

## 4.3 Environmental Effects and Significance

### 4.3.1 Integral Ecosystem Components

The *CEA Act* defines “environment” as the components of the earth including:

- “(a) land, water and air, including all layers of the atmosphere,
- (b) all organic and inorganic matter and living organisms, and
- (c) the interacting natural systems that include components referred to in paragraphs (a) and (b);”

The *CEA Act* goes on to define “environmental effect” to mean, in respect of a project:

- “(a) any change that the project may cause in the environment, including any effect of any such change on health and socio-economic conditions, on physical or cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance, and
- (b) any change to the project that may be caused by the environment, whether any such change occurs within or outside Canada.”

These definitions provide guidance for the selection of the Integral Ecosystem Component (IEC) set for the assessment of prairie grain road projects. IECs were selected to represent a group of environmental variables consistent with the definitions in the *CEA Act*. IECs selected for the purposes of the MCSR include:

- airshed
- soils
- vegetation
- watershed
- groundwater
- wildlife
- socio/economic

A brief background discussion of each IEC, the potential environmental effects of project activities, and the specific ecosystem components potentially affected by project activities, follows.

#### *Airshed*

Project activities have the potential to affect ambient air quality and contribute to greenhouse gases as a result of emissions. Noise and dust created during project implementation have the potential to affect wildlife and other land users.

### *Soils*

Improper soils handling procedures can lead to mixing of productive topsoil layers with poor quality subsoils. Project activities may result in damage to vegetation, soil compaction and a subsequent decrease in agricultural productivity. Damage to vegetation, or failure of reclamation measures can result in exposed soils and subsequent erosion problems. The use of machinery during project implementation could potentially result in spills of fuels or chemicals and the contamination of soils.

### *Vegetation*

Native and non-native vegetation can be directly impacted by road upgrade activities through deliberate measures required in order for the project to proceed e.g., clearing of timber or brush. Native grasslands, riparian areas and wetland habitats and rare or threatened plant species may be particularly vulnerable to construction disturbance or habitat destruction. Impacts to vegetation can directly affect the quality of aquatic and wildlife habitat through loss of cover, feeding habitat, changes in temperature etc. Project activities also have the potential to affect economic values related to vegetation including those of harvestable timber, non-native pasture lands, and cultivated lands.

### *Watershed*

Project activities have the potential to impact negatively on water quality through potential increases in sedimentation or chemical contamination. Such impacts can also directly affect the quality of aquatic and riparian habitats for wildlife. Changes to surface flows and runoff patterns caused by project activities may affect the quality and quantity of surface water sources. In some cases this may lead to a decrease in water resource availability for consumptive human use or for fish and wildlife use. In other cases flooding of new or sensitive areas may occur as the result of project design or activities. Changes to watercourse crossing structures or new crossings may impact the navigability of waterbodies.

### *Groundwater*

Most road projects are not likely to affect groundwater sources except in the event of encountering very shallow aquifers or high water tables. The potential significance of such impacts, however unlikely, is of concern particularly in the case of potential contamination and resultant impacts on other users. Contamination could potentially occur as a result of accidental spills or equipment malfunctions, or as the result of exposure of shallow groundwater features to surface water sources or runoff (e.g. biological or chemical contamination potential i.e. herbicides, pesticides).

### *Wildlife*

Indirect impacts to aquatic and wildlife habitat have been previously outlined with respect to impacts to other IECs. Direct impacts to wildlife survival rates and habitat structure can also be caused by project activities through habitat alteration, disruption or destruction. Many species, especially rare or threatened species, have very specific habitat requirements related to specific life cycle phases e.g. nesting habitat vs feeding habitat. Destruction or disturbance of these habitats through project activities can indirectly affect species mortality or survival rates and reproductive success. Timing of project activities to avoid sensitive time periods associated with wildlife habitats adjacent to a project site is often sufficient to avoid significant impacts. Actual

destruction of habitat features is difficult to mitigate even when habitat compensation or remediation action is taken.

