6.0 Potential Environmental Impacts and Mitigation Measures

This section documents the following:

- **Assessment of potential environmental effects:** A detailed assessment of the potential impacts associated with construction and operation (including repairs and maintenance) of the proposed roadway on the physical and natural environment and for socio-economic features that may be affected by the potential environmental changes.

- **Proposed mitigation measures:** A list and description of mitigation measures, referenced to the environmental effects they are designed to eliminate or reduce, that are required to prevent, reverse, or satisfactorily reduce significant adverse effects.

- **Determination of significance:** A quantitative statement of whether the residual adverse environmental effects, after mitigation measures are implemented, are significant; the determination of significance is based on the following criteria: magnitude, geographic extent, duration, frequency, permanence, and ecological context.

The impact assessment is organized by the identified Valued Environmental Components (VEC's) (previously identified in **Section 4.2**), and the potential for project interaction with these VECs.

Accidents, malfunctions and effects of the environment on the project are considered separately is **Section 7**.

As part of project design several standard mitigation procedures will be used to limit the extent of potential impacts; these include Sediment and Erosion Control Planning and Dust Control Measures described below. These were considered to be in place in the assessment of project impacts.

Dust Control

Dust control will be required to reduce air quality effects in local areas as dust will be generated

during the blasting operations and as the aggregates are placed over the roadbase. Blast mats will reduce some of the dust and noise, but the amount of dust generated during blasting of bedrock is expected to be low as the particles generated are relatively large and will settle very quickly. Dust control will include wetting of aggregate storage areas, haul roads and the regular sweeping of existing roadways over which the construction trucks travel. Minimizing the quantity of soil or aggregate stockpiles at the project site will also reduce wind-generated dust emissions.

Erosion and Sediment Control

The highest potential for erosion occurs during the top soil stripping, grubbing and grading operations. The emphasis of erosion and sediment control in construction projects is to prevent erosion rather than treat sediment. Key principles of erosion and sediment control will be applied including; keep clean water clean, handle dirty water separately, minimize the amount of exposed soil, minimize time of exposure of soil, keep sediment on site, avoid steep un-seeded slopes and have a contingency plan and the resources for emergencies. The "National Guide to Erosion and Sediment Control on Roadway Projects" by the Transportation Association of Canada (TAC) contains a synthesis of Canadian and international practice and numerous Best Management Practices (BMPs) for project planning, site management, erosion control and sediment control. Measures appropriate to Terry Fox Drive – Part A will be used including;

- Disposal of excavated material; surplus material; and construction debris away from watercourses, wetlands and ditches;
- Part A TFD has no watercourse crossings that require culverts, so the probability of sediment runoff affecting fish habitat is low;
- Directing water from the construction site or that accumulated in excavations to settling ponds or adjacent vegetated areas away from watercourses;
- Where native soils have a high silt or clay content, high rate settling tanks with added flocculants can be used to ensure silt laden water does not flow off site;
- Stabilization of roads and disturbed areas during and as soon as practical following construction in the vicinity of watercourses; and
- Slope stabilization prior to the area being brought to final grade in areas of high erosion potential.

Sediment and erosion control (S & EC) specifications are part of contractor requirements prepared for work near wetlands/drainage. Drawings will indicate the location, quality and quantity of the S & EC requirements to be installed and maintained by the Contractor. Prior to beginning work, the contractor must prepare a Sediment and Erosion Control Plan, stamped by a Professional Engineer and approved of by the City. Additional materials (silt fence, silt sacks, containment booms) must be kept on site as a contingency in case of inclement weather causing emergency situations where release of sediment to a watercourse is possible. Removal and proper disposal of the materials used during construction will normally be a pay item, for execution by the contractor once the grass or other vegetation has grown in well enough to stabilize the soils and the materials can be removed.

6.1 Surface Water Quality and Quantity

No permanent watercourse crossings occur in the TFD Part A project and there are no watercourse channels identified as streams in the immediate vicinity of the roadway. The Part A TFD project is within the drainage area of the Shirley's Brook watershed. Crossing structures occur in the existing Innovation Road to March Road section and one additional culvert is proposed for the 16+260 area to address sheet drainage in this area.

Potential effects related to surface water are associated with the potential for storm drainage and any associated contaminants to enter watercourses down-gradient of the project area. This generally is restricted to potential impacts to down-gradient fish and fish habitat discussed in **Section 5.8**, as recreational or potable water use is not present or utilized as a resource in the study area.

Potential effects include suspended sediment generated during construction activities, sediment and associated trace hydrocarbon or metals contaminants generated by operations or equipment/materials storage, sediment or salt associated with maintenance activities, and changes to surface water flow associated with roadway operations.

During construction earthworks, such as grubbing and stripping topsoil/overburden and the placement of excess material in stockpiles may lead to increased erosion and sedimentation of adjacent water bodies.

Some modifications of surface runoff will result from changes in drainage in the areas of new and modified roadway. Drainage ditches and cross culverts will be constructed to manage surface drainage, based on revised drainage watershed sizes. These will be designed to carry flows to the natural drainage network. The effects of the project on water quantity will be minor and localized and are considered not significant.

Mitigation for sediment impacts consists of the specifications for Sediment and Erosion Control. Potential for contaminants and flow regulation during operation is mitigated through stormwater management design. Stormwater is required to meet Provincial MOE Requirements as well as City of Ottawa guidelines during construction and operation. Monitoring of stormwater will be required as discussed in **Section 10**.

During the operations period, storm water from the roadway will be directed to an existing storm management facility that is located in the Morgan's Grant subdivision. This is expected to mitigate any surface water effects to meet applicable criteria.

Table 9 provides a summary of the surface water effects assessment.

