future wetland and upland habitat restoring the abandoned farm field in the Carp River floodplain are recommended to increase the buffer along the river from the urban developments on the inside of Terry Fox Drive.

The mitigation measures to be considered for implementation are as follows:

Construction Measures
- Development of an Edge Management Plan for the interface between the road infrastructure and the adjacent PNL & SNL forested lands:
  - Include butternut seedlings in the mix of native trees as compensation for removal of trees on the project; and,
- Install wildlife passage culverts, wildlife guide fencing and wildlife guide walls throughout the forested sections of Terry Fox drive, creating a movement barrier to most small to medium sized animals.

Interim Measures
- During initial operations, the City will monitor wildlife road kill locations to focus wildlife management options, such as ditch light reflectors, increasing public awareness and signage.

Long Term Measures
- Afforest* 2 ha of City-owned lands along the Carp River to offset impacts to Primary and secondary Natural Lands; and,
• Provide population-level monitoring of species at risk and sensitive species.

*Afforestation is the conversion or restoration of marginal farmland or unused urban areas to forest lands to help reduce the impacts of greenhouse gases on the global environment by planting trees to sequester atmospheric carbon.

6.5.2.2 Effects Assessment: South March Highlands Candidate Provincially Significant Life Science Area of Natural and Scientific Interest

A large area of the South March Highland Candidate Provincially Significant Life Science ANSI is zoned Urban Area according to the City of Ottawa’s Official Plan Schedule B. The TFD extension will lie along the north-western edge of the urban boundary that passes through the ANSI. The Part B portion of the TFD extension will remove 10.54 ha of the candidate ANSI and convert it to an urban land use. In the near future, approximately 180 ha of the 895 ha ANSI will be removed (about 20.1% of the total Candidate ANSI area) from land developments. The bordering area of ANSI removed would ultimately become edge habitat along the outer arc of the road once the future urban lands are built out.

Removal of the ANSI lying solely within the road grading limit of the ROW represents 1.2% of the total Candidate ANSI land area. This would be a permanent removal.

In addition to the direct removal of the area, potential in-direct impacts to the ANSI from the road construction may include:

• Impacts to Federal and Provincial Species at Risk (SAR) and SAR habitat (refer to Chapter 9);
• Redirection of water flows and wildlife migration patterns;
• Direct loss of amphibian, reptile and bird breeding habitat;
• Loss of Primary Natural Lands (Significant Woodlands);
• Alteration to internal forest conditions and the temporary fragmentation of forest habitat;
• Geological alteration to the Highlands located on the Carp Ridge, a large Precambrian Rock inlier that has a high rolling terrain with irregular drainage, thin soils and a complex regionally unique geology;
• Potential changes to the groundwater flux of recharge and discharge; and,
• Reduction of biological diversity (regionally and locally significant native vascular plants, birds, herptofauna, mammals, etc.).

Construction Measures

Mitigation and compensation for the incremental loss of 10.54 ha of mainly wetlands and woodland habitat in the South March Highlands ANSI will involve:

• Development of an Edge Management Plan for the interface between the road infrastructure and the adjacent ANSI to the north; and,
• Creation of an 8.2 ha wetland habitat area in the Carp River floodplain (Chapter 7).

Operational Measures

• No measures are proposed during operations beyond the normal maintenance of the roadway and vegetation along the edges.
6.5.2.3 Effects Assessment: South March Highlands Provincially Significant Wetlands Complex

General Wetland Impacts

The extension of Terry Fox Drive through the South March Highlands will have immediate direct and indirect impacts to portions of both Provincially Significant and Non-Provincially Significant Wetlands. Effects include both the direct removal of habitat and disturbance effects to remaining wetland areas. The direct loss of wetland areas is discussed further below.

Both short-term construction effects and long term operation effects may also occur on wetlands located outside of the future development lands. Construction activities will result in short-term impacts, that will require mitigation. Long-term effects from stormwater runoff may continue throughout the life of the roadway, however through proper mitigation, the effects on water quality should be insignificant.

Construction activities will remove vegetation and expose soil, making it prone to erosion during runoff events. Storm water will pick up larger sediment loads, which can be deposited in wetlands (Darnell, 1976; Ontario Ministry of Transportation, 2006). Storm water runoff may pick up concentrated contaminants, including hydrocarbons, heavy metals and salts from the road surface when it comes into use (Ehrenfeld, 1983; Ontario Ministry of Transportation, 2006). Furthermore, spills and accidents may occur during construction increasing the amount of contaminants present. Storm water runoff may also infiltrate into soil and contaminate ground water. Contaminated water may then enter the wetlands through ground and surface water flows (Ontario Ministry of Transportation, 2006). Refer to Section 7.3 for a discussion of storm water runoff existing conditions and the potential impacts and mitigation strategy to be implemented.

