

**APPENDIX B**

Parks Canada National Best Management Practices  
Roadway, Highway, Parkway and Related Infrastructure

Basic Impact Analysis: Corney Brook Road Realignment

Basic Impact Analysis: Culvert Replacement



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# Parks Canada National Best Management Practices

## Roadway, Highway, Parkway and Related Infrastructure

Canada



Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure

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## Introduction

The Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure will allow an identified suite of project activities to be undertaken in such a manner that there will not be resulting significant adverse environmental effects.

The Best Management Practice (BMP) pathway is applied when there is a suite of routine, repetitive projects (e.g. paving) or activities (e.g. de-watering), with well understood and predictable effects. This fulfils Park's Canada's obligations under the *Canadian Environmental Assessment Act 2012* as a manager of federal land, see the [Guide to the Parks Canada EIA Process](#). The BMP maximizes efficiency through creation of a pre-approved impact assessment for the defined suite of projects, to which standard mitigation and environmental management measures can be applied.

The impact assessment officer (IAO) will review a proposed project and advise the functional manager of the project if and how this BMP should be applied. The IAO's advice will be based on whether the project falls within the scope of the BMP, and whether application of the mitigation measures in the BMP will adequately address potential adverse effects of the project.

Project Managers are responsible to ensure all mitigation measures applicable to the project are added to the terms and conditions of any permits or contracts issued for the project.

The Impact Assessment Officers must ensure the project, EIA pathway applied and determination are recorded in the Parks Canada National Impact Environmental Assessment [Tracking System](#).

## Scope of Application

This BMP outlines the impact assessment of repetitive and routine projects on roadways, highways and parkways. If a project involves some or all of below activities, and the initial assessment of site and project indicate "the project is unlikely to result in significant adverse environmental effects" the BMP can be applied. Projects that this BMP would likely be applied to include:

- The proposed maintenance or repair of an **existing** sidewalk, or parking lot.
- The proposed maintenance or repair of an **existing** road, including pull-off areas, that would be carried out on the existing right of way<sup>1</sup>.

Activities included in the scope of this BMP are:

1. Project Design
2. General Activities
  - Worksite Conditions/Staging/Laydown
  - Equipment operations
  - Fuel storage and refueling

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<sup>1</sup> Highway Footprint or Right of Way (ROW): The permanent physical intrusion of a highway or freeway, including the road surface, shoulders, side slopes, drainage ditches and/or storm drainage ponds (Transport Canada, 2008).



- Site Clean Up/Waste Disposal
3. Asphalt Production and Handling
    - Asphalt Plant Operation
    - Gravel Crushing and Washing
    - Oiling of Truck Boxes
    - Clean Up and Disposal of Waste Products
  4. Concrete Handling
    - Operation, maintenance and inspection of Onsite Temporary Concrete Washout Facility
    - Removal of Temporary Concrete Washout Facilities
    - Onsite concrete management
  5. Paving, Resurfacing and Grading
    - Grading
    - Paving and Resurfacing
    - Pavement Marking and Barrier and Guardrail Reinstatement
  6. Barriers and Guardrails
    - Repair, replacement and upgrades of barriers and guardrails
  7. Vegetation Removal
    - Vegetation Removal
    - Grubbing
    - Brushing
    - Disposal of Vegetation Debris
    - Integrated Pest Management
  8. Excavation, Soil Stripping and Overburden Removal
    - Excavation
    - Soil Stripping
    - Topsoil Salvage
    - Excavated Material Storage
    - Excess Material and Waste (overburden removal)
  9. Slope Stabilization, Drilling and Blasting
    - Slope stabilization-scaling, hydraulic hammers
    - Drilling and blasting for Slope Stabilization and Geotechnical Investigations
  10. Soil and Vegetation Restoration
    - Topsoil Replacement
    - Soil Amendments
    - Seedbed Preparation
    - Species Selection
    - Seed Lot Selection
    - Seed Mixture Composition
    - Seeding
    - Alternatives to Seeding
    - Reclamation Standards
    - Reclamation Plot Evaluation
    - Time Limits



10. Drainage Structures
  - Drainage structures
  - Culverts
11. Bridge Maintenance
  - Bridge Cleaning
  - Bridge Repairs Using Treated Wood Products
  - Bridge and Structure Painting
12. Water Withdrawal and Dewatering
  - Water Withdrawal
  - Pump Screens
  - Dewatering

## Exceptions

This BMP is not suitable for the following project activities as they would require supplemental assessment and/or mitigations:

- Work that may impact aquatic or terrestrial wildlife habitat connectivity, such as fences or culverts;
- Elongation of culverts; realigning water courses; dredging; or work below the high water mark of a fish bearing water body;
- Bridge projects needing work to occur below the High-Water Mark<sup>1</sup>, with permanent alteration to the water course, such as replacement of piers/abutments or permanent installation of structures on the bed of a water body;
- Greater than 10% increase in land use footprint (e.g. gravel pit expansion); and,
- Work which might adversely impact any potential or established Aboriginal and Treaty rights or traditional use<sup>2</sup>.

If the project has the potential to have an adverse effect on the critical habitat of a species at risk (with endangered, threatened, or extirpated status) this BMP does NOT apply. The project will require a separate environmental impact analysis.

If the project has the potential for residual adverse effects on a listed species at risk (including effects to individuals and residence of the individuals) this BMP does NOT apply, the project will require a separate environmental impact analysis.

**Note:** If there is any uncertainty regarding potential adverse effects to species at risk, consult a member of the [National Office Species Conservation team](#).

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<sup>1</sup> High-water Mark is the usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to leave a mark on the land. (Fisheries and Oceans, 2015). Upper Controlled Water Elevation (UCWE) is used as definition of High-water Mark in managed waterways.

<sup>2</sup> Parks Canada must engage in additional and separate consultations with Aboriginal groups if there is a possibility of a project adversely affecting established or potential Aboriginal or Treaty rights. This is required to fulfill federal government responsibilities in upholding the honour of the crown. If there is uncertainty regarding the need for Aboriginal consultation with respect to a project, refer the matter to Parks Canada Legal Services for advice. Guidance on consultation may be sought from the [Aboriginal Affairs Secretariat](#) and from the guidance document "[A Handbook for Parks Canada Employees on Consultation with Aboriginal Peoples](#)".



## Approved geographic area of application

This BMP is intended for use in all Parks Canada administered protected heritage places with roadways, highways and parkways.

## Components of the environment that may be affected

Potential effects from projects of this type are well understood and predictable. They include:

### Water Resources:

- Adverse modifications to surface drainage patterns
- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)

### Soil/Land Resources:

- Change in slopes, landforms, and landscape
- Soil compaction and rutting
- Slope instability, due to increased soil exposure and improper excavation and storage
- Soil contamination

### Air quality:

- Decreased ambient air quality (i.e. from dust, equipment emissions, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO<sub>2</sub> and other pollutants
- Temporary increased localized temperatures from paving and equipment operation.

### Flora and Fauna:

- Damage to and/or removal of vegetation in immediate or adjacent areas
- Introduction of non-native species populations, or expansion of existing populations
- Wildlife sensory disturbance causing displacement/preferred habitat avoidance
- Wildlife habituation/attraction to artificial food sources
- Impeded/altered wildlife movement
- Damage to nests/disruption of nesting animals
- Mortality from project activities

### Cultural Resources:

- Adverse effects on the heritage value or character-defining elements of a cultural resource
- Impacts to archaeological resources (known or potential)

## Mitigation Measures

To use the document efficiently, keep the activity mitigation lists that apply to the project expanded and collapse the other activities by clicking on the section titles, print this as a pdf or



paper document and include with the EIA determination record. This will reduce the overall size and scope of the mitigations to present to contractors and project managers.

*Choose all that apply to project. Each title is hyperlinked to the related section.*

*Module*

1.	Project Design
2.	General Activities
3.	Asphalt Production and Handling
4.	Concrete Handling
5.	Paving, Resurfacing, Grading
6.	Barriers and Guardrails
7.	Vegetation Removal
8.	Excavations, Soil Stripping and Overburden Removal
9.	Slope Stabilization, Drilling and Blasting
10.	Soil and Vegetation Restoration
11.	Drainage Structures
12.	Bridge Maintenance
13.	Water Withdrawal and Dewatering



# 1. Project Design

When upgrades to infrastructure are planned opportunities to decrease the environmental impacts of long term operation should be considered in the engineering design. Some examples are: directing runoff into vegetated areas rather than directly into surface waters to decrease pollution in surface waters, increasing the span length of bridges during replacements to allow for terrestrial wildlife passage underneath and converting smaller culverts to larger culverts or clear span bridges to allow for better fish passage and less restricted flows.

## 2. General Activities Mitigations Module

Construction activities involve the use of laydown/staging areas, equipment operations, storage and handling of hazardous materials. Potential adverse effects include: destruction of vegetation, erosion and sedimentation, constriction for wildlife movements and introduction/spread of non-native vegetation.

### Work Site Conditions/Staging/Laydown

- 2.1. All employees must attend a briefing with an Impact Assessment Officer (IAO) or Surveillance Officer (SO) before beginning work at the site review and explain the mitigations that are conditions of the project approvals.
- 2.2. Minimize vegetation-clearing activities and ground disturbance by staging on existing hardened areas wherever possible.
- 2.3. Avoid or terminate activities on site that attract or disturb wildlife. Vacate the area and stay away from the immediate location if wildlife display aggressive behaviour or persistent intrusion.
- 2.4. Control materials that might attract wildlife (e.g. petroleum products, human food and garbage).
- 2.5. Notify the SO immediately about dens, litters, nests, carcasses (road kills), wildlife activity or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported to SO within 24 hours.
- 2.6. Delineate the work zone; clearly mark the limits to active construction and the access and egress locations.
- 2.7. When work involves the disturbance of soils or the use of erodible materials (e.g. sands, topsoil), prevent the transport of sediment by the installing of appropriate erosion and sediment control.
- 2.8. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken in proximity to watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events. All components require regular maintenance to ensure effectiveness.

### Equipment Operations

- 2.9. Equipment movements and workers' private vehicles shall be restricted to the 'footprint' of the construction area.



- 2.10. Ensure machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, noxious weeds and soils from off-site.
- 2.11. Operate machinery on land above the high water mark, on ice, or in another manner that minimizes disturbance to the banks and bed of any water body.
- 2.12. Limit machinery crossing (fording) a stream or watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure in compliance with the *Fisheries Act*.
- 2.13. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
- 2.14. Use temporary crossing structures or other practices to cross streams or water bodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds.

## Fuel Storage and Refueling/Emergency Plans

- 2.15. A Spill Response Plan will be prepared and detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products in accordance with all applicable federal and provincial legislation. The Plan shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
- 2.16. Spill kits shall be provided at re-fuelling, lubrication, and repair locations that are capable of dealing with 110% of the largest potential spill and shall be maintained in good working order. Site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
- 2.17. If potentially hazardous materials (e.g. cement-based products, sealants or paints) are used on site ensure raw material, mixed compounds and wash water are not released to any watercourse or soils. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
- 2.18. Hazardous or toxic products shall be stored no closer than 100 metres from streams, wetlands, water bodies or waterways.
- 2.19. Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The SO shall be notified immediately of any spill. In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
- 2.20. The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the proponent. The site will be inspected to ensure completion to the expected standard and to the satisfaction of Parks Canada.

## Site Clean Up/Waste Disposal

- 2.21. Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.



- 2.22. Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site.
- 2.23. Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Parks Canada protected heritage places. These wastes shall be contained and removed in a timely and approved manner and disposed at an appropriate waste landfill site located outside the Parks Canada protected heritage place. Construction waste storage containers, shall be emptied when 90% full. Waste containers will have lids, be wildlife proof if there attractants and waste loads shall be covered while being transported.
- 2.24. Sanitary facilities, such as a portable container toilet, shall be provided and maintained in a clean condition.

### 3. Asphalt Production and Handling Mitigations Module

Asphalt is a common building material for transportation infrastructure. Its production requires the use of gravel, water, and petroleum products, and associated project activities include transportation, storage and handling of these materials. Installation of asphalt plants is common within the larger parks where gravel extraction is undertaken.

#### Timing of Works

- 3.1. Asphalt works are preferably undertaken during periods of dry weather as this allows easier control of contaminated runoff and sediment.
- 3.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

#### Operation of Asphalt Plants

- 3.3. Asphalt plant operation must comply with all environmental pollution control regulations, including provincial regulations, and the plant operational plan.
- 3.4. Spoil piles and stock piles will be at least 30 meters from the edge of any water body.
- 3.5. There must be enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant.
- 3.6. A containment berm with an associated liner made of occlusive material (e.g. plastic of a thickness approved by the SO) and covered with absorbent sand or clay shall be installed under the asphalt storage tank to ensure containment of 110% of the tank's capacity.
- 3.7. The proponent shall be responsible for the purchase and safe delivery/storage/handling of asphalt cement and emulsions to the asphalt plant site.
- 3.8. Excess hot mix or reject new asphalt shall be temporarily in stored in the containment area sufficient to prevent runoff of petroleum into soils or surface waters as directed by the SO, and removed from the Parks Canada protected heritage place, prior to project completion.