Table 9 – Potential Project Interactions with Surface Water

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation and General Construction Activities	• Degradation of water quality due to sediment or other contaminants down-gradient of the study area	• Blasting is not expected near watercourses (if blasting required DFO Blasting Guideline to be followed) • Soils present are not highly erodible • Sediment and Erosion Control implementation and monitoring as outlined in the surface water (3.6) including: • Measures in-place prior to construction activity • Minimize time soils exposed • Clearing to be restricted to construction area and minimal work space • Daily work area stabilization • Use of clean rock for riprap/armourstone/backfill	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *once or twice (second time when additional lanes added for Section 1)* Permanence - *No* Ecological Context – *Local*	Not significant with mitigation

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
		• Contingency for predicted and unpredicted storm events • No equipment in watercourses • Timing of works in and adjacent to watercourses within designated the designated low flow construction windows to avoid sensitive periods for down-gradient fish • Construction monitoring		
Waste Disposal and Storage of Equipment and Materials	• Degradation of water quality due to sediment or other contaminants down-gradient of the study area	• Proper sighting of storage locations and refuelling areas at least 30 m from watercourse • Requirement for routine maintenance of equipment • Contingency Plan for Spills (See **Section 7**)	Magnitude – *Low* Geographic Extent - *Low* Duration - I*ntermittent* Frequency - *Occasional* Permanence - *No* Ecological Context – *Local*	Not significant with mitigation
Operations				
Routine operations and maintenance	• Degradation of water quality due to sediment or other contaminants down-gradient of the study area • Changes to flow volumes	• Stormwater management design • Mechanical clearing will primarily be used for vegetation control in sensitive areas	Magnitude – *Low* Geographic Extent - *Low* Duration - O*n-going* Frequency - *Occasional* Permanence - *No* Ecological Context – *Local*	Not significant
Winter maintenance	• Degradation of water quality due to salt down-gradient of the study area	• Salt Management/Snow Disposal Plan	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *Occasional* Permanence - *No* Ecological Context – *Local*	Not significant

* Magnitude High-affect above Fresh Water Aquatic Life Guideline ; moderate – affect near guideline; Low – affect below guideline.

6.2 Groundwater Quality and Quantity

The water supply within the study area is currently City supplied residential water from a surface water supply (Ottawa River). It is noted that there are some historical wells in the area over 500 m from the Part A study area.

No extensive groundwater dewatering efforts are expected for the project during construction. Further, any fuel spills are expected to be of low magnitude and contingency planning efforts would result in a quick clean up of any spills. Near wetlands and identified water supply wells, blast management options will be conducted by the contractor. In addition to the normal blast mats, this will include increasing the spacing between boreholes, decreasing the shot loadings within each borehole and adjusting the timing to desynchronize the percussion of the blasts. One abandoned well, which will be decommissioned through the project, is unused therefore no further impact to well supplied water sources is expected.

During operations, Salt Management/Snow Disposal planning would minimize runoff effects. As such no long term impacts to ground water supplies are anticipated as a result of the project.

Table 10 provides a summary of the ground water effects assessment.

Table 10 – Potential Project Interactions with Ground Water

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation (Blasting)	• Degradation of ground water quality due to sediment or other contaminants • Ground water quantity reduction due to dewatering activities	• No identified well water supplies within 500 m of project • Any extracted groundwater from excavation dewatering activities would be returned through surface flow • Blast management near PSW #4	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *once or twice (second time when additional lanes added for Section 1)* Permanence - *No* Ecological Context – *Local*	Not significant with mitigation

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Operations				
Winter maintenance	• Degradation of ground water quality due to salt application	• Salt Management/Snow Disposal according to City protocols	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *Occasional* Permanence – *Replacement to be provide* Ecological Context – *Local*	Not significant

* Magnitude High-affect above Drinking Water Guideline ; moderate – affect near guideline; Low – affect below guideline.

6.3 Surface Geology and Soils

Construction activities are not expected to adversely affect bedrock, surficial geology or soils. Soils in the majority of the study area are characterized as sandy which may be subject to erosion but this can be minimized with the appropriate mitigation measures (See Surface Water Section 6.1). Effects will be prevented or will be mitigated in accordance with the appropriate guidelines documented in the S&EC specifications. No monitoring is associated with bedrock/soils.

If contaminated soils are encountered, they will be removed or remediated in accordance with the Canadian Soil Quality Guidelines for the Protection of Environment and Human Health.

Table 11 provides a summary of the geology/soils effects assessment.

Table 11 – Potential Project Interactions with Surface Geology and Soils

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation	• Loss of bedrock/soils within the project footprint • Potential to encounter erodible soils • Unlikely potential to encounter contaminated soils	• Sediment and Erosion Control • If contaminated soils are encountered, they will be removed or remediated in accordance with the Canadian Soil Quality Guidelines for the Protection of Environment and Human Health	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *once or twice (second time when additional lanes added for Section 1)* Permanence - *No* Ecological Context – *Local*	Not significant with mitigation

* Magnitude High-affect CCME Industrial Guideline ; moderate – affect near guideline; Low – affect below guideline.

6.4 Air Quality

The main interaction of the proposed construction activities with the atmosphere is through dust generation and emissions from construction equipment and vehicles (sulphur compounds, carbon dioxide, carbon monoxide and nitrogen oxides). Dispersion of dust generated by construction will vary with conditions such as wind, temperature and humidity and the speed of construction vehicles. Residents located adjacent to the proposed alignment (e.g. those on the north side of the existing section of roadway) may be periodically exposed to dust from heavy equipment and vehicles within the construction area. In addition, heavy diesel construction equipment and trucks can emit particulate matter from the engine exhausts.

With mitigation for dust including the application of water or other dust suppression agent, and appropriate storage and handling procedures for soils and aggregate, particulate emissions will not result in significant impacts off the site. Dust management is expected to focus on areas with potential for localized fugitive releases such as storage piles and cleared routes from supply to application. Where possible these areas will be located away from populated areas. A tire wash

down area to be available at the worksite will minimize the tracking soil onto the public roadways. Regular sweeping of the streets will also help minimize dust from mud tracking.

Greenhouse gas (GHG) emissions are generated by all fossil fuel combustion sources. Vehicle emissions during the construction and operations phases are sources of GHG emissions. During the summer months, especially during smog events or ozone-action days, diesel truck or equipment idling will be minimized. Refuelling activities will be conducted during cooler morning or evening hours as much as possible.

During the operations period, vehicles using the road may emit several types of pollutants, including: carbon monoxide, nitrogen oxides (NOx), volatile organic compounds (VOCs or non-methane hydrocarbons - NMHC), particulate matter (PM), carbon dioxide (CO_2) and sulphur oxides (SOx).