#### *Socio/economic*

Project activities have the potential to damage or destroy unidentified historical or cultural resources e.g., native, archaeological, paleontological sites, especially on previously undisturbed sites. Apart from impacts on soils, project activities affecting native and non-native vegetation may have direct impacts on agricultural productivity including the degradation of pasture lands and crop damage. Landowners or other users including lease holders, and adjacent residential and recreational users may be impacted or inconvenienced by project activities including noise, dust, and impaired travel or access.

Most road projects are unlikely to affect the current use of lands for traditional purposes by aboriginal persons since they take place within current right-of-ways. Projects that are likely to affect aboriginal lands or lands currently used for traditional Aboriginal purposes do not fall within the scope of the MCSR.

### **4.3.2 Project/Environment Interactions**

The scope of the class screening was developed with the intention of focusing assessment work on relevant issues that have the potential to result in significant adverse environmental impacts. The potential magnitude of environmental effects before mitigation associated with each potential project/environment interaction was evaluated using a project/environment interaction matrix (Table 4.1).

A qualitative assessment of the potential magnitude of environmental effects before mitigation was applied to each potential interaction as follows:

Negligible	- activity likely has no project/environment interactions of consequence
Low	- environmental effects likely limited to the duration of work; impacts occur in the immediate area of work
Medium	- environmental effects may extend beyond the duration of work however the likely temporal scope is definable; impacts likely occur in the immediate area or within close proximity of the work site
High	- project activity may have long lasting or permanent effects; impacts may affect environmental components some distance from the immediate project area
Positive	- project activity has a net beneficial effect on the environment.

Note: This qualitative scale was developed with reference to criteria used for determining significance in the Responsible Authorities Guide to the Canadian Environmental Assessment Act s7.1.3.

Project activities considered to have a negligible potential impact on the environment or a net positive impact were not included within the scope of environmental assessment. Project activities assessed as low, medium or high were included within the scope of the environmental

assessment. The matrix was also used to assess the potential impact of the environment (climatic variables) on the project – these impacts were assessed using the same qualitative scale as other interactions.

### *Significant Effects*

For the purposes of the MCSR significant environmental effects are defined as effects that would result in a long-lasting or permanent, harmful alteration, disruption or destruction of IEC composition (species richness, abundance), structure (integrity of biophysical components and patterns, wildlife habitat characteristics) or function (supply and quality of natural resources, wildlife lifecycle requirements).

Project/environment interactions where the potential magnitude of environmental effects is rated as low or medium are not expected to result in significant environmental effects. The duration of potential environmental effects is generally predictable and the mitigation of environmental effects is considered to be manageable in terms of geographic extent. Standard best management practices as outlined in the MCSR (refer to Standard Contract Mitigation - Appendix B) will ensure to mitigate the predicted environmental effects to levels that are not significant.

Standard best management practices may not be sufficient to fully mitigate project/environment interactions where the potential magnitude of environmental effects is rated as high. The duration and geographic scope of potential environmental effects is often uncertain and there is a realistic possibility of incurring significant environmental effects without taking into account site specific environmental characteristics. Additional analysis of project/environment interactions where the potential magnitude of environmental effects is rated as high is facilitated through the CSPR. In these cases additional mitigative measures may be necessary in order to limit the potential for significant environmental effects. Residual impacts are those impacts still remaining after all appropriate mitigation has been implemented. Evaluation of the significance of residual effects is facilitated through the CSPR on a project-specific basis (see Section 6 for details on the application of the Class Screening Project Report).