- 3.9. Every effort will be made to recycle waste asphalt, either as a base course, or by recycling waste asphalt through the asphalt plant according to engineering specifications. Old cured ground asphalt material shall be removed, recycled, or stored for future recycling at an approved operational gravel pit or asphalt plant site. Stockpiles must be further than 30 metres from any surface waters.
- 3.10. Remaining stockpiles will be removed or incorporated into reclamation plans for the gravel pits or asphalt plant sites.
- 3.11. Asphalt to be removed must be sampled and analyzed to determine possible lead contamination. Contaminated asphalt will be transported to an approved waste disposal facility. A receipt of delivery is to be provided to the SO.
- 3.12. Proponent should protect containment/catchment areas and drip trays at the asphalt plant from rainfall since, if contaminated, all of the collected water will require disposal of at an approved disposal facility at the expense of the Proponent.
- 3.13. Dyking and ponding will be required to control the rate and quality of runoff from the plant site.
- 3.14. Ensure that the water in the settling ponds remains clean of petroleum products. Any contaminated water will require disposal at an approved disposal facility at the expense of the Proponent.

### Gravel Crushing and Washing

- 3.15. Where possible within engineering constraints, asphalt materials should be recycled to reduce the need for new gravel.
- 3.16. Gravel will be obtained from an approved operational borrow pit only. For gravel obtained from a borrow pit within a protected heritage place or borrow pit, gravel extraction within the footprint of the disturbed area of the approved operational borrow pit is permitted.
- 3.17. Gravel will not be crushed within 30 meters of any water body.
- 3.18. If water for cleaning is extracted from a watercourse, refer to [water withdrawal section](#) of this BMP.
- 3.19. If gravel requires washing, the water used will not be returned directly to any watercourse.
- 3.20. Water free from chemical contaminants will be discharged into ground where further erosion and runoff into surface water is prevented. Discharging into well vegetated ground surface, at a rate which prevents erosion can often provide increased absorption and reduction of sediment load.
- 3.21. Contaminated water must be treated to meet CCME guidelines or transported outside of the Parks Canada protected heritage place for disposal at an approved facility.
- 3.22. For waste removed from the park a detailed receipt of delivery to an approved facility will be provided to the SO.

### Oiling of Truck Boxes

Trucks for hauling asphalt mixture shall have tight, clean, smooth metal beds that have been sprayed with a minimum amount of thin fuel oil to prevent the mixture from adhering and causing waste asphalt.

- 3.23. Truck boxes may be oiled only when absolutely necessary.



- 3.24. Oiling will take place in a bermed area, consisting of a plastic underlay with 15 centimetres overlay of clean gravel. Oil contaminated gravel will be hand collected (so as to prevent tearing of the plastic) from the bermed area daily, and put through the asphalt plant.
- 3.25. Vehicle covers shall be securely fastened.

### **Air Quality Mitigations**

- 3.26. Asphalt plants should be 500 meters from buildings with human habitation.
- 3.27. Emissions from the asphalt plant and paving project equipment will comply with End Product Specifications (EPS) emission control standards and other provincial emissions regulations. Stack test results provided to the ESO by the operator or surveillance contractor may be required when the asphalt plant is at full capacity to ensure the plant is operating within the required standards. If the plant is not operating within the appropriate levels, production will cease until the requirements are met.
- 3.28. Sludge removed from the clarifier that is free of chemical contamination will be contained to prevent fine dust particles from becoming airborne during windy periods.
- 3.29. Unannounced stack tests will be conducted throughout the project. If the plant does not meet requirements, operation will cease until the requirements can be met.

### **Disposal and Clean Up of Other Waste Products**

- 3.30. To ensure regular clean-up of waste asphalt and petroleum spills, a defined clean up schedule will be established during the preconstruction meeting.
- 3.31. Leaks will be collected in drip-trays, the collected material will either be removed from the park, or recycled back through the Asphalt Plant. For any material removed outside the park to an approved facility, a detailed receipt will be provided to the ESO.
- 3.32. Used oil, filters, grease cartridges, oil cans and other waste products of plant servicing will be collected and disposed of at the nearest industrial waste facility.

## **4. Concrete Handling Mitigations Module**

Concrete is a common construction material used in transportation infrastructure. Its use ensures longevity of the infrastructure and safety for public use. One litre of concrete wash water or leachate in 1000L of water will kill fish. Cement-based products including grouts and concrete are lethal to fish and many other aquatic organisms. Raw product or leachate entering a watercourse will alter water chemistry, making it more basic or alkaline.

### **Onsite Temporary Concrete Washout Facility**

- 4.1. Temporary concrete washout facilities shall be located a minimum of 30m from storm drain inlets, open drainage facilities, and watercourses.
- 4.2. Temporary concrete washout facilities shall be temporary pit or bermed areas constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- 4.3. Straw bales, wood stakes, and sandbag materials can be used to construct temporary containment walls or “barriers”.



- 4.4. Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.
- 4.5. The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.
- 4.6. Perform washout of concrete mixer trucks in designated areas only.
- 4.7. Wash concrete from mixer truck chutes into approved concrete washout facility or collect in an impermeable bag for disposal.
- 4.8. Pump excess concrete in concrete pump bin back into concrete mixer truck.
- 4.9. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.
- 4.10. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per federal and provincial regulations.

### **Maintenance and Inspection of Temporary Concrete Washout Facilities**

- 4.11. Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100 mm (4 inches) for above grade facilities and 300 mm (12 inches) for below grade facilities.
- 4.12. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.
- 4.13. Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- 4.14. Temporary concrete washout facilities shall be inspected for damage (i.e. tears in PVC liner, missing sand bags, etc.).
- 4.15. Onsite concrete waste storage and disposal procedures should be monitored at least weekly or as directed by the ESO.

### **Removal of Temporary Concrete Washout Facilities**

- 4.16. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and restored.

### **Onsite Concrete Management**

- 4.17. Rolling concrete mixers with surplus concrete in amounts less than one cubic metre of wet concrete may waste this concrete in the grade right-of-way as directed by the Parks Canada Representative in areas that drain well away from watercourses. Surplus amounts in excess of one cubic metre are to be returned to the batching yard.
- 4.18. Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
- 4.19. The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.



- 4.20. Waste, solidified concrete from rolling concrete mixers in amounts less than 1 cubic meter and waste solidified concrete from construction pour shall be buried in the grade within 48 hours of the pour, subject to approval and direction from the Departmental Representative

## 5. Paving, Resurfacing, Grading Mitigations Module

Highway surface management activities are undertaken to ensure public safety on Parks Canada Agency highways by maintaining clean, level, and unbroken road surface conditions through activities such as pavement cleaning, patching, application of surface treatments, and pavement crack sealing. Grading is used to address drainage issues, vegetation encroachment, potholes and rough surfaces.

### Timing of Works

- 5.1. Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of contaminated runoff and sediment.
- 5.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

### Grading

- 5.3. During grade construction conducted close to any watercourse, water body or wetland ensure materials are not pushed, fall or are eroded into the water or wetlands.
- 5.4. No grade building shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
- 5.5. Materials shall be placed at storage sites or on the grade without spillage outside the work limits. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
- 5.6. Retain a 30 metre vegetated buffer around water bodies or install runoff management structures.
- 5.7. If possible grade roads early in the spring before vegetation develops seed heads or late in season after vegetation has set seed and is dormant to minimize non-native vegetation propagation.
- 5.8. Ensure gravel or road bed material is free of weeds and comes from an approved operational gravel source free of other contaminants.

### Paving and Resurfacing

- 5.9. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface waters.
- 5.10. Minimize application of seal coats in wet conditions. Attempt to apply only to dry surfaces and not prior to (within 24 hrs.) or during rainfall. If unforeseen rain arrives ensure runoff from recently seal coated surfaces are prevented from entering surface waters.
- 5.11. For asphalt handling and management see the [Asphalt Mitigation Module](#) of the BMP.



## Pavement Marking and Barrier and Guardrail Reinstatement

- 5.12. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface water. Pavement marking shall be undertaken pursuant to standard methods applied in National Parks for control of paint products, both in transport and handling. The Contractor shall present a description of methods to be employed for transporting and controlling paint and hazardous products, application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products, etc. to the satisfaction of the Parks Canada Representative.
- 5.13. Where concrete barriers or guard rails are temporarily removed, for highway improvements, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

## 6. Barriers and Guardrails Mitigations Module

Repair, installation and upgrade of barriers and guardrails involves laydown/staging areas, equipment operations, minor excavation (e.g., for barrier post holes) and use of concrete. Potential adverse effects include destruction of vegetation and erosion and sedimentation.

### Timing of Works

- 6.1. Where excavation is required, schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 6.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

### Repairs, Replacement and Upgrades

- 6.3. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken within 100m of watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger.
- 6.4. Where use of concrete is required for guardrail post holes, Concrete Handling Mitigations apply.
- 6.5. If vegetation removal is required for barrier or guardrail works, Vegetation Removal Mitigations apply.
- 6.6. Where concrete barriers or guardrails are temporarily removed, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

## 7. Vegetation Removal Mitigations Module

Roadside vegetation management activities include mowing, brushing, and landscape maintenance activities undertaken to maintain clear sight lines for highway users, control noxious weeds, facilitate effective drainage, and reduce possible fire hazards. Mature timber



may need to be removed for improving road alignments, improving sight lines or replacing or repairing associated infrastructure. Grubbing (stump and root removal) may be required to prepare the ground surface for other activities.

## Timing Windows

- 7.1. Vegetation clearing can negatively impact nesting birds and/or bats in spring and summer. Avoid all vegetation removal during this time. If vegetation removal is scheduled to occur within these times a qualified professional biologist/ecologist should further clarify the species presence and timing particular to the work site and any occupied bird nests, eggs, or nests of species protected under the Migratory Bird Convention Act (MBCA). See [appendix on regulatory guidance for further detail on the MBCA and SARA](#).
- 7.2. If a nest is found during the pre-work surveys, the vegetated area will be left intact with a suitable sized buffer of shrubs/trees around it until the young have fledged and left the nest. Size of buffer species dependent, to be determined in consultation with professional biologist or park ecologist.
- 7.3. Grass mowing and trimming should not occur during peak spring or fall reptile/amphibian migrations and hatching. Consult a local biologist/ecologist for site and species specific timing windows.

## Vegetation Removal Mitigations

- 7.4. Vegetation removal should be limited to the minimum Clear Zone Distance<sup>1</sup> dependent on type and size of road and maximum height needed to meet the road safety objectives.
- 7.5. Minimize full removal and retain vegetation when possible to reduce erosion.
- 7.6. Prior to the commencement of any vegetation removal, the worksite must be surveyed for species at risk. If species at risk are found, work must be stopped until site-specific mitigations to address potential adverse effects are developed.
- 7.7. Survey vegetation for non-native species, clear vegetation areas with non-native vegetation in spring and early summer to avoid further spread and development of the non-native seed bank.
- 7.8. Clearing activities shall be avoided during nesting seasons for birds, reptiles and amphibian species in the project area.
- 7.9. If wildlife is observed during work, if possible, give animals the opportunity to escape the work area to the surrounding forest or elsewhere to seek new shelter.
- 7.10. Avoid ground vegetation removal during dry, windy periods to prevent erosion of topsoil and reduction of air quality with dirt/dust.
- 7.11. Retain 30 metre vegetated buffer around water bodies, where disturbance is necessary and unavoidable restoration is required.
- 7.12. Debris will not be deposited in water bodies.
- 7.13. Ensure tree limbs/stumps are flush cut as close to the ground or stem as possible.

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<sup>1</sup> A clear zone is an unobstructed, traversable roadside area designed to enable a driver to stop safely or regain control of a vehicle that has accidentally left the roadway. The selection and design of appropriate clear zone dimensions is project-specific and should be the responsibility of professionals trained in roadside design.



- 7.14. Logs and other salvage materials are to be conveyed to and placed at a storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, waterways or water bodies.
- 7.15. During the grubbing component, stumps, roots, imbedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to a designated pit.
- 7.16. Where possible preserve identified wildlife trees by limbing or topping if they are not assessed as hazard trees.