Construction activities that will occur in the wetland areas crossed by the road extension will include: removal of organic substrates; grading activities that alter topography through digging, blasting and the use of rock infill material; and the installation of culverts; and installation of wildlife crossings. The realignment of Shirley’s Brook will also have an impact on wetland resources in PSW #2. Some temporary surface water dewatering of excavations will be required, particularly at the wetland crossings and the culvert installations on watercourses. Where needed, the discharge water will be treated or clarified before release as identified in the sediment and erosion control plans that will be prepared as part of the detailed design drawings.

Stretches of the Terry Fox Drive alignment will directly encroach on portions of wetland units, which will necessitate the removal of sensitive vegetation communities, the infilling of wetlands and compaction of soil during construction activities. In the future, the KNL development will remove most of the remainder of PSW#2, with a small piece of 0.4 ha left outside the urban boundary (Figure 5). Secondary effects of clearing the trees and wetlands along the outer edge of the road arc include edge effects and disruption of wildlife movements.

Constructing Terry Fox Drive through sections of wetland has the potential to impact existing surface drainage, either increasing or decreasing runoff reaching the wetlands. As East Shirley’s Brook is realigned, the net volume of water that flows to PSW #2 will remain as existing, but because a portion will now be an impermeable road surface, the timing and duration of runoff may be altered. The potential for this change has been modelled extensively and although altered, the effect is not significant enough to alter the functionality of the wetland ecosystem. In wetlands with large, open water conditions, this alteration could have the effect of occasionally flooding or drying out the wetlands as well as changing the seasonal water level fluctuations, but that is not the case here. Wetland pieces PSW#1 and PSW #2 that are crossed are perched wetlands over clay soils, with thin organic soils of less than 45 cm, and no appreciable retention volume or capacity to store water for extended durations. As it currently exists,
water in equals water out in over a very short period, so the change in the hydrograph is not significant enough to cause a change in function.

An altered shoreline vegetation community may allow invasive species to colonize, which can lead to changes in the shoreline invertebrate community, which are then felt further up on the food chain (Castelle et al., 1992). Often wetland shoreline zones are important wildlife habitat, and potential exists for reduced populations of wetland dependant species (Ziegler, 1990). Refer to Section 7.3 for the discussion on Surface Water existing conditions and potential impacts and mitigation.

South March Highlands Provincially Significant Wetland (PSW) Units

There are four units of the South March Highlands Provincially Significant Wetland (PSW) Complex in close proximity to the TFD alignment. While the form and function of three units (PSW #1, #2 and #4) of this PSW Complex will be impacted by the TFD extension project, the roadway alone will result in the removal of a small portion of the first two units (PSW#1: 0.69 ha; PSW#2 0.30 ha). We do not expect PSW #3 to be affected, either by direct removal of wetland area or by altering frequency of fluctuation of its’ water levels. The potential impacts to PSW #4, a small pond - wetland in close proximity to the north side of the TFD extension ROW, are also discussed below.

PSW Unit #1

Plate 1 shows the forested swamp near Stn. 14+600 of the TFD extension, approximately 200 m south of the Arnprior-Nepean rail line. This has been identified as PSW #1 (Figure 5). Water depth ranged from 0.30 to 0.60 m in early spring and was observed to be receding, but inundated into late spring/early summer. The soils in this swamp community contained deep organic substrates. A diverse community of actively breeding amphibians (leopard frogs, wood frogs) were observed during spring fieldwork in 2009. Western chorus frogs were observed calling at night but breeding activity was not confirmed here. Two juveniles of Blanding’s Turtle were first found in this area, along the West Shirley’s Brook tributary at Stn. 14+570. Fisher, a small fur-bearing mammal, was also recorded in the forested swamp habitat.

The TFD extension ROW will pass through maple and ash swamp communities of the South March Highlands PSW #1 located directly south of the railway crossing, between stations 14+600 and 14+700. Approximately, 0.69 ha of wetland will be lost due to extensive dredging of organic soils at this location in the grading limit (Figure 5). Filling in this wetland area and vernal pool habitat will also result in the direct loss of amphibian breeding habitat. The east-west wildlife corridor will be fragmented; although, the lands east of the ROW are slated for future urban development. The release of road contaminants as well as disturbance impacts (e.g., noise, light and vibration) could displace area-sensitive, pollution intolerant herpetofauna and other wildlife species from wetland habitat adjacent to the road ROW.