**Table 4.1 Project/ Environment Interaction Matrix** **Prairie Grain Roads Program - Model Class Screening Report**

Project Activities	Airshed		Soils			Vegetation			Watershed			Groundwater			Wildlife				Socio/economic					
	ambient air quality - GHG	dust	noise	soil mixing/compaction	erosion	contamination	non-native	native veg habitat	harvestable timber	rare/threatened species	water quality	hydrology	navigability	recharge/supply	aquifer contamination	other users	terrestrial habitat	aquatic habitat	rare/threatened species	protected spaces	historical resources	agricultural operations	landowners and other users	aboriginal lands
List details of all activities related to the construction, modification, expansion, operation, decommissioning or abandonment of the project. The entire lifecycle, physical extent and duration of the project and related activities should be considered.																								
<b>1. Road Upgrades</b>																								
<b>Site Preparation</b>																								
- clearing of vegetation		L			M		H	L	H	M							M	M	H	H	M	M	H	H
- removal and handling of topsoil		L		M	L		H		H	M							M	M	H	H	M	M	H	H
- excavation and disposal of unsuitable soils and surficial materials				M	L		L		H															
<b>Equipment Operation</b>																								
- operation	L		L			L			H						M				H		L	L	L	L
- accidents and malfunctions																			H		L	L	L	L
<b>Construction</b>																								
- regrading of ditches and side slopes		L																						
- addition of materials to the road base for widening and fill		L																						
- replacement or adding of materials to the road surface for widening		L																						
- use of dust control agents	L					L																		
- excavation or placement of materials for drainage works, culverts, and utility crossings				M	L		L		H	M	L						M		H		L	L	L	L
- asphaltting or paving.	L					L																		
<b>Post construction activities</b>																								
- topsoil replacement and handling		L		M			L	M	H	L							L	L	H		M	L	L	H
- revegetation of ditches, sideslopes and new ROW					P		P	M	H	P							L	P	H		M	L	L	H
- installation of permanent or temporary erosion control measures					P		P	M	P	P							P	M	H	H	P	P	P	P
- weed control measures																								
- disposal of construction waste, surplus and hazardous materials						L			H	M					M		L	M	H					
- fencing						L			M								L		L					
<b>2. Bridge Deck Modifications</b>																								
<b>Site Preparation</b>																								
- stockpiling of new construction materials																								
- removal, stockpiling, disposal of existing materials				M	L				H								M	M	H			L	L	L
<b>Equipment Operation</b>																								
- operation	L		L			L			H								M	M	H		L	L	L	L
- accidents and malfunctions																								
<b>Construction</b>																								
- sandblasting to remove painted surfaces and prepare corroded surfaces		L	L																					
- cutting and welding of new materials to existing bridge structure																								
- painting of new construction materials																								
- placement of bridge deck materials e.g., concrete slabs																								
- asphaltting or paving.	L																							
<b>Post Construction Activities</b>																								
- disposal of old bridge materials						L			H	M							L	M	H			L	L	M
- disposal of construction waste, surplus and hazardous materials									M															
- fencing				L					M								L	L	M					