Impacts on Greenhouse Gas (GHG) emissions must also be considered for new roadway projects. Levels of air pollutants at any point in the environment at any particular time are dependent on source emission rates, dispersion characteristics and removal (scavenging) rates. The primary contaminants associated with tailpipe emissions that contribute to GHG emissions and global warming are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Most of the primary pollutants are transformed in the atmosphere to secondary pollutants including smog, ozone and various nitrogen and sulphur compounds. These compounds along with water vapour and ozone are naturally occurring greenhouse gases and these compounds are continuously emitted to and removed from the atmosphere by natural processes. Concentrations of the primary pollutants tend to be highest immediately adjacent to the roadway, with a rapid decrease in concentration as one moves away from the corridor.

The impacts on air quality from vehicle emissions during operations with improved traffic flow are expected to be not significantly different than under a future scenario without the roadway with a congested local road network.

Table 12 provides a summary of the air quality effects assessment.

Table 12 – Potential Project Interactions with Air Quality

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation and General Construction Activities	• Increased levels of airborne particulate matter	• Adherence to the Environmental Code of Good Practice for General Construction • Dust control implementation and monitoring in response to complaints	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *once or twice (second time when additional lanes added for Section 1)* Permanence - *No* Ecological Context – *Local*	Not significant with mitigation
Vehicle Use/Transport of Materials	• Tailpipe emissions and resultant smog and GHG effects	• Air contaminant emissions will be minimized by proper maintenance of vehicles and equipment associated with construction.	Magnitude – *Low* Geographic Extent - *Low* Duration - *One season* Frequency - *Continuous* Permanence - *No* Ecological Context – *Local*	Not significant with mitigation
Operations				
Routine operations and maintenance (Vehicle Use)	• Tailpipe emissions and resultant smog and GHG effects	• Improvements to traffic flow is expected to result in no significant increase in emissions from current levels	Magnitude – *Low* Geographic Extent - *Low* Duration - O*n-going* Frequency - *Continuous* Permanence - *No* Ecological Context – *GHG Local and Global*	Not significant

* Magnitude High-affect above Guideline ; moderate – affect near guideline; Low – affect below guideline.

6.5 Noise

Noise levels are expected to increase for a short period of time during construction activities. In particular for the residents that are located to the north of the existing section of roadway that is to be improved. This will be mitigated by meeting regulated noise levels, such that all excavators, rock trucks, dump trucks packers and other heavy equipment will be fitted with noise reducing baffles as required by existing municipal bylaws. The City of Ottawa's Environmental Noise Control Guidelines (ENCG, 2006) will be applied to this project. Of note will be the blasting activities, although these can usually be timed to occur at the same time each day,

typically in late afternoon when most residents will be at work. Blasting is common occurrence in the area as all the developed areas are built on bedrock and excavations for basements and site servicing is often done by blasting.

Noise levels along the existing portion of the roadway are expected to increase as a result of increased land development in the area and increased traffic volume along the roadway. For the new sections of the road, it is expected that appropriate noise fencing would be put in place for new residential areas that are to be abutted against the roadway. The 2000 EA noise assessment determined that existing measures associated with subdivision development is satisfactory for mitigating noise levels predicted for year 2021 and posted speeds up to 80 km/hr.

Table 13 provides a summary of the noise effects assessment.

Table 13 – Potential Project Interactions with Noise

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
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 • Blasting plan established to time the blasts to coincide with residential activities, no night time blasts nor on weekends • Noise control implementation and monitoring in response to complaints	Magnitude – *Medium* Geographic Extent - *Low* Duration - O*ne season* Frequency - O*nce or twice (second time when additional lanes added for Section 1)* 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 existing developed areas will be similar to current levels • Noise impacts mitigated by subdivision noise control measures	Magnitude – *Low* Geographic Extent - *Low* Duration - O*n-going* Frequency - *Continuous* Permanence - *No* Ecological Context – *Local*	Not significant

* Magnitude High-affect above Bylaw requirement; moderate – affect near requirement; Low – affect below requirement.

6.6 Vegetation

The development of the Part A roadway was originally planned to remove less than 5.3 ha of existing vegetation. The majority of this largely deciduous forest has been cleared by the Morgan's Grant development since the Class EA addendum was completed in 2007. Of the remaining area, 1.15 ha of Trillium Woods will be removed east of Second Line Road and 1.17 ha of deciduous forest west of Second Line Road; totalling 2.285 ha will be cleared. Of the remaining trees several (70) are butternut trees, a species at-risk, and are to be removed. Of this seventy, sixteen are classified as retainable and their removal will be offset at a ratio of 20 to 1 through an agreement with the Ministry of Natural Resources, under the Endangered Species Act of Ontario. As a result of this mitigation and proposed edge management plan the removal of this vegetation is not deemed to be significant. Further, there is also potential for changes to vegetation communities in areas adjacent to the roadway due to non native or invasive species introductions.

The area of natural and scientific interest (ANSI) occurring within the Part A right Of way is 4.15 ha of which there remains the 2.285 ha which remains forested and will be cleared. The remainder included a Hydro Corridor and the Morgan's Grant development of which both have previously been cleared.

Mitigation for general vegetation removal (other than Species of Special Concern discussed in **Section 6.10**, or as wildlife habitat discussed in **Section 6.8,** or for Designated Environmental Areas such as ANSI discussed in **Section 6.11**) is not required as, with the exception of Butternut trees, no significant species have been encountered.

Mitigation for potential introduction of invasive species will be addressed through following the guidance provided in *A Strategic Plan for Managing Invasive Plants in Southern Ontario* (Ontario Invasive Plant Working Group, 2000).

Addendum mitigation to address vegetation community effects are outlined below.

An Edge Management Plan (EMP) is a common tool for controlling edge effects at the interface between natural and urban environments. The following is recommended for inclusion in the EMP:

Construction Measures

- On the landscape plans, specify native tree and dense shrub plantings along the forest edge;
    - Do include butternut tree saplings in the community mix;
    - Match the existing species mix as much as practical;

- Avoid the use of unsterilized topsoil from areas with invasive species for fill or landscaping along the portion of the ROW within the boundaries of the South March Highlands or other natural features.
    - This is to avoid the importation of exotic species such as wild garlic, *Phragmites* or Scotch thistle; and,

- Keep construction equipment vehicles free of residual soil deposits that could carry non-native seeds into the area.