Organic soil (peat) from PSW#1 will need to be removed to the depths of approximately 250 to 450 mm for the road construction (Golders, 2009).
Mitigation (construction, interim and long-term operations) and compensation strategies will focus on avoiding losses in biodiversity and preservation of wetland hydrology. The proposed mitigation measures include:

**Avoidance Measures**

- To improve the level-crossing geometrics at the rail line, the road alignment has been shifted 30 m east of its original location to avoid as much of the forested swamp community, essentially impacting the edge of the wetland area rather than bisecting through its centre;
- A wildlife guide wall and guide fencing will be placed on either side of the road to ensure wildlife migrate through the hydraulic culvert (CV5) rather than over the roadway;
- Stormwater Pond 4A, proposed in the 2007 PDR to be built in this wetland, will no longer be built to minimize the impacts on wetlands habitat; and,
- Clear trees outside of the spring to avoid the amphibian breeding season and bird nesting season – May 1 – July 31.

**Construction Mitigation Measures**

- New 8.2 ha constructed wetland habitat area in the Carp River floodplain offset cut will be formed as a forested swamp to support reptiles, amphibians, small mammals and birds to compensate for the loss of wetland area in PSW #1;
- Prior to construction through PSW #1, install stout snow fencing with filter cloth at the limits of grading to ensure equipment does not stray outside the construction zone;
- Install a lined watercourse diversion for the duration of period until the arch culvert CV5 is installed and finished;
- Dyke the area to be stripped using only materials that can be put in and taken out cleanly;
- Where dewatering is required, maintain separate Clean : Dirty separation of water:
  - Pump clean groundwater to the creek downstream of the site using a rubber splash pad ringed with straw bales to avoid bank erosion at the discharge point;
Pump dirty excavation water to a dewatering pad or an Envirotank, or equivalent settling chamber to allow sediments to be removed. Where particles are small (clays) use a flocculant and filtration system to ensure removal of all suspended sediment prior to discharge. Discharge to the creek as per the clean water mitigation;

- Strip or otherwise excavate to remove the organic soils – retain and reuse the seedbanks elsewhere in the wetland creation:
  - Stockpiling of the organic soils for greater than 3 months is ill advised as the seedbank may no longer be viable. Construction of the constructed wetlands on the carp River floodplain will be staged so that the stripping stages immediately precede the application of topsoil blends in the constructed wetlands;

- Place clean shot rock to build up the road base, to an elevation of at least 1.0 m above the original ground surface;
- Place the West Shirley’s Brook culvert (CV5) in a simultaneous operation while the area is dewatered;
- Place riverstone to define a low flow channel with a meandering pattern throughout the bottom of culvert CV5, and,
- Remove the dyking and adjust the silt fencing to lay tight with the new side slope.

**Interim Mitigation Measures**

- The current road right of way allows for a future grade separation of the rail line and roadway. PSW #1 may be impacted with embankments and a bridging structure in the future as the need for a transit link is realized in the distant future (beyond the current 20 year planning horizon). The current rail-level crossing may therefore be considered an interim measure in the ultimate planning scenario for the expansion of the urban area, as guided by future amendments to the Official Plan.

**Long-Term (Operations) Mitigation Measures**

- One culvert crossing is required to pass the hydraulic flows of Shirley’s Brook; the culvert width has been expanded to contain several different elevation heights, principally to convey flow, but also to allow both wet and dry passage for wildlife to maintain connectivity along the Shirley’s Brook / wetland corridor;
- Non-scalable embankments for up to 100 m either side of a watercourse or where in close proximity to a water body;
- The organically-rich ‘seed-bank’ donor soil excavated from the wetland will be reused over the bottom of the creek realignment through the rock cut and over the constructed Carp floodplain wetlands to help restore the vegetative and soil microbial communities;
- Additional seed-bank donor soil will be sourced from the other wetland areas crossed along the alignment, as required;
- Excavation work in the wetland for the creek realignment will occur must during the summer or fall to minimize damage to the habitat, disturbance of breeding wildlife and to minimize the disturbance to the ecological functions; and,
- New 8.2 ha wetland habitat area in Carp River floodplain offset cut will be created as a forested swamp to support reptiles, amphibians, fish, small mammals and birds in compensation for wetland impacts in PSW#1.
PSW Unit #2

On the north side of the rail line, PSW #2 provides a small area of willow thicket where a single male specimen of the Golden-Winged Warbler was observed (Plate 2), roughly 45 m west of Stn. 14+900. This hydrology of this wetland has been altered by beaver activity, resulting in prolonged periods of saturation. The vegetation composition is willow, dogwood and other pioneer tree and shrubs species.