**Key to Rating**  
 Potential for significant environmental effects before mitigation

L	Low
M	Medium
H	High
N	Negligible
P	Positive



**Table 4.1 cont'd Project/ Environment Interaction Matrix Prairie Grain Roads Program - Model Class Screening Report**

Project Activities	Airshed		Soils				Vegetation				Watershed			Groundwater			Wildlife				Socio/economic			
	ambient air quality - GHG	dust	noise	soil mixing/compaction	erosion	contamination	non-native	native veg habitat	harvestable timber	rare/threatened species	water quality	hydrology	navgability	recharge/supply	aquifer contamination	other users	terrestrial habitat	aquatic habitat	rare/threatened species	protected spaces	historical resources	agricultural operations	landowners and other users	aboriginal lands
<p>List details of all activities related to the construction, modification, expansion, operation, decommissioning or abandonment of the project. The entire lifecycle, physical extent and duration of the project and related activities should be considered.</p>																								
<b>4. Asphalt Plants</b>																								
<b>Site Preparation</b>																								
- clearing of vegetation	L			M			M	H	L	H	M					M	M	H	H	M	M	H		
- removal, handling, storage of topsoil	L			M			L	H	H	M										H	M	L	H	
- grading and levelling	L						L	H	H	M										H	M	L	H	
- construction of access trails	L						L	H	H	M										H	M	L	H	
<b>Equipment Operation</b>																								
- operation	L						L									M	M	H	H	L	L	L	M	
- accidents and malfunctions/ air pollution control equipment failure	L						L								M	M	L	L	L	L	L	L	M	
<b>Operation</b>																								
- use of pumps and hoses for fuels and oils															L									
- use of conveyor belts for onsite movement of aggregate/asphalt materials															L									
- operation of the asphalt plant (including pollution control equipment such as wet scrubbers or baghouse filter systems to control particulate emissions)	M	M																						
- loading/unloading operations related to fuels, oils, and asphalt																								
<b>Post construction activities and decommissioning</b>																								
- dismantling and removal																								
- excavation/remediation of contaminated soils																								
- removal and disposal of rocks and other waste materials																								
- replacement of overburden and subsoil materials																								
- site grading and contouring	L																							
- topsoil, subsoil, and plant growth medium replacement and handling	L																							
- seed bed preparation, seeding and re-vegetation																								
- installation of permanent or temporary erosion control measures																								
- protection of restored areas																								
- weed control measures.																								
- disposal of construction waste, surplus and hazardous materials																								
- fencing																								
<b>5. Watercourse/Waterbody Culvert Replacement or Installation</b>																								
- vegetation clearing	L						M	H	L	H	M					M	M	H	H	M	M	M	H	
- dewatering																								
- grading and excavation																								
- tunnelling	L	L																						
- disposal/storage of cleared materials																								
<b>Equipment Operation</b>																								
- operation of heavy equipment																								
- operation of hand machinery	L	L																						
- accidents and malfunctions	L																							
<b>Construction</b>																								
- placement of clean, washed gravel, rip-rap, foundations																								
- construction and installation of concrete or metal culverts																								
- hazardous materials spills/disposal																								
- waste removal																								
<b>Post construction activities</b>																								
- grading																								
- in-stream site restoration and/or enhancements																								
- bank stabilization																								
- revegetation																								
- disposal of construction waste, surplus and hazardous materials																								
- weed control measures																								
- fencing																								

**Key to Rating**  
 Potential for significant environmental effects before mitigation  
 L Low  
 M Medium  
 H High  
 N Negligible  
 P Positive

### **4.3.3 Effects of the Environment on the Project**

Under the *CEA Act*, an environmental assessment must consider the potential effects the environment may have on a project as part of the evaluation of environmental effects. Potential effects of the environment on prairie grain road projects include:

- Precipitation, wind and flood events that can affect the physical integrity of prairie grain road infrastructure;
- Climatic variables that may combine with project impacts on other IECs to exacerbate the magnitude or the significance of impacts;
- Extreme weather events that may increase the rate of soil erosion, the transport of contaminants into soils, surface water, and groundwater sources, and affect erosion control and reclamation efforts;
- Drought conditions that may also affect the success of reclamation and revegetation effort; and,
- Frozen soil conditions that may make the separation of topsoils and subsoils difficult or impossible increasing the potential significance of project activities on agricultural productivity and revegetation.

The issues that have been identified in this section are considered to be mitigable through proper design and siting practices and standard operating, maintenance and repair procedures.

## **4.4 Environmental Effects and Mitigation**

Mitigation tables were developed for each project category and project phase as outlined in Section 3 - road upgrades, bridge deck modifications, borrow and aggregate pits, asphalt plants and culvert replacement or installation (Table 4.2). Mitigation measures were developed based on the specific predicted impacts of project activities on Integral Ecosystem Components as identified in the Project/Environment Interaction Matrix (Table 4.1). Mitigation was not specified for projects with likely negligible environmental effects as identified in the matrix.