Interim Measures

- Conduct a post-construction survey of the ROW one year after construction to identify and recommend removal strategies for invasive species before they become firmly established.

Long Term Measures

- Monitor butternut health following agreement with the MNR.

Table 14 provides a summary of the vegetation effects assessment.

Table 14 – Potential Project Interactions with Vegetation

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation	• Loss of 2.285 ha of deciduous forest and ANSI • Loss of natural	• Not considered to be ecologically significant or valued except as habitat or for Species of Special Concern (**Sections 6.10 and 6.8**) • To control potential for invasive	Magnitude – *Low* Geographic Extent - *Low* Duration - *Ongoing* Frequency -	Not significant with mitigation

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
	vegetation communities • Loss of SAR plants • Loss of regionally and locally significant plant species • Conversion from interior forest conditions to edge habitat	species – no use of unsterilized topsoil from areas with invasive species for fill or landscaping along the portion of the ROW within the boundaries of the South March Highlands or other natural feature • Prepare edge management landscaping plans for implementation • Avoid importation of exotic plan species • Provide follow up monitoring • Development of an Edge Management Plan for the interface between the road infrastructure and the adjacent natural lands	O*ngoing* Permanence -Yes Ecological Context – *Local*	
Operations				
Routine operations and maintenance	• Potential for vegetation to be affected by vehicle emissions • Introduction of invasive species affecting community	• Not considered to be ecologically significant or valued except as habitat or for Species of Special Concern (**Sections 6.10 and 6.8**) • Invasive species management following general OIPWG guidance and City environmental sustainability policy • Post-construction survey of the ROW and a 30 m buffer one year after construction to identify and remove invasive species before they become firmly established	Magnitude – *Low* Geographic Extent - *Low* Duration - O*n-going* Frequency - *On-going* Permanence - Yes Ecological Context – *Local with mitigation*	Not significant with mitigation

* Magnitude High-affect at a population level; moderate – affect at a regional level; Low – affect local.

6.7 Wetlands

Potential impacts to wetlands related to this project are indirect as no wetlands are within the footprint of the roadway, nor are there any provincially significant wetlands in the immediate vicinity of the roadway. There are a number of individual wetlands within the nearby South March Highlands Provincially Significant Wetland (PSW) Complex that lie east and northeast of

the roadway. The large wetland complex located approximately 200 m north of the far western section of Part A does not appear to be provincially significant based on mapping provided in May 2009 by the Ontario Ministry of Natural Resources. There is limited potential for stormwater to affect the wetland (such as salt impacts and for groundwater or surface water regime changes affecting wetland hydrology) as the predominant drainage is away from this area crossing TFD from west to east. As the closest wetlands to the road are up-gradient they are therefore less prone to the water-borne problems of invasive species, salt impacts and water regime changes.

Given that there will be no direct loss of wetland areas and the closest wetlands are about 200 m away from the roadway (and up gradient) significant effects to wetlands are not expected.

Table 15 provides a summary of the wetland effects assessment.

Table 15 – Potential Project Interactions with Wetlands

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation	• Indirect impacts to wetland function including sedimentation, invasive species and hydrology alteration	• Appropriate Sediment and Erosion Control in the vicinity of wetlands including no stockpiling of potentially erosive materials • No blasting next to wetlands during the bird nesting season • Direction of surface runoff from construction areas to overland flow prior to wetlands • Drainage control to maintain existing wetland hydrology • Guidance on Invasive Species Management from Ontario Invasive Species Working Group • Significant Wetlands are up-gradient and about 200 m from the roadway limiting potential impacts	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *once or twice (second time when additional lanes added for Section 1)* Permanence - *No* Ecological Context – *Local*	Not significant with mitigation
Operations				

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Winter maintenance	• Degradation of water quality due to salt downgradient of the study area • Significant Wetlands are up-gradient and about 200 m from the roadway	• Salt Management Plan • Stormwater runoff directed through existing SWM pond for quality treatment prior to discharge	Magnitude – *Low* Geographic Extent - *Low* Duration - *one season* Frequency - *Occasional* Permanence - *No* Ecological Context – *Local*	Not significant

* Magnitude High-affect loss of wetland function; moderate – affect not involving loss of function; Low – minor affect to individuals.

6.8 Wildlife

As described in the baseline conditions section of this report, a large variety of mammals and herpetofaunal species are known to exist in the study area. Potential effects related to wildlife include direct loss of habitat within the ROW and fragmentation of adjacent habitat, as well as potential vehicle mortality. In general, the wildlife present is common in the general area and not limited by habitat at the population level (Birds are discussed separately in **Section 6.9** and Species of Special Concern in **Section 6.10**). Significant tracts of natural habitat will continue to exist to the north of the roadway. It is expected that wildlife will migrate to this area.

A deer wintering area is noted for the general area surrounding the South March Highlands Area of Natural and Scientific Interest. This area, where it is adjacent to Part A TFD, is generally within currently developed or proposed subdivision development. It is proposed that on-going monitoring of vehicle/wildlife collisions occur and if determined required, in consultation with MNR, appropriate signage be established.

One amphibian vernal pool was noted in the project area. However, this was generally dry throughout the growing season and not considered significant for amphibian populations in the area. No monitoring of wildlife is anticipated during construction. During operations,

monitoring of the location of roadkills should be maintained by City staff until enough information is available to target signage in the most prone areas along Terry Fox Drive.

Table 16 provides a summary of the wildlife effects assessment.

Table 16 – Potential Project Interactions with Wildlife

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation	• Loss of habitat • Disturbances or killing of wildlife	• Not considered to be ecologically significant or valued except as habitat for Birds or Species of Special Concern (**Section 6.9 and 6.10**) • Education of construction workers to avoid wildlife killing	Magnitude – *Low* Geographic Extent - *Low* Duration - O*ngoing* Frequency - O*ngoing* Permanence -Yes Ecological Context – *Local*	Not significant
Operations				
Routine operations and maintenance	• Habitat fragmentation • Vehicle mortality	• Maintain records of roadkill; • Provide targeted signage at primary crossing locations	Magnitude – *Low* Geographic Extent - *Low* Duration - O*n-going* Frequency - *On-going* Permanence - Yes Ecological Context – *Local*	Not significant

- Magnitude High-affect at a population level; moderate – affect at a regional level; Low – affect local.