Site grading associated with the TFD extension will impact sections of PSW #2 located on the north side of the railway crossing near station 14+800. Approximately 0.3 ha of wetland area will be removed at this location contained within the road grading limit. The East Shirley’s Brook alignment will be relocated away from its current path through PSW #2, to lie in a new 250 m ‘valley’. Meandering at a sinuosity 1.3 times its’ length, as appropriate for a wetland at near zero grade. The wetland will continue to receive the same volume of water, albeit a combination of creek water and treated stormwater from the roadway and continue to function ecologically as it currently does.

Plate 2:
Provincially Significant Wetland #2 at Stn 14+900, with the east Shirley’s Brook tributary

Mitigation and compensation strategies will focus on minimizing disturbance to lands adjacent to the road grading limits. Specific mitigation and compensations includes:

Avoidance Measures
- Eliminating storm water management pond 4B, which was initially planned for this location; and,
- A wildlife guide wall and guide fencing will be placed on either side of the road to ensure wildlife migrate through the wildlife passage culvert (TCV2) rather than over the roadway.

Construction Measures
- Narrowing the road footprint using shot rock in the base to allow for steeper side slopes, which will have the added benefit in reducing wildlife mortality (e.g. turtle road kills) by deterring wildlife access to the road level;
- New 8.2 ha constructed wetland habitat area in the Carp River floodplain offset cut will be formed as a forested swamp to support reptiles, amphibians, small mammals and birds to compensate for the loss of wetland area in PSW #2;
• Interim Mitigation Measures; and,
• Installation of a dry wildlife passage culvert to maintain temporary connectivity across the wetland corridor.

**Long Term Measures**

• In the long term, only a small (1.6 ha) piece of this portion of the Provincially Significant Wetland will remain, as the rest will be removed by the KNL Developments subdivision; and,
• Stormwater will be treated in the remnant of the wetland, providing some modest level of additional nutrient treatment.

**PSW Unit #3**

Plate 3 shows the broad-leaved sedge and softstem bulrush organic shallow marsh community of PSW#3 at the upland outlet point to the east tributary of Shirley’s Brook. This wetland unit is approximately 80 m north of the centreline at Stn 15+350. The east tributary of Shirley’s Brook drains wetland PSW#3 west through PSW#2 before turning east and flowing under the rail line (Figures 4 and 5) in a 600 mm concrete culvert. There is a 6 m elevation drop extending for a 550 m stretch of the creek between PSW#3 and PSW#2. As a result, the creek’s gradient drop exceeds 1% as described in Chapter 8.

Plate 3:
Provincially Significant Wetland #3, 80 m north of Stn 15+350

**Avoidance Measures**

• A wildlife guide wall and guide fencing will be placed on either side of the road to ensure wildlife migrate through the hydraulic culvert rather than over the roadway.

**Construction Measures**

• No construction will occur in this wetland as part of this project;
• A hydraulic culvert (CV6) will be placed 70 m downstream of the wetland, but will be embedded 0.30 m minimum so the wetland water levels and rate of fluctuation are not affected; and,
• A temporary diversion channel, lined with coir erosion control matting will be used to flume water around the area of the culvert construction. Sediment and erosion controls along the outer
edge of the grading limit will be maintained throughout the course of construction until the slopes are fully stabilized with at least 150 mm of ‘grass’.

Long Term Measures

- New 8.2 ha wetland habitat area in Carp River floodplain offset cut will be formed as a forested swamp to support reptiles, amphibians, small mammals and birds, to compensate for any long term impacts to PSW #3.

PSW Unit #4

Plate 4 shows PSW #4 of the South March Highlands Complex, which is a permanent pond with a speckled alder mineral deciduous thicket swamp community with a dense shrub layer (75% cover) and open water areas 0.5 m to 1.0 m deep. This wetland unit provides unique amphibian habitat. Several salamanders (1 yellow spotted, 15 blue spotted) and three frog species were documented in this wetland pond during the spring breeding period in April 2009. Breeding of the Western Chorus Frog was confirmed here as their distinctive egg masses were found here during field work during the second week of April, 2009.