## Disposal of Vegetation Debris

- 7.17. All vegetation debris must be removed as soon as possible from the right-of-way, either by transporting off-site for disposal or piling and burning on-site.
- 7.18. All vegetation containing non-native species will be piled and burnt or bagged and removed off site to disposal facility.
- 7.19. Piles will be made where trees are felled, piles will be 1.2-1.8 (4 to 6 feet) in diameter and no more than 1.2 m (4 feet) high (approximately 1 to 3 trees per pile) or as instructed by local fire and vegetation specialists.
- 7.20. Piles are to be located so that they do not scorch surrounding live trees and measures must be in place to ensure that fires do not spread (i.e., conduct burning on snow or on mineral soil).
- 7.21. Piles will be left until fall for burning to allow for curing of green fuels.
- 7.22. Provincial regulations for air quality must be met.
- 7.23. Where fire fuel loading is not a concern vegetation debris of limited amounts will be dragged in the forest to mimic natural tree fall.
- 7.24. If removal or burning are not feasible a chipper may be used for less than 50 boles per hectare. Chip depth is to be a maximum of 5 cm (2 inches), spread over area no greater of 5m x 5m per hectare so as to not cover underlying vegetation, prevent new native seedlings from sprouting, and cause soil/seed bank sterilization. Spreading of chips may extend beyond these parameters with permission from Parks Canada.
- 7.25. To facilitate chipping of woody debris, all trees/shrubs/vines can be left temporarily along the road shoulders and laid facing the same direction.
- 7.26. In some cases, logs from newly cut trees may be set aside for use elsewhere as directed by local park site managers and the ESO.
- 7.27. Store removed vegetation on already disturbed areas to minimize disturbance area.
- 7.28. In appropriate areas re-establish native vegetation where it has been completely removed/damaged.

## Integrated Pest Management

- 7.29. A Field Unit Integrated Pest Management Plan (IPMP) must be completed and approved prior to the use of herbicides to ensure the most effective and least harmful substances are properly used.



## 8. Excavations, Soil Stripping and Overburden Removal

### Mitigations Module

Construction projects often involve excavations. To successfully complete reclamation of disturbed areas, and protect areas from erosion proper soil handling and backfilling procedures must be followed. Post excavation and stripping soil and vegetation restoration mitigations should be applied. See section of this BMP for [Soil and Vegetation Restoration](#).

#### Timing of Works

- 8.1. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 8.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

#### Excavation

- 8.3. Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation.
- 8.4. All sediment control measures must be in place before starting work in the vicinity of rivers, water bodies, watercourses, and wetlands.
- 8.5. Special precautions may have to be taken during excavation in the vicinity of intermittent or active drainage channels.
- 8.6. Excavation plans must be compared to local archaeological resource inventories, if available. If no archaeological information is available for the work area, an Archaeological Overview Assessment (AOA) may be required to determine the archaeological potential of the work area. Based on the results from the AOA, an Archaeological Impact Assessment might be required. It would be time and cost efficient to refer the plan to Parks Canada's Terrestrial Archaeology section before conducting any excavation to determine the appropriate course of action.
- 8.7. If cultural resources (eg. archaeological resources) are discovered, immediately cease work, and alert SO.
- 8.8. Minimize changes to the ground surface that affects its infiltration and runoff characteristics and maintain/re-establish effective surface drainage on completion of the project
- 8.9. Backfill and compact excavations as soon as possible. Optimize degree of compaction to minimize erosion and allow for re-vegetation.
- 8.10. All trenches or ditches left unattended overnight must be fenced or covered to prevent wildlife entrapment.

#### Soil Stripping

- 8.11. Strip topsoil under dry conditions, whenever possible.
- 8.12. No stripping shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest.



- 8.13. In the event of a work program shutdown during inclement weather (e.g. winter conditions unfavourable for construction, heavy rain events, construction delays, etc.) erosion control of bared soils or excavated material stockpiles is required.
- 8.14. Stripping close to any watercourse, water body or wetland shall employ methods to ensure materials are not pushed, do not fall or erode into the water or wetlands.
- 8.15. Work within a 100 metre buffer from the high water mark of waterways or wetlands will require a site specific sediment and erosion control plan.
- 8.16. An erosion control plan is also needed to control dust generated from the construction site.

### Topsoil Salvage

- 8.17. Salvage topsoil at all excavation sites for reclamation purposes.
- 8.18. Usually the upper 15 cm of soil, below the sod layer if present, is considered topsoil, where depths exceed 15cm salvage the entire depth of topsoil.
- 8.19. Remove stumps and woody debris from topsoil, wherever possible.

### Excavated Material Storage

- 8.20. Allow space for separate storage of topsoil and spoil; where space is available separate stored topsoil from spoil by at least 1 m. Use appropriate material (e.g., geo-textile) to separate soil components where space is limited.
- 8.21. Topsoil may be stored on hardened surfaces, geo-textile material or directly on undisturbed vegetation. If storage occurs on vegetation, material recovery by hand may be required.
- 8.22. Cover all stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during precipitation events.
- 8.23. Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain.
- 8.24. Construct barricades to prevent losses on steep terrain ( $>18^\circ$ , 3:1) and within 100m of watercourses.

### Excess Materials and Waste (Overburden Removal)

- 8.25. Remove excess excavated material from site where it cannot be used for the final grading of the area. Site specific arrangements must be made for disposal locations and procedures of overburden.
- 8.26. Surplus excavated material may be used to fill depressions around the project site providing topsoil is stripped before filling, with approval from SO.

## 9. Slope Stabilization, Drilling and Blasting Mitigations Module

Where standard excavation is not sufficient, scaling, hydraulic hammers, drilling units or trim blasting are used to break up rock or soil for removal. Accumulations of debris in ditches reduce their effectiveness at trapping rock fall and reduce public safety. Ditches will be cleaned using a loader and back hoe. Guardrails and rock fences may be temporarily removed to permit this activity.



## Timing of Works

- 9.1. Time any vegetation removal work should adhere to the Migratory Bird windows for the area.
- 9.2. Time work to reduce impact to mammals, amphibians and reptiles using rock faces during sensitive life stages such as birthing and rearing of young. This often occurs during the spring. Confirm timing windows with local wildlife ecologists.
- 9.3. Avoid ditch clearing during wet periods and wait until ditches are dry to reduce impacts to amphibians and reptiles and limit sedimentation.

## Slope Stabilization-Scaling, Hydraulic Hammers

The use of hydraulic hammers attached to excavators is considered the ideal solution for rock disintegration. It avoids rock blasting where the parent rock is no longer rippable by the excavator's bucket but still has enough planes of weakness for economical operation and effective use of the hydraulic hammer. Scaling is the manual removal of loose material on rock slopes using pry bars, hydraulic press, brooms, shovels and power equipment operated by personnel using roped access to a rock face.

- 9.4. For vegetation clearing refer to the [vegetation removal mitigation module](#) of this BMP.
- 9.5. For slope-stabilization in soils, please refer to the Excavation section.
- 9.6. Survey the work site for cultural resources such as rock art (ex. pictographs, petroglyphs, etc. prior to the work commencing, establish site specific mitigations for their protection.
- 9.7. Measures shall be taken to control dust as much as possible during the removal and falling of rock materials down slope.
- 9.8. Placement of rip rap and backfill on shorelines shall be undertaken without contacting the watercourse, wetted margins and must not be below the High Water Mark.
- 9.9. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately- sized, clean rock is used, and rock is installed at a similar slope to maintain a uniform bank.
- 9.10. Direct concentrated surface water (runoff) away from cut and fill slopes.
- 9.11. Immediately stabilize banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through vegetation restoration with native species suitable for the site-refer to [soil and vegetation restoration section of BMP](#).

## Drilling and Blasting for Slope Stabilization and Geotechnical Investigations

Trim blasting is used for controlled blasts in which explosive charges are placed in predetermined pattern of holes drilled into the rock face and then detonated. Potentially unstable masses of rock can sometimes be stabilized using rock bolts and long steel rods drilled into the rock to bind it together. Drilling is a common method of investigation to obtain geotechnical reports required for engineering design.



## Drilling

- 9.12. Debris from drilling will be contained (screened or settle out) so it will not cover the surrounding area or enter any water course. All debris will be removed, [see section on overburden removal](#) for further mitigations.
- 9.13. The cuttings from all drilling will be contained so they can be removed entirely from the site. If contaminated, the cuttings are to be disposed at an approved waste disposal facility.
- 9.14. Control of spoil and sediment loaded water is required on the drill site. Dyking will be required to retain the deposit on non-vegetated surfaces. If contaminated, the spoil pile must be disposed at an approved waste disposal facility.
- 9.15. During aquifer tests, the water must be piped so it does not erode any soil or any part of the ground. If the water from the tests is piped to a creek, stream, or river, the pipe is to be situated so that there is no erosion of the stream bank or bed. If any sand or similar material is discharged during the aquifer test, care must be taken that the sand does not cover any vegetation.
- 9.16. All test wells will be filled in after the testing is completed. The proponent will be responsible for rectifying any future problems associated with any of the wells or test wells.

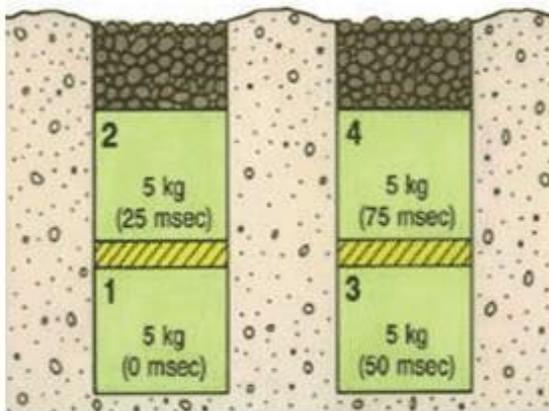
## Blasting

- 9.17. The Parks Canada Representative will identify a magazine location for explosives should a factory site or "ready-to-use" explosives storage site be required
- 9.18. The blasting supervisor will ensure no damage to infrastructure, people, surrounding vegetation or wildlife by mitigating risk of fly rock.
- 9.19. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.
- 9.20. If explosives are required as part of a project (e.g., removal of structures such as piers, pilings, footings; removal of obstructions such as beaver dams; or preparation of a river or lake bottom for installation of a structure such as a bridge or culvert), the potential for impacts to fish and fish habitat will be minimized by implementing the following measures:
  - Time in water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries [timing windows](#).
  - Isolate the work site to exclude fish from within the blast area by using bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams.
  - Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting.
  - Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e. Decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1).



- Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.
- Place blasting mats over top of holes to minimize scattering of blast debris around the area.
- Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products. Remove all blasting debris and other associated equipment/products from the blast area.

Figure 1: Sample Blasting Arrangement



Per Fig. 1: 20 kg total weight of charge; 25 msecs delay between charges and blast holes and decking of charges within holes. (Fisheries and Oceans Canada, 2015)

## 10. Soil and Vegetation Restoration Mitigations Module

Almost all projects activities included in this BMP will require some ecological restoration- *the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed*. The restoration plan can be a simple application of the following mitigations and can be at the site or both at the site and in concert with another site designated to offset the permanent impact of a project. For disturbance areas greater than a hectare a restoration plan is required. The restoration works can be often be considered projects in and of themselves. Soil and vegetation restoration must apply the principles of effective, efficient and engaging solutions.

### Timing Windows

- 10.1. Develop restoration plan as part of the project scoping and specifications prior to project approvals.



- 10.2. Vegetation restoration is most effective if seeded in the fall, this allows for full scarification of the seed over the winter and adequate moisture available. Spring and early summer will also work, consider using seed that requires shorter scarification times for these applications. Transplants will do best in the spring and summer and will require adequate watering.

## Topsoil Replacement

- 10.3. Implement restoration plan for the disturbed area immediately following completion of construction.
- 10.4. Replace topsoil to all areas immediately following fine grading.
- 10.5. Do not compact topsoil.
- 10.6. Where insufficient topsoil is available imported soil may be used as a last resort. Imported topsoil must be certified completely free of non-native seeds and compost developed from sewage treatment plants. Methods of improving vegetation succession using locally sourced, weed and contaminant free materials are preferred.
- 10.7. Slopes to be seeded should be no steeper than 2 horizontal to 1 vertical (2:1) and covered with a minimum of 5 cm (2 inch) of topsoil. Finish grading should always follow top soil placement.
- 10.8. Where remaining soils are unstable due to steepness or soil characteristics, immediate installation of sod or erosion control blanket is required.
- 10.9. Methods of bioengineering such as terracing, willow staking, live pole drain systems should be assessed as solutions where soils are steeper or remain unstable.

## Soil Amendments

### Fertilizer Application

- 10.10. Avoid use of fertilizer to limit non-native vegetation growth and allow for local species to use available nutrients.
- 10.11. If needed use locally sourced mycorrhizae compost teas to improve vegetative success.