6.9 Migratory Birds

The project area includes habitat that would support migratory birds including hedgerows and forested areas. (See **Appendix C** for species that were identified during the bird survey). Potential effects to migratory birds include direct loss of habitat and potentially nests, as well as indirect noise disturbance during both construction and operations periods. It is recognized that the projects will need to be compliance with the federal *Migratory Birds Convention Act (MBCA* 1994) and the provincial *Fish and Wildlife Conservation Act* (*FWCA* 1997). Further the City is also aware that the "incidental take" of migratory birds and the disturbance, destruction or taking of the nest of a migratory bird are prohibited under Section 6 of the *Migratory Bird Regulations*. "Incidental take" is the killing or harming of migratory birds due to actions, such as economic

development, which are not primarily focused on taking migratory birds. As no permit can be issued for the incidental take of migratory birds or their nests as a result of the proposed activities, mitigation to prevent loss include the timing restrictions to avoid nesting birds during vegetation removal (both for site preparation and maintenance activities). If bird nests are encountered outside of the expected period additional guidance will be sought from Environment Canada.

Vehicle collisions could also result in bird mortality. There will likely be impacts from habitat loss, which would occur in the clearing and grubbing stages of construction. Habitat loss includes the removal of trees, shrubs and other ground cover such as herbaceous plants, brush piles and dead falls that provide nesting habitat for various bird species. Edge habitat tends to attract generalist predators and parasites to an area. The presence of high concentrations of predators can result in these areas becoming reproductive sinks in which large numbers of birds attempt to breed but have poor breeding success. The deleterious effects of habitat edge may extend up to 600 m into the forest/undisturbed interior. Potential adverse effects may result from the destruction or permanent abandonment of a nest or increased predation of eggs and young during temporary abandonment.

Table 17 provides a summary of the migratory birds effects assessment.

Table 17 – Potential Project Interactions with Migratory Birds

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation	• Loss of habitat • Mortality or loss of nests • Noise disturbance • Increase in predation and decrease in breeding success	• Clearing and blasting of the ROW will be conducted outside of the general nesting window (May 1 to July 23) to avoid destruction of nests • Training of staff to identify nesting birds and stop work if encountered • If bird nests are encountered outside of the expected period, additional guidance will be sought from Environment Canada	Magnitude – *Low* Geographic Extent - *Low* Duration - One Season Frequency - O*nce or twice (second time when additional lanes added for Section 1)* Permanence -Yes Ecological Context – *Local*	Not significant with mitigation
Operations				
Routine operations and maintenance	• Vehicle collision mortality • Mortality associated with maintenance (mowing)	• Clearing of the ROW will be conducted outside of the general nesting window (May 1 to July 23) to avoid destruction of nests • Training of staff to identify nesting birds and stop work if encountered • If bird nests are encountered outside of the expected period, additional guidance will be sought from Environment Canada	Magnitude – *Low* Geographic Extent - *Low* Duration - O*n-going* Frequency - *On-going* Permanence - Yes Ecological Context – *Local with mitigation*	Not significant with mitigation

* Magnitude High-affect at a population level; moderate – affect at a regional level; Low – affect local.

6.10 Species of Special Concern

SARA provides protection for individuals of wildlife species at-risk listed under Schedule 1 of the Act, their residences (dwelling places, such as a den or nest or other similar area that is occupied or habitually occupied by one or more individual during part or all of its life cycle) and critical habitat (that part of areas used or formerly used by the species to carry out their life processes that is deemed essential for survival or recovery). Legal measures to provide protection to wildlife in addition to *SARA* include: the *Migratory Birds Convention Act* (MBCA), *Canada Wildlife Act*, *Fisheries Act* (FA), and *National Parks Act*. Joint responsibility for recovering

listed species is delegated to Environment Canada, Parks Canada Agency and the Department of Fisheries and Oceans. The federal government works closely with the provincial Ontario government in the recovery and protection of Species at-Risk present in the province. The 1996 National Accord for the Protection of Species at-Risk in Canada, committed to a national approach for species protection. Where federally listed species of special concern are protected provincially, the provincial legislation takes jurisdiction (except for migratory birds and fish which are federally protected). Environment Canada has the added responsibility to protect any species at-risk that is not adequately protected by provincial or territorial laws.

The Ontario *ESA* provides protection for listed species, stating "no person shall kill, harm, harass, capture or take a living member of a species that is listed on the Species at-Risk in Ontario List as an extirpated, endangered or threatened species" (Section 9 *ESA 2007*) and "no person shall damage or destroy the habitat of, a species that is listed on the Species at-Risk in Ontario List as an endangered or threatened species" (Section 10 *ESA 2007*). Habitat refers to both regulated habitat (specifically designated in regulation) and general habitat ("an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding"… including "dens, nests, hibernacula and other residences).

The province of Ontario has direct responsibility for species listed under *ESA* within provincial lands. In addition, policy applicable to the provincial *Planning Act* requires municipalities to "have regard to" the habitat of endangered and threatened species.

The species of concern that have been observed either within or in the vicinity of the TFD Part A project that are listed under *SARA*, and which are also listed under the provincial *ESA*, include Butternut Trees and Blanding's turtle. Additional *SARA/ESA* species have been identified in the general area or as having potential to occur in the general area were determined to have a low potential to occur within the Part A study area (see **Section 5.4.9**).

No federal or provincial recovery / management plans have been finalized for these species and critical / regulated habitat has not been designated within or near the project area. Recovery teams have been established nationally for American Ginseng and Butternut. Provincial recovery teams are in place for Blanding's Turtle (as part of Ontario Multi-species at-risk turtles) and for Butternut.

Potential adverse affects to these species include loss of the Butternut within the ROW, potential for wildlife / vehicle collision, habitat loss or fragmentation and potential for loss of bird nests.