Mitigation measures specified are a compilation of best management practices from a variety of sources including appropriate federal guidelines, provincial standards and guidelines, and industry guidelines and practices.

Mitigation measures outlined in the tables have been re-worded into language appropriate for incorporation into contribution agreements and/or construction contracts (herein referred to as Standard Contract Mitigation - see Appendix B). Compliance with Contract Mitigation and any additional mitigation measures as specified in the CSPR will be a condition of all Contribution Agreements between PFRA acting on behalf of the Minister of Agriculture and Agri-Food Canada, and prairie grain road project proponents.



#### **4.5 Accidents and Malfunctions**

The likelihood of accidents and malfunctions occurring that would cause negative environmental impacts is minimal, as prairie grain road project activities are routine and their effects predictable. Examples of unlikely accidents and malfunctions include: heavy rains that could lead to unexpected erosion and sedimentation of waterbodies; equipment failure and breakdown; spills of asphalt, paint, herbicides, fuel and salt from equipment operation that could contaminate waterbodies and land areas. Equipment breakdown during construction could delay the project sufficiently that the project could not proceed during times of increased environmental sensitivity (such as peak fish migration or breeding season).

However, ensuring proper siting and design measures, source controls, appropriate timing of construction and standard operating maintenance and repair procedures, following Workers Compensation Board regulations and preparing emergency plans and maintaining emergency equipment on site will help to overcome these situations and be able to mitigate these issues. Regardless of the extent of malfunctions and accidents, the negative impact from these small scale projects would be short-lived and minimal.

#### **4.6 Consideration of Cumulative Effects**

For the purposes of the MCSR, cumulative environmental effects are defined as those effects on the environment which result from project activities when combined with effects on the environment as a result of other past, current and foreseeable projects and activities.

The geographic and temporal scale of potential environmental effects associated with prairie grain road projects is generally limited and predictable. Potential cumulative environmental effects will be addressed in the CSPR by identifying other projects and activities that occur within the geographic area of predicted environmental effects for a given project. Projects and activities identified, that also have effects on the same IECs identified for prairie grain road projects, will be assessed in combination with the road project for cumulative environmental effects. Additional mitigation will be recommended as required.

Evaluation of the significance of cumulative effects is facilitated through the Class Screening Project Report on a project-specific basis (see Section 6 for details on the application of the CSPR in regard to cumulative effects assessment).