This piece of the wetland complex lies roughly 60 m north of the alignment grading limits at Stn 15+650, in a section where the road surface will be in 3 m of cut through a small pinnacle, yet with the paved surface roughly 2 m above the surface of the pond. To determine the direction of water flow in and out of the wetland, the perimeter was specifically walked by a Dillon biologist (Baxter, R.). A weak hydrologic surface water connection exists between PSW Unit #4 and PSW#3, flowing to the northwest. To the south a clear ridge precludes water outletting southwards. The thicket swamp wetland / pond does not appear to have a clearly defined outlet for drainage to the south, contradicting the provincial mapping, indicating that this feature may be an isolated swamp fed by groundwater.

Plate 4:
PSW #4 provides breeding habitat for a diverse group of amphibians

The area around PSW #4 has been designated as Primary Natural Lands in the City of Ottawa’s Greenspace Master Plan and close to a designated destination in the Recreational Master Plan. Based on the current road grading limit there will be an approximately 60 m buffer distance between it and the wetland boundary. The exact distance will be determined as the detailed designs progress to the layout before construction. Although this wetland feature will not be directly impacted in the future or directly by the TFD extension, some mitigation may be required to buffer the effects of disturbance. This has
been looked at closely during detailed design, considering the effects on drainage both vertically and horizontally. Mitigation measures that will be included are:

**Avoidance Measures**

- A wildlife guide wall and guide fencing will be placed on either side of the road to ensure wildlife migrate through the wildlife passage culvert (TCV4) rather than over the roadway; and,
- Direct roadway ditching away from the wetland, preferably to flow south through the wildlife passage culvert.

**Construction Mitigation Measures**

- The area will be stoutly fenced during construction to avoid any unnecessary disturbance by human activities heavy equipment or materials stockpiling;
- Where blasting occurs, in close proximity:
  - A reduced blasting zone will be established between Stn. 15+550 and 15+750, bracketing the wetland and the placement of culvert TCV4 intended for use by amphibians;
  - Reduce the magnitude of the charges to reduce the potential for cracks and fissures to form in the rock and to reduce the percussive stresses on organisms resident in the pond;
  - Reduce the incidence of cracks in the rock by clearly directing the contractor, through the construction specifications, that the rock surrounding the wetland feature shall not be shattered for a minimum of 50 m in either direction;
  - If cracks do occur, particularly if they begin to seep water, the contractor shall be instructed to seal the cracks with concrete grouting or the best available technology;
  - Restrict blasting operations within 500 m of this pond to outside the amphibian breeding period of March 15 – May 15;
- Dyke any natural low points to ensure water continues to drain northwards, not into the cut along the roadway. Direct runoff from the road away from the wetland; and,
- Install 30 piece of log into Culvert TCV3 and TCV4 as woody debris for amphibians to shelter under while transiting through the culverts.

**Interim Mitigation Measures**

- Provide wildlife passage connections for reptiles, amphibians and small mammals to the small depressions and ephemeral pools to the south by installing a dry culvert (TVC4), guide fencing and guide wall at Stn 15+650.

**Long Term Measures**

- Keep the area isolated by directing recreational uses away from the wetland;
- Ensure roadside ditching takes potentially dirty water away the wetland, not toward it; and,
- Densely plant native coniferous tree species along the side slopes to isolate the wetland, reduce salt impacts and reduce the noise and vibration associated with the roadway.
6.5.2.4 Effects Assessment: South Kizel Drain and Other Wetlands

Other Wetland Area 1 (WL-1)

Other Wetland Area 1 (WL-1) is a small ephemeral pool in the white-pine hardwood mixed forest located near station 15+640 on the south side of the road, therefore will be removed in the future KNL Development construction period. Water depths in this non-provincially significant feature range from 0.3 m to 1.0 m in early spring and lower during mid-spring surveys. WL-1 substrates consist of leaf litter and dead fall. Amphibians (e.g. wood frogs) were documented in this wetland area during the breeding season.

The total area of WL-1 will be removed as a combination of the current road project and future land development. Of that removal, the road side slope grading will remove 0.05 ha. This is likely to have an impact on the local amphibian population, in particular wood frogs. Compensation plans to mitigate the incremental removal of this wetland feature due to the roadway have been developed by the City of Ottawa for an 8.2 ha wetland habitat area in the Carp River floodplain.