A description of effects and proposed mitigation to avoid or lessen adverse effects is described below. Monitoring is identified in **Section 10**. Mitigation to avoid or lessen adverse effects, and environmental effects monitoring will be coordinated with MNR as these species are also listed under *ESA*, and with Recovery teams as appropriate. The intent of mitigation proposed is to prevent impacts to listed species and their habitat, but if not possible, to meet the requirements for a permit under *ESA* (Section 17) including:

- "… an overall benefit to the species will be achieved within a reasonable time through requirements imposed by conditions of the permit;
- … reasonable alternatives have been considered, including alternatives that would not adversely affect the species, and the best alternative has been adopted, and
- … reasonable steps to minimize adverse effects on individual members of the species are required by conditions of the permit; or
- …the activity will result in a significant social or economic benefit to Ontario;
- … consultation with a person who is considered … to be an expert on the possible effects of the activity on the species and to be independent of the person who would be authorized by the permit to engage in the activity;
- … has submitted a written report … on the possible effects of the activity on the species, including the person's opinion on whether the activity will jeopardize the survival or recovery of the species in Ontario;
- … the activity will not jeopardize the survival or recovery of the species in Ontario;
- … reasonable alternatives have been considered, including alternatives that would not adversely affect the species, and the best alternative has been adopted;
- … reasonable steps to minimize adverse effects on individual members of the species are required by conditions of the permit; and
- The Lieutenant Governor in Council has approved the issuance of the permit."

It is noted that the Transition aspects of Regulation 242/08 of the ESA apply to this undertaking as it meets criteria:

- 23-2) Laying down highways and lots upon the ground within a draft plan of subdivision under the authority of subsection 51 (57) of the *Planning Act*, if the draft plan was approved before June 30, 2008.

- 23-9) Carrying out an undertaking, if approval to proceed with the undertaking was given under Part II of the *Environmental Assessment Act* before June 30, 2008.

- 23-10) Carrying out an undertaking, if proceeding with the undertaking was authorized before June 30, 2008 under, vii. the Municipal Class Environmental Assessment approved under the *Environmental Assessment Act* on October 4, 2000 and amended on September 6, 2007.

Item 23-10 applies to the Part A project.

Under the transitional exemptions in ESA Regulation 242/08 (clause 5) an agreement may be undertaken with the minister (Ontario Minister of Natural Resources) if:

- The Minister is of the opinion that the agreement requires the person who engages in the activity to take reasonable steps to minimize adverse effects on the species;
- The Minister is of the opinion that, if the agreement is complied with, the activity will not jeopardize the survival or recovery of the species in Ontario; and
- The Minister is of the opinion that the agreement does not conflict with obligations in a recovery strategy.

Proposed mitigation and monitoring is outlined in the following sections.

As per EC recommendations of January 2010:

- All mitigation and project activities that affect species at-risk will be approved and permitted as required by the Ontario Ministry of Natural Resources (MNR).
- Works that may disturb nesting migratory birds, such as vegetation clearing, will take place outside of the core nesting season to protect nesting Golden-winged Warblers (although not

currently identified for Part A) and all other migratory birds. The core nesting season in this part of the province is between May 1 and July 23.

- The City will contact Environment Canada if migratory bird species at-risk are found on the project site during site preparation or construction.

6.10.1 Butternut Mitigation and Monitoring

Removal of butternut trees will be undertaken in consultation with MNR, appropriate Recovery Team members, and in accordance with the regulations under the *ESA*.

Under *ESA* Regulation 242/08 (clause 5), removal of Butternut trees may be permitted (exempted) if a qualified Butternut Health Assessor determines the tree is affected by butternut canker to such a degree that it is not necessary to retain the tree at its current location to support the protection or recovery of butternut (i.e. the tree is not "retainable"). Non-retainable Butternut will be removed from the alignment according to this regulation.

At least 15 of the retainable trees are located within the direct footprint of the Part A roadway and will require removal. An additional 2 retainable Butternut are located within the grading limit and outside of the ROW and may also require removal. There were also 6 small retainable Butternut that would be suitable for transplantation to a location as agreed by MNR.

The options for leaving the trees in their current location have been evaluated and where possible will be undertaken. The roadway is fixed at this location by the intersection with the existing TFD. Transplantation is generally not an option for the retainable trees due to their size.

For the trees deemed retainable, the City will apply for a permit (*ESA* Clause 17(2c)) or ministerial agreement (Reg. 242/08 (clause 23)), and will work with MNR to meet the requirement that removal does not jeopardize the survival and recovery of the species and results in an overall benefit to the Butternut population by compensation.

This may include plantings or other arrangement approved by MNR. It is noted that guidance on planting and tending replacement trees is based on the size of removals. The number of replacement trees if required for each mature tree removed is currently being determined, but for larger trees is typically at a 20:1 ratio. Plantings, if required, will be at a location deem suitable by MNR or its delegate such as the Forest Gene Conservation Association (FGCA). The intent of

the ratio of plantings to removals greater than one is to ensure that more than one tree survives to maturity to replace the tree removed. Seedlings are to be selected for butternut canker disease resistance and planting locations will be chosen based on guidance from the MNR or their delegate. Plantings, if required, will include other tree species emulating the existing habitat and incorporating a minimum 5 m set back from existing larger trees. Plantings will be conducted under the supervision of a qualified professional biologist or forester.

Current guidelines state that plantings can occur within 10 km of the removal site. In an effort to plant seedlings in areas best suited for establishment success, we suggest sites >1 km from the nearest known infected Butternut Tree and away from plants known to be susceptible to juglone toxicity, a naphthoquinone produced by Butternut Trees (Rink, 1990). This may include plantings along the alignment as part of the landscaping. If plantings occur, a five (5) year monitoring program will be undertaken by the City to then document the health of plantings and tend to seedling growth. This replacement program will result in an overall increase in the number of Butternut trees, the reproductive capacity of the population and an increased diversity in the local gene pool.

Seeds/scions from retainable trees will be removed for propagation upon recommendation from MNR and, if included in MNR permits, will be collected and archived such as through provision to the FGCA.