**Mitigation - Road Upgrades**

<b>Mitigation Required</b>			
<b>Environmental Component</b>	<b>Potential Impact</b>	<b>Project or Activity</b>	<b>Mitigation Required</b>
<b>Airshed</b>	ambient air quality	equipment operation, construction	<ul style="list-style-type: none"> <li>ensure all vehicles are properly tuned, in good operating order, and are fitted with standard air emission control devices</li> <li>minimize idling of combustion engines at all times</li> <li>chemicals, including herbicides, shall not be sprayed in windy conditions such that chemicals may be caused to drift</li> </ul>
	dust	site preparation, construction, post construction	<ul style="list-style-type: none"> <li>clearing should not be taken far in advance of construction where erosion could be a problem</li> <li>stockpiled topsoil which is not to be used for six months should be stabilized with plant cover</li> <li>dust affecting other parties shall be controlled by the proponent (e.g. the wetting down of dry, exposed soils during site preparation)</li> <li>activities during adverse weather conditions should be avoided</li> </ul>
	noise	equipment operation	<ul style="list-style-type: none"> <li>noise affecting other parties shall be controlled by the proponent (e.g. restriction of daily construction hours)</li> </ul>
<b>Soils</b>	soil mixing & compaction	site preparation, equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>all existing topsoil within the right-of-way and from areas to be covered by materials stockpiles should be salvaged and stockpiled when ground is thawed to minimize soil mixing and compaction</li> <li>stockpiled topsoil, subsoil and overburden materials should be placed on equivalent soil materials (e.g. topsoil should be placed on topsoil, subsoil should be placed on subsoil, etc.)</li> <li>the separation distances between stockpiled topsoil, subsoil and overburden should be a minimum of 1 m to prevent mixing</li> <li>minimize traffic or postpone work, particularly when soil is wet, to reduce potential for soil compaction</li> <li>stockpiled topsoil, subsoil and overburden shall be replaced in an order that minimizes mixing and in an order that ensures placement with like materials</li> <li>leave site tilled and ready for reseeded</li> <li>activities should not be undertaken when soils are frozen</li> </ul>
	erosion	site preparation, construction	<ul style="list-style-type: none"> <li>appropriate geotechnical control measures to stabilize soils and slopes must be implemented</li> <li>stockpiled soils should be stabilized and protected from wind and water erosion</li> <li>clearing and stockpiling should not be undertaken far in advance of construction where erosion is likely</li> <li>vegetation outside the right-of-way should not be damaged</li> <li>slopes greater than 3:1 should be cleared by hand, unless later cutting or filling will be required</li> <li>the ground surface within watercourse or waterbody buffer zones should not be disturbed except at specified crossings</li> <li>catch water ditches should be installed on newly constructed backslopes to minimize soil erosion</li> <li>upon completion of the road, backslopes inside and outside the right-of-way should be scarified to a minimum depth of 0.3 m and re-topsoiled</li> <li>all re-topsoiled areas must be reseeded as soon as possible after construction</li> <li>the ends of culverts should be ripped and adjacent slopes stabilized</li> <li>soil around a culvert should be well-graded and compacted granular material</li> <li>activities during adverse weather conditions should be avoided</li> </ul>
<b>Vegetation</b>	contamination	equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>levels of contaminants on the site should not constitute a hazard to human or animal health or to soil and water quality; contaminants should not impede the germination, growth, survival or management of vegetation used for site reclamation or adjacent to the site.</li> <li>contingency plans for the clean-up of spills should be prepared prior to construction; spills of contaminants should be contained and reported immediately to Provincial Authorities for remediation.</li> <li>upon completion of the work, or cancellation of the contract, fuel caches and all other hazardous or waste materials should be removed from the work site</li> <li>chemicals should not be sprayed during or immediately preceding showers or rain storms</li> </ul>
	non-native vegetation	site preparation, post construction	<ul style="list-style-type: none"> <li>disturbance to areas of vegetation will be minimized</li> <li>all disturbed areas of non-native vegetation shall be successfully revegetated with species approved by the respective landowners as soon as possible after construction</li> <li>stockpiled topsoil, subsoil and overburden shall be replaced in an order that minimizes mixing and in an order that ensures placement with like materials</li> </ul>
	native vegetation	site preparation, post construction	<ul style="list-style-type: none"> <li>disturbance to areas of natural vegetation such as native prairie, bush, forest and wetland areas will be minimized</li> <li>stockpiling of topsoil, subsoil and overburden materials is to be avoided in areas of native vegetation</li> <li>excavation and placement of materials used in construction should avoid areas of native vegetation</li> <li>stockpiled topsoil, subsoil and overburden shall be replaced in an order that minimizes mixing and in an order that ensures placement with like materials</li> <li>disturbed areas of native vegetation shall be successfully revegetated with species that reflect the pre-disturbance plant community as soon as possible after construction</li> </ul>
	harvestable timber	site preparation	<ul style="list-style-type: none"> <li>loss of merchantable timber will be minimized in areas of forest cover traversed by the road</li> <li>provincial requirements may exist for timber salvage on public lands including road right-of-ways; non-merchantable timber and slash will be disposed of in an approved manner</li> </ul>
	rare/threatened plant species	site preparation, post construction	<ul style="list-style-type: none"> <li>excluded from class screening, reclassified to individual assessment</li> </ul>
	water quality	site preparation, equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>appropriate geotechnical control measures to stabilize soils and slopes must be implemented</li> <li>precautionary measures shall be implemented at all drainage crossings to ensure that no potentially hazardous material is inadvertently spilled or deposited into surface waters</li> <li>do not store petroleum products along the right-of-way within 100 m of an existing surface water drainage course</li> <li>mobile machinery should not be serviced or washed within 100 m of a surface water drainage</li> <li>do not park equipment within 30 m of a surface water body</li> </ul>