### Topsoil substitute

- 10.12. Apply an organic cellulose only amendment as a soil substitute if reclamation standards are not being met within the defined time frame.
- 10.13. Determine the type of organic amendment based on the site-specific requirements (e.g., peat moss, compost).

## Seedbed Preparation

- 10.14. The seedbed will be scarified by hand or, with the approval of the SO, by machine on large areas (i.e., roadbeds) where it is accessible and appropriate.
- 10.15. The seedbed will be scarified if seeding takes place more than 7 days after final grading or if there has been a rainfall between final grading and the seeding date.



- 10.16. The cleats of a tracked vehicle or a harrow device will be used, where possible, to prepare an adequate seedbed with seedling safe-sites (microsites) substantially free of soil crusts.
- 10.17. Align cleat marks at right angles on slopes to trap seed and sediment and reduce erosion.

## Species Selection

- 10.18. When selecting species and varieties:
  - Use species of local native plant communities.
  - Species viability in proposed environment and climatic conditions.
  - Capability to effectively control erosion, where required.
  - Adaptation to the variable site conditions of undulating topography.
  - Consider palatability of some species to herbivores and avoid growing attractants in areas of increased risk to wildlife and visitors.
  - Variable life expectancy to produce variable, delayed die-out of seeded species and replacement with indigenous native plants.

## Seed Lot Selection

- 10.19. Select seed lots based on indigenous species variety and quality (guaranteed weed seed free content and highest purity and germination), consult with vegetation restoration specialist or fire/vegetation ecologist.
- 10.20. Reject any seed lots containing any seed of undesirable crop or weed species.

## Seed Mixture Composition

- 10.21. The proportion of each species should be calculated to provide an adequate quantity of pure live seed (PLS) per unit area of each key component.
- 10.22. Aim for density of about 140 seedlings/m<sup>2</sup> at the end of the first growing season to provide adequate ground cover and allow native species to re-colonize the site over time.
- 10.23. Consider that parameters such as seed lot purity, seed germination, seedling establishment, seed size and seeding method affect the final stand composition.

## Seeding

- 10.24. Use approved native seed mixes developed for site-specific conditions for various elevations.
- 10.25. Seed and stabilize (e.g. mulch/tackifier) bare areas as soon as possible after disturbance, preferably as soon as a significant area is graded and finished and before the next rain event. If there is a risk of seedling mortality as a result of fall frost stabilize until appropriate growing conditions exist.
- 10.26. Use sod in high traffic areas or places that need extra erosion control. Source sod grown from native species (often called fescue sod) and ensure adequate anchoring and watering is in place.
- 10.27. Use temporary seeding when outside the seeding dates for permanent vegetation
- 10.28. Apply a seed mixture which is appropriate for the climate, soil, and drainage conditions of the site.
- 10.29. Apply seed at a rate appropriate to the seed mixture, seeding method and existing vegetation conditions.



- 10.30. Conduct broadcast seeding under calm wind conditions. Hydro-seeding is acceptable where access is available.
- 10.31. Do not exceed 30 kg/ha for the broadcast method, ensure seed is integrated with the soil by light rake or harrow. Broadcast method seeding rate is 25 kg/ha (2.5g/m<sup>2</sup>) (e.g., 1x25 kg bag will cover 10,000m<sup>2</sup> or 1 hectare).
- 10.32. For hydro-seeding do not exceed 75 kg/ha with light mulch rates (500 kg/ha- of mulch with hydro-seeding) and 150 kg/ha with heavy mulch rates (1500 kg/ha of mulch with hydro-seeding).
- 10.33. Do not increase the seeding rate to compensate for poor seedbed conditions.
- 10.34. Monitor temporary erosion control measures to prevent seed loss.
- 10.35. Some seeding procedures may have to be completed or repeated in subsequent years.

### Alternatives to Seeding

- 10.36. Use topsoil seed bank in small areas when there is no risk of erosion or competition from invasive species (i.e., natural regeneration).
- 10.37. Use native transplants in areas where conventional seeding applications are not applicable or where slope stability is an issue.
- 10.38. Use conventional forestry planting methods for container grown transplants, see website for guidance.

### Reclamation Standards

- 10.39. Minimum standard for plant density is 25 plants/m<sup>2</sup>, with 90% frequency.
- 10.40. Minimum standard for plant cover is 80% ground cover, with 90% frequency.
- 10.41. Minimum standard for plant community composition standard is 50% cover and 90% frequency of native species.
- 10.42. Exclude species designated as weeds in the work sites from the plant density standard consult local vegetation ecologist for current site specific non-native vegetation management program.
- 10.43. Rock, plant litter and non-vascular species are included in the cover standard.
- 10.44. Remaining plant cover of seeded native species is acceptable.

### Reclamation Plot Evaluation

- 10.45. Select any site within reclamation area measuring 10 x 10 m, providing 100 plots of 1 square meter.
- 10.46. Measure the plant density, cover and composition in each of the 100 square meter plots.
- 10.47. The reclamation standard will have been met if 90 of the 100 plots match or exceed the criteria.
- 10.48. No fertilizer will be applied one year before the reclamation standard is evaluated.

### Time Limits

- 10.49. Inspect site annually during the growing season.
- 10.50. Minimum reclamation standard, as above, to be met within one season post planting.
- 10.51. Apply amendments annually, depending on reclamation progress.



- 10.52. Re-seed site if the plant density standard is not expected to be achievable within 5 years.
  - A new restoration plan will be prepared and implemented when reclamation standards have not been met after 5 years.

## 11. Drainage Structures Mitigations Module

Drainage structures on roadway, highway and parkways are structures such as culverts, ditches and drains. Drainage structure management activities are undertaken to ensure that surfaces are safe and efficiently drained, water is efficiently channeled to ditches and watercourses, and erosion of highways and adjacent properties is prevented. These mitigations include the cleaning and maintenance of drainage structures and related hardware, as well as the repair or replacement of existing and installation of new drainage structures.

### Timing of Works

- 11.1. Time work in water to respect **timing windows** to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics specialists and DFO offices for further information on **timing windows** in your region.
- 11.2. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- 11.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 11.4. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

### Drainage Structures

- 11.5. Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.
- 11.6. Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks when using earth-moving equipment.
- 11.7. For smaller scale debris and sediment removal activities, remove materials by hand.
- 11.8. To assist with bank stability and invasive plant prevention, leave topsoil and root systems intact on channel banks surrounding your work area.
- 11.9. Ensure any works to repair damaged structures retain the pre-repair channel conditions (e.g., streambed profile, substrate, channel cross section) and do not constrict the stream width.
- 11.10. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

### Culverts

If a proposed culvert crosses a stream where fish are present, the crossing should be designed or upgraded to provide fish passage and avoid interference with fish habitat. To mitigate the



impact of culverts on fish movement technical assessment of the water flows and fish species is required to establish a culvert design that will allow for passage of fish. Often there are regional or provincial best practices available online and qualified professionals can assist with designs. Some best management practices for installation or replacement of culverts follows.

#### Culvert Design and Alternatives

Utilize alternative crossing structures (e.g. clear span bridges, lock blocks and concrete decks) as a replacement for culverts, where possible.

- 11.11. Ideally, crossings should have natural streambed material through them to allow continuous substrate that matches the streambed below and above the crossing. Open bottom crossings are ideal for maintaining natural substrate.
- 11.12. Utilize a single large culvert design over a multiple culverts design (i.e. several smaller culverts) to reduce debris blockage and increased fish and wildlife passage, where hydrologically feasible
- 11.13. Design culvert bottoms to be placed at least 30cm below the stream bed elevation to ensure culverts remain passable by fish and wildlife by preventing culverts from becoming perched.
- 11.14. A minimum water depth of 200 mm should be provided throughout the culvert length. To maintain this water depth at low flow periods an entrance/downstream pool can be constructed. In some cases, an upstream pool may also be necessary.
- 11.15. The culvert slope should follow the existing streambed slope where possible.
- 11.16. The culvert, inlet(s) and outlet(s) should be adequately protected with rip-rap to prevent erosion and scour around the culvert during high runoff events. The following measures should be incorporated when using replacement rock to stabilize the culvert:
  - Place appropriately-sized, clean rocks into the eroding bank area by hand or machinery operating outside the water course.
  - Do not obtain rocks from below the ordinary high water mark of any water body.
  - Where possible, install rock at a slope similar to the stream bank to maintain a uniform stream profile and natural stream alignment. Otherwise, install the rock at the closest slope required to ensure it is stable.
  - Ensure rock does not interfere with fish passage or constrict the channel width.
- 11.17. Trash racks should not be used near the culvert inlet. Accumulated debris may lead to severely restricted fish passage and potential injuries to fish. Where trash racks cannot be avoided in culvert installations, they must only be installed above the water surface indicated by bank full flow. A minimum of 9 inches clear spacing should be provided between trash rack vertical members. If trash racks are used, a long term maintenance plan must be provided along with the design, to allow for timely clearing of debris.
- 11.18. Natural or artificial supplemental lighting should be considered in new or replacement culverts that are over 150 feet in length.
- 11.19. Ensure designs locate culvert structures in areas that minimize impacts to riparian vegetation and associated wildlife.



### Culvert Installation

- 11.20. It may be necessary to exclude fish from the immediate construction site while a culvert is being installed. If this practice is necessary, fish shall be salvaged by a qualified aquatics professional from within the exclusion area.
- 11.21. If dewatering is required refer to the [dewatering mitigation module](#) of this BMP for appropriate mitigations.
- 11.22. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.
- 11.23. Remove any old structures to a suitable upland disposal facility away from the riparian area and floodplain to avoid waste material from re-entering the watercourse

### Wildlife Considerations for Culverts

At times, culverts are placed along portions of highways that bisect wetlands or specific habitats that support an abundance of wildlife. Consider building natural rock ledges through culverts to allow for small and medium-sized animals to walk on during periods of high flow.

## 12. Bridge Maintenance Mitigations Module

Bridge structure management activities include the cleaning and painting of bridge structures as well as the repair, rehabilitation, and replacement of bridge elements including decks, railings, abutments, and bearings. Works may include asphalt, concrete works, chipping, painting, grouting, timber truss, abutment and piling maintenance. These activities help ensure bridge structures remain structurally sound and safe for public use.

### Timing of Works

- 12.1. Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics ecologists, provincial jurisdictions and DFO offices for further information on [timing windows](#) in your region.
- 12.2. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- 12.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 12.4. Cover or otherwise contain stockpiled materials during heavy rain events or extended absences.
- 12.5. If the work schedule requires working in the rain, the area of work must be isolated with appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

### Bridge Cleaning

- 12.6. Schedule bridge-cleaning activities to coincide with the watercourse's spring freshet when possible. At freshet or during periods of high flow a large watercourse will often have its highest background levels of sediment. At this time, the introduction of a small amount of sediment to a watercourse (from bridge cleaning) will have a lower risk of potential impact when considered against those high natural background levels.



- 12.7. If works are planned outside the freshet or if your region does not experience a freshet, discuss the protocol and timing of these works with your local aquatic ecologist and/or DFO Officer.
- 12.8. Dry sweep and collect loose material off bridge surfaces before washing the bridge. Adequately seal drains and any open joints on the bridge deck before sweeping or washing to prevent material or sediment-laden wash water from entering any watercourse
- 12.9. If dry sweeping and preventing direct runoff to waterway is not a feasible way to clean the surface, discussion and planning with local aquatic ecologists will be required.
- 12.10. Use water alone. If your cleaning activities require degreasers or any other chemical, approval for use must be obtained from local aquatic specialists and/or DFO.
- 12.11. Contain any wash water or runoff to the bridge deck. Direct wash water towards the bridge approaches and away from the watercourse, then to a vegetated area or contained settling area (e.g., dry ditch channel unconnected to a watercourse) where it can infiltrate.
- 12.12. If superstructure cleaning is undertaken above or on the bridge deck level, prevent potentially harmful materials from entering into road drains. Block deck drains with suitable barriers (e.g., polyethylene or drain blocks) to prevent direct discharge to a watercourse, or re-route runoff through temporary piping onto adjacent settling pond or structure, using a hydro vacuum would be another option.
- 12.13. If water for cleaning is extracted from a watercourse, refer to [water withdrawal section](#) of this BMP.

## Repairs Using Treated Wood Products

- 12.14. Untreated wood products are recommended, if treated wood is to be used, ensure it has been treated with a wood preservative appropriate for the project. Refer to the [Parks Canada Guide for the Use, Handling and Disposal of Pressure Treated Wood 2009](#) and any further updates from [Parks Canada Real Property – Environmental Management](#).
- 12.15. If treated timber must be cut to size, ensure cutting takes place away from the bridge and watercourse. Sawdust from treated wood is harmful to aquatic organisms and must be prevented from entering any watercourse.
- 12.16. Wood preservatives should be applied in a contained area and not be applied over or within 200m of water.