Retainable Butternuts located outside of the grading limits will be preserved using appropriately sized tree protection zones (TPZs) based on the City of Toronto Urban Tree Guidelines. TPZs will be demarcated with a tree protection barrier erected at a minimum distance from the specimen's trunk as per **Table 18** or at the tree's dripline, whichever is greater.

Until an Agreement is reached with the MNR, temporary tree protection zones (TPZs) will be established around each retainable butternut tree documented within the grading limits. A tree protection barrier will be erected at a minimum distance from the trunk to delineate the temporary TPZs. A contract specification has been prepared to include heavy duty snow fencing at the outer limit of each temporary TPZs. No grading or vegetative clearing will be permitted within the temporary TPZs until removal or transplantation of retainable butternuts is approved by the MNR under the formal Agreement. Until clearance is received from the City, a 25 m

radius temporary no-grading zone will be established around each retainable tree located within the road grading limit.

Table 18 – Temporary Tree Protection Zones for Retainable Butternuts within the Road Grading Limit

Trunk Diameter (DBH*)	Minimum Tree Protection Zone **
<10 cm	1.2 m
10-29 cm	1.8 m
30-40 cm	2.4 m
41-50 cm	3.0 m
51-60 cm	3.6 m
61-70 m	4.2 m
71-80 cm	4.8 m
81-90 cm	5.4 m
91-100 cm	6.0 m
*DBH – Diameter at Breast Height	** Measured from the outside edge of the tree base (radius).

6.10.2 Blanding's Turtle Mitigation and Monitoring

Sightings of Blanding's Turtle in the Second Line intersection area indicate occasional turtle use of the study area.

Clearing will not occur during the turtle nesting season (typically June). During construction if Blanding's Turtles are observed in the vicinity of the construction area they will be relocated prior to any work commencing in consultation with MNR. During the nesting season if construction is occurring, the area should be searched regularly for evidence of active nests. If a nest is located, the Canadian Wildlife Service within Environment Canada should be notified to provide guidance on relocation procedures and the relocation agency engaged. Turtle (S.H.E.L.L.) Tortue have been engaged for this service. Construction staff will be given orientation on species at-risk including identification of Blanding's Turtles and appropriate contacts for relocation or nest observation.

In an effort to reduce the incidences of Blanding's Turtles nesting alongside or crossing the roadway, we propose limiting the use of gravel in areas where Blanding's Turtles are likely to occur and use of a small guide wall/fencing discourage nesting and related movement and direct wildlife to crossing areas.

An open bottom or embedded box culvert will be located in the Second Line Road area (chainage approximately 16+260) which will serve as a small wildlife crossing in this area. Additional wildlife crossings and signage are proposed to the southwest as a component of the Part B project. Given the low potential for the turtle to occasionally use the study area habitat, it is proposed that the City monitor the roadway for five (5) years to determine potential for turtle road kill in this area in the spring and fall when migrations to breeding or wintering sites may be occurring and surveys will target these periods. If turtle use of the area is observed, MNR will be contacted to determine appropriate mitigation.

The MNR Kemptville Species at-Risk Biologist has provisionally indicated that an agreement may not be needed for Blanding's Turtle as long as no specimens are harmed during clearing of forested areas or construction. Mitigation and monitoring procedures are likely to be sufficient to protect this species from harm during construction.

Additional mitigation measures in general for reptiles and amphibians will include (as per EC advice, January 2010):

- Erosion control measures used in the project, such as silt fencing, will help prevent reptiles/amphibians from entering the work area and measures will be in place prior to commencement of clearing/construction.

Although not currently expected to occur as part of the Part A project, if dredging or dewatering of potential reptile/amphibian habitat occurs, it will be conducted as per EC guidance (January 2010) including:

- Dredging/dewatering wetted areas outside of the breeding window (after emergence from hibernation, but before breeding begins);
- If dewatering, then constructing or using a sump system or netting to prevent reptiles/amphibians from being pulled into dewatering mechanism;
- Salvage of egg masses and transportation to an appropriate location (as determined by MNR and species' experts) prior to dredging/dewatering (if permitted by MNR und ESA 2007 for species at-risk);

- Amphibian/reptile salvage prior to dredging/dewatering (if permitted by MNR under ESA 2007 for species at-risk); and
- Machinery will be prevented from going through wetted areas until the above-described salvages have been completed, or using plywood to allow machinery to "walk" over the wetted areas to reduce damage.

6.10.3 Other Potential SAR Species

Other SAR with some potential to occasionally occur within the Part A study area include Golden-winged Warbler and Eastern Milksnake. MNR and EC will be notified if any additional species at-risk are encountered.

A Golden-winged Warbler was observed nesting over 1 km southwest of the study area. Since the Golden-winged Warbler relies on disturbance-generated ecosystems, often scrub, hydro right-of-ways, recently cleared areas or field edges, to create breeding habitat, the construction of Terry Fox Drive may ultimately benefit this species by creating more early successional edge habitat. Edge creation experiments have documented the species moving into areas of suitable habitat within 3 years of its creation (COSEWIC, 2006).

Works that may disturb nesting such as vegetation clearing will avoid the nesting season (May 1 – July 23).

A Milksnake observation was located over 2.5 km to the south of the study area and on the other side of a rail line and fairly large creek (Shirley's Brook). The nesting season is typically from late May to early July with hatching in July to September (COSEWIC, 2002). Clearing for the study area is proposed for late fall and will be outside of this season. No hibernation areas are known in the vicinity of the study area. Given the low potential for Milksnake to occasionally use the study area habitat, it is proposed that the City monitor the roadway for five (5) years to determine potential for snake road kill. This snake is not known to favour roadways as basking sites, so the highest potential for interaction is in the spring and fall when migrations to breeding or hibernation sites may be occurring and surveys will target these periods. If Milksnake use of the area is observed, MNR will be contacted to determine appropriate mitigation.

6.10.4 Species of Special Concern Summary

If any listed wildlife species, its critical habitat or the residences of individuals of that species may be adversely impacted by the project, the responsible authorities for the *CEAA* assessment must notify the Minister(s) responsible for the listed species.

Table 19 provides a summary of the species of concern effects assessment.