Other Wetland Area 2 & 3 (WL-02; WL-03)

Other Wetland Area 2 (WL-2) is a small, non-provincially significant wetland area at station 14+250, near PSW Unit #1, on the outside edge of the roadway arc. This wetland area is an ephemeral community located in the sugar maple-ironwood deciduous forest. It is located on the west side of the upland feature known as the saddle, as it lies between two higher rock knolls. Approximately, 0.01 ha of WL-2 will be removed due to the grading requirements of the TFD extension, however no additional area will be removed in the future as the area develops. Plans to compensate for the small impact to this wetland feature have been developed by the City of Ottawa for an 8.2 ha constructed wetland habitat in the Carp River floodplain.

Other Wetland Area 2 & 3 (WL-02; WL-03)

Other Wetland Area 2 (WL-2) is a small wet depression at station 14+275, near PSW Unit #1, on the inside edge of the roadway arc on the southeast side of the saddle. One of the species at risk was found near here [species and location held confidential at the request of MNR]. This small, ephemeral wetland is expected to be removed through the land development process. It is very close to the roadway, but will not be directly impacted by the road. As an interim measure in this area, a dry wildlife passage culvert and guide wall will be installed at 14+285 to allow for wildlife movement between WL-02 and WL-03 and habitats further away. The culvert may become redundant in the future as the KNL lands develop for housing, pending the field investigations and planning decisions made at that time to reflect the changes of the provincial Endangered Species Act enacted in 2007.

Other Wetland: Carp Tributary 1 (WL-04)

An ‘other’ wetland (WL-04) (Figure 5) was identified within the clay floodplain area on the east side of the Carp River, between Station 13+350 and 13+450 (Plate 5). A small tributary draining the Richardson Ridge Woodlot flows through this feature. This upland woodlot and floodplain wetland is planned to be preserved under the future development. The wetland area contained Freeman’s maple deciduous swamp, broad-leaved sedge organic shallow marsh and mixed graminoid mineral meadow marsh ELC communities. Peat layers in this wetland are expected to range in depth from 150 mm to 600 mm, averaging 240 mm. The wetland feature is bordered by agricultural fields to the north and south sides, the Carp River floodplain to the west and the South March Highlands ANSI further to the east.
Plate 5:
Non-Significant Wetland in the Carp River Floodplain at Stn 13+450

Approximately, 0.26 ha of the western edge of WL-04 falls within the TFD grading limit and will be removed (Figure 5). This removal will affect the broad-leaved sedge organic shallow marsh and mixed graminoid mineral meadow marsh vegetation communities. No additional removals are expected from the Richardson’s Ridge development in the future. Other potential impacts include stormwater runoff, salt contamination, disruption to wildlife habitat (e.g. amphibian, breeding bird, small mammals) and hydrological alteration. Two wet culverts will be placed here to convey the diffuse flow under the roadway, however we expect that wildlife will be able to utilize these culverts as passages permanently.

Mitigation for the disturbance of 0.26 ha of wetland habitat in WL-04 will involve:

Avoidance Measures

- Elimination of storm water management ponds 3A and 3B, which were planned for this location. These will be replaced by water oil and grit treatment compartments fitted into the catch-basins.

Construction Measures

- Floodplain to be pre-loaded:
  - Dyke and fence area to be stripped and graded as per the instructions of PSW #1 above;
- Reuse of the seed bank in the soils to support the restoration of the floodplain cut compensation as a swamp wetland; and,
- Three culvert installations under the road bed is planned at station 13+365 to maintain the floodplain dynamics of the Carp River and maintain the existing wetland hydrology and to allow for year-round wildlife passage.

Interim Measures

- No interim measures proposed.

Long Term Measures

- Continue to monitor flood activities in the Carp River watershed; and,
- Afforest the isolated farmland along the river.
Other Wetland: Carp Tributary 2

One small, high gradient, ephemeral stream flows out of series of small, ill-defined wetland depressions at the base of the Canadian Shield-defined Richardson’s Ridge, flowing west towards the Carp River. The small wet depressions may be removed by land developments in the future but will not be directly affected by the roadway. The road alignment crosses this ephemeral tributary as it enters the forest near Station 14+000 (Plate 6). No fish were found over several sampling periods due to the high gradient, small size and low flow conditions so it is not considered as direct fish habitat.

Plate 6:
Ephemeral tributary draining small, ill-defined wet depressions flowing west to the Carp River at Stn 14+000.