**Mitigation - Road Upgrades**

Table 4.2 A			Mitigation Required
Environmental Component	Potential Impact	Project or Activity	
			<ul style="list-style-type: none"> <li>keep all construction equipment within the existing road right-of-way and do not permit equipment to enter a surface water drainage course</li> <li>the proponent will be responsible for conforming with all requirements of the Transportation of Dangerous Goods Act, the Transportation of Dangerous Goods Regulations, Provincial Regulations and other relevant regulations, with particular reference to the transport, handling, accidental releases, and disposal of fuels or other hazardous materials</li> <li>contain and immediately clean up any spills or leaks using a suitable commercial absorbent</li> <li>spills of contaminants must be contained and reported immediately to Provincial Authorities for remediation.</li> <li>chemicals, including emulsions and tackifiers, used in the construction of the proposed roads should not be directly sprayed into or onto surface water bodies</li> <li>chemicals should not be sprayed in windy conditions such that the chemicals may be caused to drift</li> <li>use clean, washed, rock for rip rap</li> <li>use only clean, washed, granular fill as fill in the reconstructed section of the roadway in contact with wetland areas</li> <li>place excess material from culvert installations where it will not erode into waterways</li> <li>ensure that oil, asphalt, and tar are restricted to the road surface during application and do not enter surface waters</li> <li>all waste and surplus materials will be removed from the site and disposed of at a provincially approved facility; littering by work crews is strictly prohibited</li> <li>provide temporary erosion control measures as necessary on each side of each drainage course on both sides of the road to prevent or reduce the likelihood of sediment or other deleterious substances entering the drainage course</li> <li>herbicides for weed control shall not be sprayed within 30 m of a waterbody; where vegetation control is required after initial clearing, manual cutting in sensitive areas is preferable</li> <li>activities during adverse weather conditions should be avoided</li> <li>chemicals should not be sprayed during or immediately preceding showers or rain storms</li> <li>drainage control measures will be implemented to intercept and divert stormwater run-off away from receiving waterbodies</li> </ul>
	hydrology		<ul style="list-style-type: none"> <li>not applicable</li> </ul>
	navigability	post construction	<ul style="list-style-type: none"> <li>ensure the potential for navigation is not impeded by removing any waste materials from watercourses</li> </ul>
<b>Groundwater</b>	recharge & supply	not applicable	
	aquifer contamination	equipment operation, construction	<ul style="list-style-type: none"> <li>contain and immediately clean up any spills or leaks using a suitable commercial absorbent</li> </ul>
	other groundwater users	equipment operation, construction	<ul style="list-style-type: none"> <li>contain and immediately clean up any spills or leaks using a suitable commercial absorbent</li> </ul>
<b>Wildlife</b>	terrestrial wildlife habitat	site preparation, equipment operation, construction, post-construction	<ul style="list-style-type: none"> <li>disturbance to areas that serve as terrestrial habitat such as native prairie, bush, forest and wetland areas will be minimized</li> <li>disturbed areas shall be successfully revegetated with species that reflect the pre-disturbance plant community as soon as possible after construction</li> <li>disturbance, including noise associated with equipment, during key periods in waterfowl, other migratory birds, birds, wildlife staging and reproductive periods will be avoided; key periods for projects can only be defined by provincial or federal government biologists</li> <li>stockpiling of topsoil, subsoil and overburden materials and excavation and placement of materials used in construction should avoid areas that serve as terrestrial habitat</li> <li>spills of contaminants are to be contained and reported immediately to Provincial Authorities for remediation</li> <li>stockpiled topsoil, subsoil and overburden shall be replaced in an order that minimizes mixing and in an order that ensures placement with like materials</li> <li>construction waste, surplus and hazardous materials will be removed from the site and disposed of at a provincially approved facility</li> </ul>
	aquatic habitat	site preparation, construction, equipment operation	<ul style="list-style-type: none"> <li>whenever possible, waterbodies including wetlands and water courses will be avoided</li> <li>temporary erosion control measures are to be used to prevent or reduce the likelihood of sediment or other deleterious substances from entering a watercourse.</li> <li>disturbed areas shall be successfully revegetated with species that reflect the pre-disturbance plant community as soon as possible after construction</li> <li>mobile machinery should not be serviced or washed within 100 m of a surface water drainage</li> <li>do not park equipment within 30 m of a surface water body</li> <li>keep all construction equipment within the existing road right-of-way and do not permit equipment to enter a surface water drainage course</li> <li>the proponent should be responsible for conforming with all requirements of the Transportation of Dangerous Goods Act, the Transportation of Dangerous Goods Regulations, Provincial Regulations and other relevant regulations, with particular reference to the transport, storage, handling, accidental releases, and disposal of fuels or other hazardous materials</li> <li>construction waste, surplus and hazardous materials will be removed from the site and disposed of at a provincially approved facility</li> <li>herbicides for weed control shall not be sprayed within 30 m of a waterbody; where vegetation control is required after initial clearing, manual cutting in sensitive areas is preferable</li> <li>herbicides shall not be sprayed in windy or raining conditions</li> </ul>
	rare/threatened wildlife species	site preparation, equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>excluded from class screening, reclassified to individual assessment</li> </ul>
	parks & protected areas	site preparation, equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>excluded from class screening, reclassified to individual assessment</li> </ul>
<b>Socio/economic</b>	historical resources	site preparation,	<ul style="list-style-type: none"> <li>all known archeological, paleontological, cultural or historical sites will be avoided unless otherwise permitted by Provincial Authorities</li> </ul>