## Bridge and Structure Painting

- 12.17. Ensure paint flakes, abrasive grits and abrasive/paint flake mixtures do not enter the watercourse as they may leach toxic heavy metals into receiving waters and/or be ingested by fish.
- 12.18. Install ground covers and/or vertical drapes such as sheets of plastic or air-permeable cloth (e.g., burlap or canvas) prior to removal activities to capture falling debris. Floating barges may be deployed in watercourses to capture falling debris, such as paint flakes and dust.
- 12.19. Waste materials collected during removal and application of protective coating operations (e.g., blasting abrasives, paint particles, rust and grease) should be



collected and retained for disposal at appropriate locations. Waste materials must not be deposited into watercourses or riparian areas.

- 12.20. Use hydro blasting or manual techniques, where possible, when removing road dirt, soluble salts and loose paint to minimize impacts to the watercourse.
- 12.21. Use water without cleaning agent additives if grease film removal is necessary.
- 12.22. Avoid use of toxic liquid paints, primers, solvents, degreasers and rust inhibitors.
- 12.23. Minimize spill potential by storing, mixing and transferring paints and solvents on land.

## 13. Water Withdrawal and Dewatering Mitigations Module

Construction often requires the use of water, many common methods of excavation and site isolation require dewatering. Temporary, short term water withdrawal provides an efficient uncontaminated water source for local project sites. Dewatering can allow sites to be effectively dry during construction, reducing the impact of sediment laden water entering fish bearing waters.

### Timing Windows

- 13.1. As a general guide to prevent taking more water than aquatic system can support, limit total take of water to less than 5 successive days and less than 10 days in any period of 30 days.
- 13.2. Avoid water withdrawal during breeding seasons of amphibians and reptiles to avoid destruction of egg masses, consult local aquatics ecologist for site specific guidance.

### Water Withdrawal

- 13.3. Water should not be withdrawn from a wetland or stream less than 5 metres wide at the surface or a lake less than one hectare in area.
- 13.4. Water withdrawal should follow the 10/90 rule which allows for up to 10% of the stream flow to be withdrawn, as long as the stream flow does not fall below the 90% exceedence flow (eg. 1 in 10 chance in a given year).
- 13.5. No permanent or semi-permanent works for water withdrawal should be placed in the stream channel.
- 13.6. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish, amphibians and/or reptiles. Entrainment occurs when a fish or amphibian is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish, reptile or amphibian is held in contact with the intake screen and is unable to free itself.

### Pump Screens

- 13.7. In freshwater, fish-bearing waters design and installation of intake end-of-pipe fish screens:
  - Locate screen in areas and depths of water with low concentrations of fish throughout the year away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
  - Orient the screen face in the same direction as the flow of water.
  - Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.



- Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
- Provide structural support to the screen panels to prevent sagging and collapse of the screen. Large cylindrical and box type screens should have a manifold installed to ensure even water velocity distribution across the screen surface. The end of the structure should be made of solid materials and the end of the manifold capped.
- Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where debris loading (woody material, leaves, algae mats, etc.) is a concern. A 150 mm (6 in.) spacing between bars is typical.
- Provision should be made for the removal, inspection, and cleaning of screens.
- Ensure regular maintenance and repair of cleaning apparatus, seals, and screens to prevent debris fouling and impingement of fish.
- Pumps must be shut down when fish screens are removed for inspection and cleaning.

## Dewatering

- 13.8. A site specific dewatering plan is required be provided before commencing a pump-out sump to dewater excavation sites with specific details on how and where the water will be discharge.
- 13.9. Site specific mitigations may be required depending on the conditions of the discharge area, freezing conditions operation, overflow avoidance, decanting and settlement pond reclamation.
- 13.10. Water containing suspended materials shall not be pumped into watercourses, drainage systems or on to land, except with the permission of the SO.
- 13.11. Soil and vegetation erosion protection is required for water pumped on to land.



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## Appendix 1 Regulatory Guidance

### Jurisdictions

While all projects on lands managed by Parks Canada must adhere to Federal law and regulation, it is considered best practice to refer to local community, regional, provincial regulation and best practices where federal guidance is silent and/or attempt to meet those targets if it can reduce the overall impact of the project.

Some of the project activities reviewed have potential environmental impacts that are addressed by various provincial, federal and territorial acts and regulations. All activities must meet current environmental law and regulations in their design and construction. The following is a brief description of some of the key federal acts and regulations. Further review, understanding and application of other federal, provincial and territorial environmental laws are part of a rigorous approach to project planning and execution.

#### ***Canada National Parks Act and Regulations-Parks Canada***

All work inside National Parks and Protected Areas must be performed in accordance with the laws and regulations set out in the *Canada National Parks Act* and Regulations. This includes the requirement for most activities described to only be done under a permit such as: business licence for contractor, disturbance of natural objects, travel in restricted areas, special events or use of disposal sites.

#### ***Fisheries Act - Fisheries and Oceans Canada***

If a project is to be conducted near water, it is the proponent's responsibility to ensure they avoid causing [serious harm to fish](#) in compliance with the *Fisheries Act*. The [advice in on the Fisheries and Oceans website](#) will help a proponent avoid causing harm and comply with the Act.

If the water body in the project area has fish or is connected to waters at any time that have fish the project must meet the [self assessment criteria on the Fisheries and Oceans website](#), if not a project review can be made by Fisheries and Oceans Canada to assess whether the project requires authorization or authorization can be requested directly. Given the level of detail required for a review and/or authorization request the EIA officer may need to consider a more involved EIA pathway in those circumstances.

#### ***Migratory Bird Convention Act – Environment Canada***

The purpose of this Act is to implement the Convention by protecting and conserving migratory birds - as populations and individual birds - and their nests. Section 6 - prohibits the disturbance, destruction, or taking of a nest, egg, or nest shelter of a migratory bird.

In Canada, the general nesting period may start as early as mid-March and may extend until end of August. This is a general nesting period that covers most federally protected migratory bird species. This period varies regionally across Canada mainly due to differences in species assemblages, climate, elevation and habitat type. Generally, the nesting period is delayed in more northerly latitudes, corresponding to vegetation development and food availability. (Environment Canada, 2014). To help with determining regionally relevant periods where



nesting is likely to occur, Environment Canada is publishing estimated regional nesting periods within large geographical areas across Canada referred as "nesting zones". These periods are estimated for each zone and consider the time of first egg-laying until the young have naturally left the vicinity of the nest. Field Units may wish to refine this section and add their known local nesting periods.

### *Species at Risk Act*

If a species listed under the *Species at Risk Act* (SARA) is found within the project area, any potential adverse effects from the proposed project to the individuals of the species, their residences and/or their critical habitat must be understood. Species at risk considerations require specific expertise, due to additional legal requirements under the SARA and CEAA 2012. If the projects or activities to be addressed by the BMP could affect a listed species or its critical habitat, the EIA officer may need to consider a more involved EIA pathway in those circumstances.



# Basic Impact Analysis

## *Corney Brook Road Realignment*

Cape Breton Highlands National Park of Canada

Cape Breton Field Unit



File #: CBFU2015-043

27 October, 2015



Parks  
Canada

Parcs  
Canada

Canada

<b>PROJECT TITLE</b>	Corney Brook Road Realignment Project
<b>PROJECT LOCATION</b>	Cape Breton Highlands National Park of Canada (west)
<b>PROJECT SITE</b>	Cabot Trail – 10km inside west park entrance
<b>PROponent</b>	<b>Kate McCarthy Project Manager (PWGSC)</b> <a href="mailto:kate.mccarthy@pwgsc.gc.ca">kate.mccarthy@pwgsc.gc.ca</a>
<b>PROJECT DATES</b>	2015/11/01 to 2016/03/30
<b>INTERNAL PROJECT #</b>	CBHNPC-2015-0435

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**PROJECT DESCRIPTION**

This project calls for the realignment of a 1km section of Cabot Trail between Corney Brook and Trout Brook. The existing alignment has undergone numerous maintenance repairs over the years in order to address stability-related issues. Here, cliff recession is slowly undermining support material for this section of roadway. In one example, a massive rock release had occurred at the base of a roadside retaining wall sometime during the Spring 2014. Continually responding to such maintenance repairs is no longer considered feasible and thus a more comprehensive solution is deemed necessary.

Stantec Consulting conducted geotechnical investigations on this portion of the highway. Their proposed longterm solution recommends road relocation to approximately 20m inland from the existing road. Doing so would mitigate problems attributable to cliff weathering and other slope processes.

The existing roadway is approximately 10.4 meters wide, encompassing two 3.7 meter wide asphalt driving lanes and a gravel shoulder for each direction which are approximately 1.5m in width, with guiderail on the coastal side of the highway. An existing fibre-optic line runs underground along the east (inland) side of the road shoulder along the entire site.

To the south of this proposed realignment, the Trout Brook Day Use Area and Vieux Chemin du Cap Rouge Trail terminus are located. Scheduled work activities begin around mid-November and continue until about early May 2016. During this period, the DUA is typically closed for the season. For the trail terminus, PCA is currently reviewing viable options where the trail enters into the construction zone.

To the north, Corney Brook Campground and Corney Brook Trailhead are situated within close proximity. Although some visitor experience disruptions are anticipated, no facility closures are planned at this time within these areas.



## Project Activities

### **Material Management**

Significant volumes of excavated material will be transported at an approved facility outside the park. Some of the excavated material however, an estimated 10% of the overall total, may be placed on the existing La Bloque roadway (To be determined). This would increase the road elevation to about 3m above existing conditions. Material disposal would occur at La Bloque during a period when the road is normally closed for the season thereby avoiding onsite traffic concerns. Deposited material would be compacted and contoured to blend in with the existing road profile. Parks Canada field staff would be on-site assisting with operations.

### **Blasting Operations**

Use of explosives is required along sections of bedrock outcrop. Pursuant to the *Canada National Parks Act, General Regulations* (Section 35), a Superintendent Authority will be required authorizing permission to use explosives. Although issuance will be a separate administrative process from the BIA, the fully signed permit will eventually be appended to this file for future documentation and reference purposes.



### ***Sedimentation and Erosion Control***

A sedimentation and erosion control plan will be developed for the highway realignment to use as a guideline during construction. The plan will outline measures to prevent soil erosion and sediment laden runoff from leaving the construction site. The plan will focus on prevention of soil erosion, with removal of sediment prior to discharge into any nearby watercourses. This will be achieved in part by minimizing exposed soils and areas disturbance as quickly as possible.

### ***Traffic Management***

The overall principles for traffic management are to:

- maintain at least one-way traffic during construction by using appropriate control measures;
- maintain two-way traffic during rock removal operations between the transition areas at start and end construction limits;
- manage and control vehicular movements through the site;
- maintain safety for workers, cyclists, motorists, etc.;
- provide appropriate access to the site for excavation and construction traffic; and,
- implement proper signage along the roadway during construction.

### ***Project Phasing/ Sequencing***

Sequential phasing will entail:

1. Mobilization of equipment and material
2. Implement Traffic Control measures (e.g., site safety signage, directional barricades, etc.)
3. Install environmental control and prevention measures
4. Transport and stockpiling of materials and equipment
5. Line corridor delineation and tree removals
6. Install access roads to rock cut location off existing alignment
7. Rock excavation and removal operations, including material transport and disposal
8. Place sub-base and base gravels
9. Place and compact roadway embankment, sub-base and base gravel
10. Asphalt operations
11. Install guard rails in areas where deemed necessary
12. Removal of remaining existing asphalt and proper disposal
13. Remediation of impacted sites (top-soiling, hydroseeding, revegetation as deemed necessary, etc.)
14. Demobilization and re-establishment of two-way traffic

It is anticipated the entire project will require 32-36 weeks of construction for the highway realignment. Posting for project tender is scheduled for early November 2015.

More specific information of project activities is available upon request.