Table 19 – Potential Project Interactions with Species of Special Concern

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation	• Loss of Butternut trees	• Implementation of MNR requirements under ESA and mitigation as noted including: o Consultation with MNR and meeting agreement/ permit requirements o Assessment of retain ability status o Retainable trees within areas where removal is required to meet overall population sustainability goals o Preservation of retainable trees outside grading limits with TPZs o Temporary TPZs until formal agreements established	Magnitude – *Moderate with mitigation* Geographic Extent - *Low* Duration - One Season Frequency - O*nce or twice (second time when additional lanes added for Section 1)* Permanence -Yes Ecological Context – *Regional*	Not significant with management and monitoring
	• Loss of terrestrial Blanding's Turtle habitat	• Not likely be a significant terrestrial habitat area • Mitigation noted above including: o No clearing during June nesting period o Relocation of individuals if encountered o Searches of potential habitat if construction during June o Training of project personal on turtle mitigation o Limiting gravel use o Use of guide wall/fence in potential habitat o Open bottom/embedded culvert / wildlife crossing o Wildlife crossing signage o Part B additional		

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
		crossings o Monitoring o Erosion and sediment control o EC guidance on dewatering if occurs		
	• Potential for impact to bird nest	• Clearing and blasting of the ROW will be conducted outside of the general nesting window (May 1 to July 23) to avoid destruction of nests		
Operations				
Routine operations and maintenance	• Vehicle mortality of turtle or snake	• Implementation of a monitoring program and contact with MNR if further mitigation required	Magnitude – *Moderate with mitigation* Geographic Extent - *Low* Duration - O*n-going* Frequency - *On-going* Permanence - Yes Ecological Context – *Regional*	Not significant with management and monitoring
	• Habitat fragmentation/ travel corridors	• Existing development throughout most of the corridor • Future travel corridors to the south of the project		
	• Potential for impact to bird, turtle or snake nests	• Clearing and blasting of the ROW will be conducted outside of the general nesting window (May 1 to July 23) to avoid destruction of nests • Contact with MNR if at risk species observed		

* Magnitude/Extent High- mortality or critical habitat loss associated with population effect; Moderate – non critical habitat or individual loss.

6.11 Land Use (Including ANSI)

The project is compatible with existing land uses including land owned by the proponents, land acquired or to be acquired for the proposed project, the location of all physical works and activities, construction and emergency access routes and natural or sensitive areas. It is noted that the development of the Area of Natural and Scientific Interest is ongoing and has been approved

by under regional plans. The project is predicted to result in loss of 4.15 ha of ANSI, 3 ha of primary natural area and 1.1 ha of secondary natural area. The majority of Trillum Woods adjacent to Part A has been previously removed as part of subdivision development, but it is estimated that the project will require tree removal on 1.1 ha of Trillum Woods.

As noted in section 6.6, impacts to vegetation communities will be minimized through development of a Vegetation Management Plan.

Disturbance to existing adjacent land use during construction will be temporary and generally limited to the immediate vicinity of the ROW. Adjacent land use will not be affected during operation.

Table 20 provides a summary of the land use effect assessment.

Table 20 – Potential Project Interactions with Land Use

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation and General Construction Activities	• Direct loss of ROW land for other potential uses including ANSI • Disturbance of adjacent landuse • Local loss of biodiversity	• The ROW land use has been approved as part of the City Planning Process within an overall green areas management strategy • Development of an Edge Management Plan for the interface between road infrastructure and adjacent ANSI and natural areas	Magnitude – *Low* Geographic Extent - *Low* Duration - One Season Frequency - O*nce or twice (second time when additional lanes added for Section 1)* Permanence -Yes Ecological Context – *Local*	Not significant

6.12 Land and Resource Use by Aboriginal People

Consultation is under way with Aboriginal Peoples. At this point, no concerns have been raised with respect to this proposal, including any impacts to current and traditional activities being

practiced by an Aboriginal group in the vicinity of the project. **Section 9.3** provides additional details of this consultation.

If concerns are raised, the Proponent will work to address these concerns and document the resulting agreements.

6.13 Physical and Cultural Heritage, Structures/Sites or Things of Historical, Archaeological, Paleontological or Architectural Significance

Only one area of historical significance (the O'Brien Farm site: BiFx-16) was identified within the study area. Based on its review of archaeological testing conducted in 2005 (Stewart, 2005) and 2009 (Stewart, 2009), the Ontario Ministry of Culture considers the northern locus (a scatter of early to mid nineteenth century ceramics) to have cultural heritage value. Consequently, the Ministry requires that Stage 4 mitigation of the O'Brien Farm site (north component) be undertaken prior to development (Sherratt, 2009). The extent of the mitigation is to be determined in consultation with the Ontario Ministry of Culture. No other material of archaeological significance was encountered and remainder of the Part A study area was cleared of any further archaeological consideration.

While no archaeological or cultural resources were identified outside of the O'Brien Farm site (BiFx-16), there is always the potential that deeply buried resources might be uncovered during the course of construction. A contingency is in place for addressing unexpected heritage finds. The plan calls for a work stoppage in the area of the discovery and immediate contact with the regulatory authority. Should human remains be encountered, all work in the associated area(s) must be halted and immediate contact made with the regulatory authority, as well as the local police, the coroner and the Registrar or Deputy Registrar of the Cemeteries Regulation Branch of the Ministry of Small Business and Consumer Relations. Follow-up and monitoring would only be necessary in the event that unexpected archaeological or cultural resources were encountered.

Table 21 provides a summary of the heritage resources effects assessment.

Table 21 – Potential Project Interactions with Historical, Archaeological, Paleontological and Architectural Resources

Project Interaction	Potential Effect	Mitigative Factor and Measure	Significance Criteria*	Assessment of Significance
Construction				
Site Preparation and General Construction Activities	• Loss of known heritage resource	• Heritage resource clearance to be issued at completion of archaeological mitigation • Contingency for unexpected discoveries	Magnitude – *Low* Geographic Extent - *Low* Duration - One Season Frequency - O*nce or twice (second time when additional lanes added for Section 1)* Permanence -Yes Ecological Context – *Local*	O'Brien Farm site warrants archaeological mitigation; Significance of the O'Brien Farm site removed with archaeological mitigation