**Mitigation - Road Upgrades**

Table 4.2 A			
Environmental Component	Potential Impact	Project or Activity	Mitigation Required
		construction	<ul style="list-style-type: none"> <li>• if required by Provincial Authorities, the recommendations of a completed Historical Resources Impact Assessment (HRIA) must be followed</li> <li>• in the event of the discovery of archeological or historical sites during construction, activity at the location must be suspended until permission to proceed is granted by Provincial Authorities</li> <li>• in the event of the discovery of archeological or historical sites during construction, activity at the location must be suspended until permission to proceed is granted by Provincial Authorities</li> </ul>
	agricultural operations	site preparation, equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>• site preparation, construction &amp; post-construction activities should be scheduled to minimize disturbance to normal agricultural operations (e.g. seeding or harvesting of crops)</li> <li>• mitigation can take the form of compensation where such scheduling is not feasible</li> <li>• highly productive agricultural land should be avoided where possible</li> <li>• fragmentation of productive agricultural land into small parcels should be minimized</li> </ul>
	landowners and other users	site preparation, equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>• site preparation activities, including siting and timing of work, shall conform to the terms and conditions of signed agreements with all potentially affected landowners and other users</li> <li>• mutually agreed upon strategies intended to mitigate noise effects shall be implemented by proponent (e.g. restriction of daily construction hours)</li> <li>• adjacent landowners should be consulted and agreement reached on dust control, seed mixture for revegetation, and replacement fences</li> </ul>
	aboriginal lands	site preparation, equipment operation, construction, post construction	<ul style="list-style-type: none"> <li>• excluded from class screening, reclassified to individual assessment</li> </ul>