**VALUED ECOSYSTEM COMPONENTS**

Valued Ecosystem Components (VECs) are environmental elements with scientific, social, cultural, economic, archaeological or aesthetic importance. VECs with potential to interact with project components are listed below:

VECs	Potential Environmental Effects
<p><b>Water Resources</b></p> <ul style="list-style-type: none"> <li>- Surface/ groundwater hydrology, surface/ groundwater quality and quantity</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Adverse modifications to surface drainage patterns</li> <li><input type="checkbox"/> Potential runoff, erosion, sedimentation, and altered drainage,</li> <li><input type="checkbox"/> Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, nutrients from improper wastewater disposal, etc.)</li> </ul>
<p><b>Land Resources</b></p> <ul style="list-style-type: none"> <li>- soil, topography, geology &amp; landscape</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Changes in slopes, landforms, and landscape</li> <li><input type="checkbox"/> Soil compaction and rutting</li> <li><input type="checkbox"/> Soil contamination</li> </ul>
<p><b>Air &amp; Noise</b></p> <ul style="list-style-type: none"> <li>- altered air quality and increased noise levels.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Decreased ambient air quality (i.e. from dust, emissions, etc.)</li> <li><input type="checkbox"/> Increased ambient noise levels</li> <li><input type="checkbox"/> Increased levels of CO2 and other pollutants</li> <li><input type="checkbox"/> Increased localized temperatures</li> </ul>
<p><b>Flora and Fauna</b></p> <ul style="list-style-type: none"> <li>- aquatic &amp; terrestrial species /population, communities &amp; habitats</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Impacts vegetation in immediate or adjacent areas</li> <li><input type="checkbox"/> Introduction of invasive species</li> <li><input type="checkbox"/> Sensory disturbance causing displacement/habitat avoidance</li> <li><input type="checkbox"/> Wildlife habituation/attraction to artificial food sources</li> <li><input type="checkbox"/> Impeded/altered wildlife movement</li> <li><input type="checkbox"/> Loss of habitat (food &amp; cover)</li> <li><input type="checkbox"/> Damage to nests/disruption of nesting animals</li> </ul>
<p><b>Human Environment</b></p> <ul style="list-style-type: none"> <li>- public safety, visitor experience, and cultural resources</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Disruption to park visitor experience due to noise, air and water quality, changed traffic patterns &amp; aesthetics</li> <li><input type="checkbox"/> Increased risk to public and workers from project activities</li> <li><input type="checkbox"/> Loss/disruption of unknown heritage, archaeological and paleontological features</li> </ul>

## EFFECTS ANALYSIS

The most important **positive** effect is the improved highway that will be safer for the travelling public.

The most important **negative** effect would be impacts from loss of resulting from the new roadbed footprint.

*Refer to Appendix 1 Effects Matrix Analysis for detailed information.*

## MITIGATION MEASURES

### Water Resources

- 1) Develop and implement a *Sediment and Erosion Control/ Prevention Plan* for areas of concern.
- 2) Sedimentation and erosion control mechanisms must be installed around work areas to prevent silt from entering watercourse.
- 3) Continually assess site for erosion control requirements and implement control measures as required (*i.e. traps, straws, bales, erosion blankets, silt fencing*)
- 4) Fuels, and other petroleum-based products must not be stored within 100m of any waterbody.
- 5) Equipment operating near waterbodies must be inspected daily for leaks.
- 6) Minimize clearing, grubbing, and grading near waterbodies (Corney Brook).
- 7) As much as possible, retain vegetated buffer (at least 30m) around waterbodies unless otherwise directed by PCA personnel.
- 8) Sediment must settle out or be filtered before water is allowed to enter a watercourse.
- 9) All boreholes, especially those drilled into the table-water during geotechnical investigations should be properly sealed.
- 10) Apply road surface seal coats to dry surfaces and not prior to or during rainfall events.
- 11) If concrete is mixed on site, concrete wash water should either be used in subsequent mixes and or properly disposed of outside the park.
- 12) Only clean aggregate material, free of particulate matter, non-native species, shall be placed in water.
- 13) Backfill and compact excavations as soon as reasonably possible.
- 14) Optimize degree of compaction to minimize erosion and allow for revegetation.

### Land Resources

- 15) Maintain construction site in a tidy condition, free from the accumulation of waste products, debris and litter.
- 16) All construction-generated waste must be properly disposed at an appropriate facility.
- 17) Construction sites must undergo thorough clean up at project completion.
- 18) Restrict travel to approved access routes along the construction zone.
- 19) Construction materials shall be stored within delineated work sites or designated areas.
- 20) Restore vegetation or surface cover as soon as possible to minimize duration of soil exposure.

- 21) Phase work to minimize duration of exposure of disturbed areas.
- 22) Halt construction during excessive rainfall events.
- 23) Delay trenching or excavation until just prior to installation of infrastructure.
- 24) Minimize length of trench or area and exposure time.
- 25) Dewater all excavations at appropriate locations.
- 26) Ensure backfilling is undertaken using suitable materials and that adequate soil compaction is conducted to avoid ground subsidence.
- 27) Provide additional backfill where subsidence has occurred.
- 28) Delay slope clearing until before scheduled construction. Reclaim upon work completion.
- 29) Prepare an *Emergency Response Plan* to cover such incidents as accidents and malfunctions, fires, high winds, heavy rainfall and runoff, etc.
- 30) Develop an onsite *Spill Response Plan* that ensures spill contingency resources and measures are in place before work begins.
- 31) Capture, contain, and clean up spills and leaks immediately.
- 32) Ensure site is equipped with appropriate containment/clean-up tools, and that all personnel are trained in their use.
- 33) All hazardous materials and wastes must be clearly labeled with WHMIS labels and information and handled as required.
- 34) If contamination is uncovered during excavation, investigate and identify the source. Ensure proper removal and disposal.

### **Air Quality**

- 35) Equipment and vehicles must not be left idling between work periods.
- 36) Ensure materials being stored/transported are covered with tarps or equivalent material to contain fine particulate matter.
- 37) Avoid site preparation during dusty, dry, windy periods.
- 38) Avoid ground vegetation removal during dry, windy periods to prevent blowing of dirt/dust.
- 39) Confine “noise” activities to daytime hours as approved by Park authority.

### **Flora and Fauna**

- 40) All construction equipment/materials must be cleaned prior to entering park to minimize the risk of introducing weeds and invasive species.
- 41) Use existing roadways/disturbed areas for site access and travel within the site.
- 42) Ensure excavated material does not damage/bury plant material that is to be retained on site/adjacent areas.
- 43) Minimize site clearing and retain vegetation when possible to reduce habitat loss/fragmentation.
- 44) Clearly mark vegetation that is not to be removed.
- 45) Minimize site clearing and retain vegetation when possible to reduce habitat loss/fragmentation.
- 46) If appropriate, re-establish native vegetation where it has been removed/damaged.
- 47) Where possible preserve wildlife trees if they are not hazard trees.
- 48) Depending on presence of wildlife, schedule high noise level activities and other intrusive

construction activities to avoid critical life stages (*i.e. breeding, nesting, rearing, and migration*). Park Resource Personnel will be consulted for specific species information.

- 49) Survey area for active nests/dens prior to start of work. (Due to scheduled time of undertaken, presence of active nests is unlikely).
- 50) Fence excavations to prevent injuries to wildlife.
- 51) Construct and orient fences in a manner that reduces impact to wildlife movement.
- 52) Feeding, enticement, or harassment of wildlife is strictly prohibited.
- 53) Toxic materials and any materials, which may pose a hazard to wildlife, must be stored in secured buildings or containers.
- 54) Store food, garbage, and other smelling products in sealed containers.
- 55) Pack all garbage out from the site daily, unless permanent garbage facilities exist at the site.
- 56) Minimize time boreholes/test pits remain open to reduce small terrestrial wildlife mortality.

### **Human Environment**

- 57) Evaluate proposed site layout, access routes, and construction activities to minimize their visual impact. Time construction activities to minimize vehicle conflicts
- 58) When possible, use natural pruning methods, which minimize damage to trees and retain (as much as possible) their natural appearance and form.
- 59) Cut vegetation low/flush to the ground.

### **Cultural Resources**

- 60) Archaeological surveys should be conducted or at least considered prior to construction (Consult with PCA beforehand).
- 61) Prior to construction, the new road corridor should be surveyed by qualified personnel to determine presence of cultural resources.
- 62) Should previously unknown archaeological resources/cultural artifacts be discovered, immediately cease work, and notify PCA archaeology (Maura McKeough – 902.733.3530).

### **Accidents and Malfunctions**

The likelihood of accidents or malfunctions occurring and causing negative environmental impacts due to project activities is minimal. Potential accidents and malfunctions may occur at the staging location and during the construction and operation phases. These may include: vehicle collisions; spills from equipment operated on site; structural failures; spills or leaks (from paint, chemicals, and concrete) into the terrestrial or aquatic environment. Project activities that could result in accidents and malfunctions largely relate to the operation and maintenance of heavy machinery, vehicles, and hand machinery. Structural failures, vehicle collisions, spills, and leaks would likely be attributed to human error. Spills resulting from improperly stored materials are also possible.

Accidents and malfunctions will be avoided through compliance with mitigation measures.

In addition to the above-noted mitigation, the Proponent is also expected to adhere to mitigation contained within Parks Canada's *National Best Management Practices for Roadway, Highway and Parkway and Related Infrastructure* where appropriate (Appendix 2).

## **CONSIDERATION OF THE NEED FOR PUBLIC PARTICIPATION & ABORIGINAL CONSULTATION**

Due to the limited scope, public participation is not warranted. During project implementation, the project will likely cause temporary delays and inconveniences. Upon completion, motorists will benefit in ways of increased safety of roadway and greater convenience (e.g., reduced need for continual delays associated with ongoing maintenance).

Formal Aboriginal Consultation on this project was initiated with the representatives of the Mi'kmaq of Nova Scotia. Based on the Mi'kmaq response, several measures to mitigate impacts on archeological resources are set out in this BIA.

## **EFFECT SIGNIFICANCE**

Taking into account the specific mitigation measures mentioned above, the project is not likely to cause significant residual environmental effects. Implementation of the chosen alternative would have a limited effect on natural resources and therefore no cumulative environmental impacts are forecasted.

## **SITE INSPECTION**

Periodic surveillance monitoring is required by qualified PCA personnel and may include daily site visits during work activity, attending related meetings and briefings, evaluating effectiveness of mitigation measures, and consultation with staff and work crews during work activity.

The PCA environmental protection officer shall be continuously updated on project developments as they unfold.

**DECISION**

Taking into account implementation of mitigation measures outlined, the project is:

- Unlikely** to cause significant adverse environmental effects.  
 **Likely** to cause significant adverse environmental effects.

**SIGNATURES AND APPROVAL**

**BIA Author**

**Name:** Archie Doucette *Environmental Assessment Coordinator, CBFU*

**Signature:** Archie Doucette **Date:** 28 October, 2015

**BIA Recommender**

**Name:** Maura McKeough, *A/ Cultural Resource Manager, CBFU*

**Signature:** Maura Mc Keough **Date:** 28 October, 2015

**BIA Recommender**

**Name:** Derek Quann, *Resource Conservation Manager, CBHNPC*

**Signature:** Derek Quann **Date:** 29 OCT 2015

**Approved by:**

**Name:** Derek Quann, *A/ CBHNPC Superintendent*

**Signature:** Derek Quann **Date:** 29 OCT 2015

**Project Manager (Functional)**

**Name:** Kate McCarthy, *Project Manager PWGSC (or designate)*

**Signature:** Guord Benlos **Date:** 29 OCT, 2015  
*for Kate McCarthy*

*I have read and commit to following the mitigations set out in this report*

**Comment:**

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## APPENDIX 1

### **Effects Identification Matrix:** *Corney Brook Realignment Project*

**Effects Identification Matrix: *Corney Brook Road Realignment Project***

A. Direct Effects (during preparation/construction phases)														
			Components potentially directly affected by the proposed project											
			Natural Resources					Cultural Resources		Visitor Experience				
			Air	Soil & geology	Hydrology	Flora	Fauna	~ Landscapes	~ Resources	Visitor access	Recreational	Viewscapes	Soundscapes	Visitor Safety
Phase	Associated Activities													
Project Components	Preparation / construction	Material storage	✓	✓	✓	✓	✓					✓	✓	✓
		Clearing	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Detour set up	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Waste disposal	✓	✓	✓	✓	✓						✓	✓
		Dredging	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Drainage	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Excavation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Grading	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Backfilling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Machinery use	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Transport - materials & equipment	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Sedimentation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Use of chemicals	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Temporary facilities	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Vehicle traffic	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓
		Decommissioning	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	
		Remediation	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	

## APPENDIX 2

### **Parks Canada's Best Management Practice (*Environmental Protection Measures*)**



Parks  
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Parcs  
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# Parks Canada National Best Management Practices

## Roadway, Highway, Parkway and Related Infrastructure

Canada



Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure

Approved by

Original signed by Mike Wong

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Mike Wong, Executive Director Natural Resource Conservation Branch

Original signed by Calvin Mercer

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Calvin Mercer, Associate Vice-President Asset Management and Project Delivery

July 23, 2015

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Date



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## Introduction

The Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure will allow an identified suite of project activities to be undertaken in such a manner that there will not be resulting significant adverse environmental effects.

The Best Management Practice (BMP) pathway is applied when there is a suite of routine, repetitive projects (e.g. paving) or activities (e.g. de-watering), with well understood and predictable effects. This fulfils Park's Canada's obligations under the *Canadian Environmental Assessment Act 2012* as a manager of federal land, see the [Guide to the Parks Canada EIA Process](#). The BMP maximizes efficiency through creation of a pre-approved impact assessment for the defined suite of projects, to which standard mitigation and environmental management measures can be applied.