6.5.2.5 Effects Assessment: Deer Wintering Yards

Although white tailed deer are an important game species, they are quite abundant in the South March Highlands natural areas. Deer wintering yards have been identified by the OMNR as part of their game management strategy and policies for estimating populations of deer. The construction of Terry Fox Drive will remove 11.5 ha of deer Wintering Yards as per Figure 5. Wildlife in this area is more complex that the management of deer however. Although Deer Wintering Yards is a Designated Natural Feature, the high incidence of diverse wetlands, forest communities, shrub thickets, abandoned fields and stream corridors that occur within the study area require a more in-depth analysis than restricting the effects analysis to the effects of the project on white tailed deer. Subsequently, an expanded section on Wildlife is detailed in the section following the Vegetation VEC, below.

6.5.3 Assessment of Significance: Designated Natural Features

Table 6-7 provides a summary of the Designated Natural Features effects assessment for the Primary and Secondary Natural Lands, Area of Scientific and Natural Interest, Provincially Significant Wetlands, Deer Wintering Yards and Other Wetlands.

The relative significance of environmental effects on each Valued Environmental Component is evaluated using the criteria identified in Section 3.4 as presented in the Infrastructure Canada draft scoping document (INFS, 2009):
### Table 6-7 – Summary of Effects on Designated Natural Features against Current Baseline Conditions