The impact assessment officer (IAO) will review a proposed project and advise the functional manager of the project if and how this BMP should be applied. The IAO's advice will be based on whether the project falls within the scope of the BMP, and whether application of the mitigation measures in the BMP will adequately address potential adverse effects of the project.

Project Managers are responsible to ensure all mitigation measures applicable to the project are added to the terms and conditions of any permits or contracts issued for the project.

The Impact Assessment Officers must ensure the project, EIA pathway applied and determination are recorded in the Parks Canada National Impact Environmental Assessment [Tracking System](#).

## Scope of Application

This BMP outlines the impact assessment of repetitive and routine projects on roadways, highways and parkways. If a project involves some or all of below activities, and the initial assessment of site and project indicate "the project is unlikely to result in significant adverse environmental effects" the BMP can be applied. Projects that this BMP would likely be applied to include:

- The proposed maintenance or repair of an **existing** sidewalk, or parking lot.
- The proposed maintenance or repair of an **existing** road, including pull-off areas, that would be carried out on the existing right of way<sup>1</sup>.

Activities included in the scope of this BMP are:

1. Project Design
2. General Activities
  - Worksite Conditions/Staging/Laydown
  - Equipment operations
  - Fuel storage and refueling

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<sup>1</sup> Highway Footprint or Right of Way (ROW): The permanent physical intrusion of a highway or freeway, including the road surface, shoulders, side slopes, drainage ditches and/or storm drainage ponds (Transport Canada, 2008).



- Site Clean Up/Waste Disposal
3. Asphalt Production and Handling
    - Asphalt Plant Operation
    - Gravel Crushing and Washing
    - Oiling of Truck Boxes
    - Clean Up and Disposal of Waste Products
  4. Concrete Handling
    - Operation, maintenance and inspection of Onsite Temporary Concrete Washout Facility
    - Removal of Temporary Concrete Washout Facilities
    - Onsite concrete management
  5. Paving, Resurfacing and Grading
    - Grading
    - Paving and Resurfacing
    - Pavement Marking and Barrier and Guardrail Reinstatement
  6. Barriers and Guardrails
    - Repair, replacement and upgrades of barriers and guardrails
  7. Vegetation Removal
    - Vegetation Removal
    - Grubbing
    - Brushing
    - Disposal of Vegetation Debris
    - Integrated Pest Management
  8. Excavation, Soil Stripping and Overburden Removal
    - Excavation
    - Soil Stripping
    - Topsoil Salvage
    - Excavated Material Storage
    - Excess Material and Waste (overburden removal)
  9. Slope Stabilization, Drilling and Blasting
    - Slope stabilization-scaling, hydraulic hammers
    - Drilling and blasting for Slope Stabilization and Geotechnical Investigations
  10. Soil and Vegetation Restoration
    - Topsoil Replacement
    - Soil Amendments
    - Seedbed Preparation
    - Species Selection
    - Seed Lot Selection
    - Seed Mixture Composition
    - Seeding
    - Alternatives to Seeding
    - Reclamation Standards
    - Reclamation Plot Evaluation
    - Time Limits



10. Drainage Structures
  - Drainage structures
  - Culverts
11. Bridge Maintenance
  - Bridge Cleaning
  - Bridge Repairs Using Treated Wood Products
  - Bridge and Structure Painting
12. Water Withdrawal and Dewatering
  - Water Withdrawal
  - Pump Screens
  - Dewatering

## Exceptions

This BMP is not suitable for the following project activities as they would require supplemental assessment and/or mitigations:

- Work that may impact aquatic or terrestrial wildlife habitat connectivity, such as fences or culverts;
- Elongation of culverts; realigning water courses; dredging; or work below the high water mark of a fish bearing water body;
- Bridge projects needing work to occur below the High-Water Mark<sup>1</sup>, with permanent alteration to the water course, such as replacement of piers/abutments or permanent installation of structures on the bed of a water body;
- Greater than 10% increase in land use footprint (e.g. gravel pit expansion); and,
- Work which might adversely impact any potential or established Aboriginal and Treaty rights or traditional use<sup>2</sup>.

If the project has the potential to have an adverse effect on the critical habitat of a species at risk (with endangered, threatened, or extirpated status) this BMP does NOT apply. The project will require a separate environmental impact analysis.

If the project has the potential for residual adverse effects on a listed species at risk (including effects to individuals and residence of the individuals) this BMP does NOT apply, the project will require a separate environmental impact analysis.

**Note:** If there is any uncertainty regarding potential adverse effects to species at risk, consult a member of the [National Office Species Conservation team](#).

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<sup>1</sup> High-water Mark is the usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to leave a mark on the land. (Fisheries and Oceans, 2015). Upper Controlled Water Elevation (UCWE) is used as definition of High-water Mark in managed waterways.

<sup>2</sup> Parks Canada must engage in additional and separate consultations with Aboriginal groups if there is a possibility of a project adversely affecting established or potential Aboriginal or Treaty rights. This is required to fulfill federal government responsibilities in upholding the honour of the crown. If there is uncertainty regarding the need for Aboriginal consultation with respect to a project, refer the matter to Parks Canada Legal Services for advice. Guidance on consultation may be sought from the [Aboriginal Affairs Secretariat](#) and from the guidance document "[A Handbook for Parks Canada Employees on Consultation with Aboriginal Peoples](#)".



## Approved geographic area of application

This BMP is intended for use in all Parks Canada administered protected heritage places with roadways, highways and parkways.

## Components of the environment that may be affected

Potential effects from projects of this type are well understood and predictable. They include:

### Water Resources:

- Adverse modifications to surface drainage patterns
- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)

### Soil/Land Resources:

- Change in slopes, landforms, and landscape
- Soil compaction and rutting
- Slope instability, due to increased soil exposure and improper excavation and storage
- Soil contamination

### Air quality:

- Decreased ambient air quality (i.e. from dust, equipment emissions, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO<sub>2</sub> and other pollutants
- Temporary increased localized temperatures from paving and equipment operation.

### Flora and Fauna:

- Damage to and/or removal of vegetation in immediate or adjacent areas
- Introduction of non-native species populations, or expansion of existing populations
- Wildlife sensory disturbance causing displacement/preferred habitat avoidance
- Wildlife habituation/attraction to artificial food sources
- Impeded/altered wildlife movement
- Damage to nests/disruption of nesting animals
- Mortality from project activities

### Cultural Resources:

- Adverse effects on the heritage value or character-defining elements of a cultural resource
- Impacts to archaeological resources (known or potential)

## Mitigation Measures

To use the document efficiently, keep the activity mitigation lists that apply to the project expanded and collapse the other activities by clicking on the section titles, print this as a pdf or



paper document and include with the EIA determination record. This will reduce the overall size and scope of the mitigations to present to contractors and project managers.

*Choose all that apply to project. Each title is hyperlinked to the related section.*

*Module*

1.	Project Design
2.	General Activities
3.	Asphalt Production and Handling
4.	Concrete Handling
5.	Paving, Resurfacing, Grading
6.	Barriers and Guardrails
7.	Vegetation Removal
8.	Excavations, Soil Stripping and Overburden Removal
9.	Slope Stabilization, Drilling and Blasting
10.	Soil and Vegetation Restoration
11.	Drainage Structures
12.	Bridge Maintenance
13.	Water Withdrawal and Dewatering



# 1. Project Design

When upgrades to infrastructure are planned opportunities to decrease the environmental impacts of long term operation should be considered in the engineering design. Some examples are: directing runoff into vegetated areas rather than directly into surface waters to decrease pollution in surface waters, increasing the span length of bridges during replacements to allow for terrestrial wildlife passage underneath and converting smaller culverts to larger culverts or clear span bridges to allow for better fish passage and less restricted flows.

## 2. General Activities Mitigations Module

Construction activities involve the use of laydown/staging areas, equipment operations, storage and handling of hazardous materials. Potential adverse effects include: destruction of vegetation, erosion and sedimentation, constriction for wildlife movements and introduction/spread of non-native vegetation.

### Work Site Conditions/Staging/Laydown

- 2.1. All employees must attend a briefing with an Impact Assessment Officer (IAO) or Surveillance Officer (SO) before beginning work at the site review and explain the mitigations that are conditions of the project approvals.
- 2.2. Minimize vegetation-clearing activities and ground disturbance by staging on existing hardened areas wherever possible.
- 2.3. Avoid or terminate activities on site that attract or disturb wildlife. Vacate the area and stay away from the immediate location if wildlife display aggressive behaviour or persistent intrusion.
- 2.4. Control materials that might attract wildlife (e.g. petroleum products, human food and garbage).
- 2.5. Notify the SO immediately about dens, litters, nests, carcasses (road kills), wildlife activity or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported to SO within 24 hours.
- 2.6. Delineate the work zone; clearly mark the limits to active construction and the access and egress locations.
- 2.7. When work involves the disturbance of soils or the use of erodible materials (e.g. sands, topsoil), prevent the transport of sediment by the installing of appropriate erosion and sediment control.
- 2.8. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken in proximity to watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events. All components require regular maintenance to ensure effectiveness.

### Equipment Operations

- 2.9. Equipment movements and workers' private vehicles shall be restricted to the 'footprint' of the construction area.



- 2.10. Ensure machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, noxious weeds and soils from off-site.
- 2.11. Operate machinery on land above the high water mark, on ice, or in another manner that minimizes disturbance to the banks and bed of any water body.
- 2.12. Limit machinery crossing (fording) a stream or watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure in compliance with the *Fisheries Act*.
- 2.13. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
- 2.14. Use temporary crossing structures or other practices to cross streams or water bodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds.

## Fuel Storage and Refueling/Emergency Plans

- 2.15. A Spill Response Plan will be prepared and detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products in accordance with all applicable federal and provincial legislation. The Plan shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
- 2.16. Spill kits shall be provided at re-fuelling, lubrication, and repair locations that are capable of dealing with 110% of the largest potential spill and shall be maintained in good working order. Site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
- 2.17. If potentially hazardous materials (e.g. cement-based products, sealants or paints) are used on site ensure raw material, mixed compounds and wash water are not released to any watercourse or soils. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
- 2.18. Hazardous or toxic products shall be stored no closer than 100 metres from streams, wetlands, water bodies or waterways.
- 2.19. Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The SO shall be notified immediately of any spill. In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
- 2.20. The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the proponent. The site will be inspected to ensure completion to the expected standard and to the satisfaction of Parks Canada.

## Site Clean Up/Waste Disposal

- 2.21. Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.



- 2.22. Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site.
- 2.23. Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Parks Canada protected heritage places. These wastes shall be contained and removed in a timely and approved manner and disposed at an appropriate waste landfill site located outside the Parks Canada protected heritage place. Construction waste storage containers, shall be emptied when 90% full. Waste containers will have lids, be wildlife proof if there attractants and waste loads shall be covered while being transported.
- 2.24. Sanitary facilities, such as a portable container toilet, shall be provided and maintained in a clean condition.

### 3. Asphalt Production and Handling Mitigations Module

Asphalt is a common building material for transportation infrastructure. Its production requires the use of gravel, water, and petroleum products, and associated project activities include transportation, storage and handling of these materials. Installation of asphalt plants is common within the larger parks where gravel extraction is undertaken.

#### Timing of Works

- 3.1. Asphalt works are preferably undertaken during periods of dry weather as this allows easier control of contaminated runoff and sediment.
- 3.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

#### Operation of Asphalt Plants

- 3.3. Asphalt plant operation must comply with all environmental pollution control regulations, including provincial regulations, and the plant operational plan.
- 3.4. Spoil piles and stock piles will be at least 30 meters from the edge of any water body.
- 3.5. There must be enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant.
- 3.6. A containment berm with an associated liner made of occlusive material (e.g. plastic of a thickness approved by the SO) and covered with absorbent sand or clay shall be installed under the asphalt storage tank to ensure containment of 110% of the tank's capacity.
- 3.7. The proponent shall be responsible for the purchase and safe delivery/storage/handling of asphalt cement and emulsions to the asphalt plant site.
- 3.8. Excess hot mix or reject new asphalt shall be temporarily in stored in the containment area sufficient to prevent runoff of petroleum into soils or surface waters as directed by the SO, and removed from the Parks Canada protected heritage place, prior to project completion.