<table>
<thead>
<tr>
<th>Project Interaction</th>
<th>Potential Effect</th>
<th>Mitigative Factor and Measure</th>
<th>Significance Criteria</th>
<th>Assessment of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Period</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Natural Lands (Significant Woodland)</td>
<td>• Loss of 10.2 ha of forested Primary Natural Lands within footprint; • Loss of 1.0 ha of forested Secondary Natural Lands within footprint; • Disturbance expected within 100 m zone along road; • Area is designated as general urban land use.</td>
<td>• Large areas of significant woodlands to remain outside the arc in preserved lands; • 25 ha area of Significant woodland preserved within the arc (Richardson Ridge Forest); • Development of an Edge Management Plan for the interface between the road infrastructure and the adjacent PNL / SNL areas; • Compensation through the creation of 2 ha of afforestation on Carp River floodplain or elsewhere within the Ottawa region; • Small loss of biodiversity including Species at Risk habitat and regionally/locally significant flora and fauna.</td>
<td>• Nature of Effect – Negative, direct loss; • Magnitude – Low; Medium with land development; • Geographic Extent - Local; • Duration - Construction; • Frequency - Once (low); • Permanence – Permanent; • Ecological Context – Local and species-wide.</td>
<td>Not significant with mitigation.</td>
</tr>
<tr>
<td>Secondary Natural Lands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South March Highlands Candidate Area of Natural and Scientific Interest ANSI</td>
<td>• Removal of 10.54 ha of Candidate ANSI within road grading footprint representing 1.2% of total 895 ha; • 67% of ANSI will remain intact as internal forest conditions.</td>
<td>• Development of an Edge Management Plan for the interface between the road infrastructure and the adjacent ANSI; • Partial compensation through the creation of an 8.2 ha wetland restoration area in Carp River floodplain; • Incremental loss of biodiversity including habitats for Species at Risk and regionally/locally significant flora and fauna; • Future development designated as general urban land use to remove 21.2% of ANSI; • Large area protected outside the TFD arc is owned and managed as conservation forest by the City of Ottawa.</td>
<td>• Nature of Effect – Negative, direct; • Magnitude – Medium; • Geographic Extent - Local; • Duration - Construction; • Frequency - Once (low); • Permanence – Permanent; • Ecological Context – Local and species-wide.</td>
<td>Not significant with mitigation.</td>
</tr>
<tr>
<td>Wetlands (PSW and Other Non-PSW)</td>
<td>• Removal of 0.3+0.69 ha of Provincially Significant Wetlands within road footprint; • Removal of 0.26+0.01+0.04 ha of Other Wetlands within footprint; • Remnant of PSW#2 may removed by future land development; • Minor alteration of wetland hydrology, but shallow soils over impervious clay will result in a minimal impact in wetland function.</td>
<td>• Avoidance: eliminate SWM ponds 4A &amp; 4H; redesigned SWM treatment strategy at discharge points to Shirley’s Brook; • Avoidance: eliminate SWM ponds 3A &amp; 3B; redesigned SWM treatment strategy at discharge points to Carp River Tributary #1; • Direct wetland loss represents 0.87% of the total 114 ha PSW complex; • Narrow road base by increasing the steepness of slopes using armour-stone wildlife guide walls; • Maintain wildlife corridors, culvert installations with guide walls; • Construct during the fall to minimize impacts on vegetation and wildlife; • Compensation for wetland loss through the creation of an 8.2 ha constructed wetland habitat area in the Carp River floodplain; ratio about 8 gain : 1 loss; • No groundwater contributions into PSW#1 and PSW #2 but may be in PSW#4; • No groundwater contributions into PSW#1 and PSW #2 but may be in PSW#4;</td>
<td>• Nature of Effect – Negative, direct; • Magnitude – Medium; • Geographic Extent - Local; • Duration - Construction; • Frequency - Once (low); • Permanence – Permanent; • Ecological Context – Local and species-wide.</td>
<td>Not significant with mitigation.</td>
</tr>
<tr>
<td><strong>Operations Period</strong></td>
<td></td>
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</tr>
<tr>
<td>Routine operations and maintenance period (Vehicle Use)</td>
<td>• High potential for road kill of animals; • Noise disturbance to adjacent developed areas; • Noise disturbance to sensitive wildlife;</td>
<td>• Maintain and monitor a continuous barrier to wildlife movement throughout forested sections; • Monitoring the use of culverts and the number of killed animals will be important to learn more about road impacts on the ecology and how they can be minimized in the future; • Wildlife can become adapted to increased traffic levels. Species unable to adapt will move deeper into the South March Highland forest lands further north; • Edge management plantings will reduce road noise once trees mature and the canopy closes; • Road kills can cause significant impacts to at-risk animal populations. May initially be significant to wildlife until the guide fencing is learned, plantings mature and adaptation occurs; • Regular maintenance will be required to maintain the fence from damage due to fallen trees, vandalism, vehicle accidents;</td>
<td>• Nature of Effect: negative, direct; • Magnitude – Moderate; • Geographic Extent - Low; • Duration - On-going; • Frequency - Continuous; • Permanence – Yes – Until development occurs; • Ecological Context – Local and species-wide.</td>
<td>Not significant with mitigation.</td>
</tr>
<tr>
<td>Project Interaction</td>
<td>Potential Effect</td>
<td>Mitigative Factor and Measure</td>
<td>Significance Criteria</td>
<td>Assessment of Significance</td>
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<td>Storm runoff</td>
<td>Contamination of PSW’s by runoff. Reduce salt use for de-icing and incorporate Best Management Plans; Treat runoff in SWM system to meet MOE water quality guidelines (e.g., oil &amp; grit separators before discharge).</td>
<td>Nature of Effect – Negative, indirect; Magnitude – Low; Geographic Extent - Local; Duration - Continuous; Frequency - Periodic; Permanence – Permanent; Ecological Context – Regional contribution to pollution load in Ottawa River.</td>
<td>Not significant with mitigation.</td>
<td></td>
</tr>
<tr>
<td>Habitat Fragmentation</td>
<td>Interim fragmentation of wildlife habitat in ANSI and Primary Natural Lands. Over longer term period, when land development proceeds road will be on the edge of the ANSI. Provide interim wildlife crossings for small mammals and herptiles; May need to post warning signs or temporarily fence roadway, depending on the need as based on monitoring of road kill statistics and locations; Provide population-level monitoring of species at risk to ensure mitigation measures are effective.</td>
<td>Nature of Effect – Negative, direct; Magnitude – Low; Geographic Extent - Local; Duration - Continuous; Frequency - Periodic (medium); Permanence – Permanent; Ecological Context – Local and species-wide.</td>
<td>Not significant with mitigation.</td>
<td></td>
</tr>
<tr>
<td>Reduction of biological diversity (incl. regional and local significant species)</td>
<td>Direct internal forest habitat loss; Disturbance to wildlife; Road kill of wildlife. Provide wildlife crossings and guide walls; Monitor wildlife populations; Compensation for wetland loss and reduction of biological diversity through the creation of an 8.2 ha constructed wetland restoration area in Carp River floodplain.</td>
<td>Nature of Effect – Negative, indirect; Magnitude – Low; Geographic Extent - Local; Duration - Continuous; Frequency - Periodic (medium); Permanence – Permanent.</td>
<td>Not significant with mitigation.</td>
<td></td>
</tr>
</tbody>
</table>

* Magnitude: High – fundamental loss of ecological functions of feature; moderate – large portion of feature removed, but functionally intact; Low – minor area affected, slightly affecting the ecological functions.