- 3.9. Every effort will be made to recycle waste asphalt, either as a base course, or by recycling waste asphalt through the asphalt plant according to engineering specifications. Old cured ground asphalt material shall be removed, recycled, or stored for future recycling at an approved operational gravel pit or asphalt plant site. Stockpiles must be further than 30 metres from any surface waters.
- 3.10. Remaining stockpiles will be removed or incorporated into reclamation plans for the gravel pits or asphalt plant sites.
- 3.11. Asphalt to be removed must be sampled and analyzed to determine possible lead contamination. Contaminated asphalt will be transported to an approved waste disposal facility. A receipt of delivery is to be provided to the SO.
- 3.12. Proponent should protect containment/catchment areas and drip trays at the asphalt plant from rainfall since, if contaminated, all of the collected water will require disposal of at an approved disposal facility at the expense of the Proponent.
- 3.13. Dyking and ponding will be required to control the rate and quality of runoff from the plant site.
- 3.14. Ensure that the water in the settling ponds remains clean of petroleum products. Any contaminated water will require disposal at an approved disposal facility at the expense of the Proponent.

### Gravel Crushing and Washing

- 3.15. Where possible within engineering constraints, asphalt materials should be recycled to reduce the need for new gravel.
- 3.16. Gravel will be obtained from an approved operational borrow pit only. For gravel obtained from a borrow pit within a protected heritage place or borrow pit, gravel extraction within the footprint of the disturbed area of the approved operational borrow pit is permitted.
- 3.17. Gravel will not be crushed within 30 meters of any water body.
- 3.18. If water for cleaning is extracted from a watercourse, refer to [water withdrawal section](#) of this BMP.
- 3.19. If gravel requires washing, the water used will not be returned directly to any watercourse.
- 3.20. Water free from chemical contaminants will be discharged into ground where further erosion and runoff into surface water is prevented. Discharging into well vegetated ground surface, at a rate which prevents erosion can often provide increased absorption and reduction of sediment load.
- 3.21. Contaminated water must be treated to meet CCME guidelines or transported outside of the Parks Canada protected heritage place for disposal at an approved facility.
- 3.22. For waste removed from the park a detailed receipt of delivery to an approved facility will be provided to the SO.

### Oiling of Truck Boxes

Trucks for hauling asphalt mixture shall have tight, clean, smooth metal beds that have been sprayed with a minimum amount of thin fuel oil to prevent the mixture from adhering and causing waste asphalt.

- 3.23. Truck boxes may be oiled only when absolutely necessary.



- 3.24. Oiling will take place in a bermed area, consisting of a plastic underlay with 15 centimetres overlay of clean gravel. Oil contaminated gravel will be hand collected (so as to prevent tearing of the plastic) from the bermed area daily, and put through the asphalt plant.
- 3.25. Vehicle covers shall be securely fastened.

### **Air Quality Mitigations**

- 3.26. Asphalt plants should be 500 meters from buildings with human habitation.
- 3.27. Emissions from the asphalt plant and paving project equipment will comply with End Product Specifications (EPS) emission control standards and other provincial emissions regulations. Stack test results provided to the ESO by the operator or surveillance contractor may be required when the asphalt plant is at full capacity to ensure the plant is operating within the required standards. If the plant is not operating within the appropriate levels, production will cease until the requirements are met.
- 3.28. Sludge removed from the clarifier that is free of chemical contamination will be contained to prevent fine dust particles from becoming airborne during windy periods.
- 3.29. Unannounced stack tests will be conducted throughout the project. If the plant does not meet requirements, operation will cease until the requirements can be met.

### **Disposal and Clean Up of Other Waste Products**

- 3.30. To ensure regular clean-up of waste asphalt and petroleum spills, a defined clean up schedule will be established during the preconstruction meeting.
- 3.31. Leaks will be collected in drip-trays, the collected material will either be removed from the park, or recycled back through the Asphalt Plant. For any material removed outside the park to an approved facility, a detailed receipt will be provided to the ESO.
- 3.32. Used oil, filters, grease cartridges, oil cans and other waste products of plant servicing will be collected and disposed of at the nearest industrial waste facility.

## **4. Concrete Handling Mitigations Module**

Concrete is a common construction material used in transportation infrastructure. Its use ensures longevity of the infrastructure and safety for public use. One litre of concrete wash water or leachate in 1000L of water will kill fish. Cement-based products including grouts and concrete are lethal to fish and many other aquatic organisms. Raw product or leachate entering a watercourse will alter water chemistry, making it more basic or alkaline.

### **Onsite Temporary Concrete Washout Facility**

- 4.1. Temporary concrete washout facilities shall be located a minimum of 30m from storm drain inlets, open drainage facilities, and watercourses.
- 4.2. Temporary concrete washout facilities shall be temporary pit or bermed areas constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
- 4.3. Straw bales, wood stakes, and sandbag materials can be used to construct temporary containment walls or “barriers”.



- 4.4. Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.
- 4.5. The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.
- 4.6. Perform washout of concrete mixer trucks in designated areas only.
- 4.7. Wash concrete from mixer truck chutes into approved concrete washout facility or collect in an impermeable bag for disposal.
- 4.8. Pump excess concrete in concrete pump bin back into concrete mixer truck.
- 4.9. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.
- 4.10. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per federal and provincial regulations.

### **Maintenance and Inspection of Temporary Concrete Washout Facilities**

- 4.11. Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100 mm (4 inches) for above grade facilities and 300 mm (12 inches) for below grade facilities.
- 4.12. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.
- 4.13. Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- 4.14. Temporary concrete washout facilities shall be inspected for damage (i.e. tears in PVC liner, missing sand bags, etc.).
- 4.15. Onsite concrete waste storage and disposal procedures should be monitored at least weekly or as directed by the ESO.

### **Removal of Temporary Concrete Washout Facilities**

- 4.16. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and restored.

### **Onsite Concrete Management**

- 4.17. Rolling concrete mixers with surplus concrete in amounts less than one cubic metre of wet concrete may waste this concrete in the grade right-of-way as directed by the Parks Canada Representative in areas that drain well away from watercourses. Surplus amounts in excess of one cubic metre are to be returned to the batching yard.
- 4.18. Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
- 4.19. The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.



- 4.20. Waste, solidified concrete from rolling concrete mixers in amounts less than 1 cubic meter and waste solidified concrete from construction pour shall be buried in the grade within 48 hours of the pour, subject to approval and direction from the Departmental Representative

## 5. Paving, Resurfacing, Grading Mitigations Module

Highway surface management activities are undertaken to ensure public safety on Parks Canada Agency highways by maintaining clean, level, and unbroken road surface conditions through activities such as pavement cleaning, patching, application of surface treatments, and pavement crack sealing. Grading is used to address drainage issues, vegetation encroachment, potholes and rough surfaces.

### Timing of Works

- 5.1. Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of contaminated runoff and sediment.
- 5.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

### Grading

- 5.3. During grade construction conducted close to any watercourse, water body or wetland ensure materials are not pushed, fall or are eroded into the water or wetlands.
- 5.4. No grade building shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
- 5.5. Materials shall be placed at storage sites or on the grade without spillage outside the work limits. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
- 5.6. Retain a 30 metre vegetated buffer around water bodies or install runoff management structures.
- 5.7. If possible grade roads early in the spring before vegetation develops seed heads or late in season after vegetation has set seed and is dormant to minimize non-native vegetation propagation.
- 5.8. Ensure gravel or road bed material is free of weeds and comes from an approved operational gravel source free of other contaminants.

### Paving and Resurfacing

- 5.9. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface waters.
- 5.10. Minimize application of seal coats in wet conditions. Attempt to apply only to dry surfaces and not prior to (within 24 hrs.) or during rainfall. If unforeseen rain arrives ensure runoff from recently seal coated surfaces are prevented from entering surface waters.
- 5.11. For asphalt handling and management see the [Asphalt Mitigation Module](#) of the BMP.



## Pavement Marking and Barrier and Guardrail Reinstatement

- 5.12. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface water. Pavement marking shall be undertaken pursuant to standard methods applied in National Parks for control of paint products, both in transport and handling. The Contractor shall present a description of methods to be employed for transporting and controlling paint and hazardous products, application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products, etc. to the satisfaction of the Parks Canada Representative.
- 5.13. Where concrete barriers or guard rails are temporarily removed, for highway improvements, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

## 6. Barriers and Guardrails Mitigations Module

Repair, installation and upgrade of barriers and guardrails involves laydown/staging areas, equipment operations, minor excavation (e.g., for barrier post holes) and use of concrete. Potential adverse effects include destruction of vegetation and erosion and sedimentation.

### Timing of Works

- 6.1. Where excavation is required, schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 6.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

### Repairs, Replacement and Upgrades

- 6.3. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken within 100m of watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger.
- 6.4. Where use of concrete is required for guardrail post holes, Concrete Handling Mitigations apply.
- 6.5. If vegetation removal is required for barrier or guardrail works, Vegetation Removal Mitigations apply.
- 6.6. Where concrete barriers or guardrails are temporarily removed, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

## 7. Vegetation Removal Mitigations Module

Roadside vegetation management activities include mowing, brushing, and landscape maintenance activities undertaken to maintain clear sight lines for highway users, control noxious weeds, facilitate effective drainage, and reduce possible fire hazards. Mature timber



may need to be removed for improving road alignments, improving sight lines or replacing or repairing associated infrastructure. Grubbing (stump and root removal) may be required to prepare the ground surface for other activities.

## Timing Windows

- 7.1. Vegetation clearing can negatively impact nesting birds and/or bats in spring and summer. Avoid all vegetation removal during this time. If vegetation removal is scheduled to occur within these times a qualified professional biologist/ecologist should further clarify the species presence and timing particular to the work site and any occupied bird nests, eggs, or nests of species protected under the Migratory Bird Convention Act (MBCA). See [appendix on regulatory guidance for further detail on the MBCA and SARA](#).
- 7.2. If a nest is found during the pre-work surveys, the vegetated area will be left intact with a suitable sized buffer of shrubs/trees around it until the young have fledged and left the nest. Size of buffer species dependent, to be determined in consultation with professional biologist or park ecologist.
- 7.3. Grass mowing and trimming should not occur during peak spring or fall reptile/amphibian migrations and hatching. Consult a local biologist/ecologist for site and species specific timing windows.

## Vegetation Removal Mitigations

- 7.4. Vegetation removal should be limited to the minimum Clear Zone Distance<sup>1</sup> dependent on type and size of road and maximum height needed to meet the road safety objectives.
- 7.5. Minimize full removal and retain vegetation when possible to reduce erosion.
- 7.6. Prior to the commencement of any vegetation removal, the worksite must be surveyed for species at risk. If species at risk are found, work must be stopped until site-specific mitigations to address potential adverse effects are developed.
- 7.7. Survey vegetation for non-native species, clear vegetation areas with non-native vegetation in spring and early summer to avoid further spread and development of the non-native seed bank.
- 7.8. Clearing activities shall be avoided during nesting seasons for birds, reptiles and amphibian species in the project area.
- 7.9. If wildlife is observed during work, if possible, give animals the opportunity to escape the work area to the surrounding forest or elsewhere to seek new shelter.
- 7.10. Avoid ground vegetation removal during dry, windy periods to prevent erosion of topsoil and reduction of air quality with dirt/dust.
- 7.11. Retain 30 metre vegetated buffer around water bodies, where disturbance is necessary and unavoidable restoration is required.
- 7.12. Debris will not be deposited in water bodies.
- 7.13. Ensure tree limbs/stumps are flush cut as close to the ground or stem as possible.

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<sup>1</sup> A clear zone is an unobstructed, traversable roadside area designed to enable a driver to stop safely or regain control of a vehicle that has accidentally left the roadway. The selection and design of appropriate clear zone dimensions is project-specific and should be the responsibility of professionals trained in roadside design.



- 7.14. Logs and other salvage materials are to be conveyed to and placed at a storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, waterways or water bodies.
- 7.15. During the grubbing component, stumps, roots, imbedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to a designated pit.
- 7.16. Where possible preserve identified wildlife trees by limbing or topping if they are not assessed as hazard trees.

## Disposal of Vegetation Debris

- 7.17. All vegetation debris must be removed as soon as possible from the right-of-way, either by transporting off-site for disposal or piling and burning on-site.
- 7.18. All vegetation containing non-native species will be piled and burnt or bagged and removed off site to disposal facility.
- 7.19. Piles will be made where trees are felled, piles will be 1.2-1.8 (4 to 6 feet) in diameter and no more than 1.2 m (4 feet) high (approximately 1 to 3 trees per pile) or as instructed by local fire and vegetation specialists.
- 7.20. Piles are to be located so that they do not scorch surrounding live trees and measures must be in place to ensure that fires do not spread (i.e., conduct burning on snow or on mineral soil).
- 7.21. Piles will be left until fall for burning to allow for curing of green fuels.
- 7.22. Provincial regulations for air quality must be met.
- 7.23. Where fire fuel loading is not a concern vegetation debris of limited amounts will be dragged in the forest to mimic natural tree fall.
- 7.24. If removal or burning are not feasible a chipper may be used for less than 50 boles per hectare. Chip depth is to be a maximum of 5 cm (2 inches), spread over area no greater of 5m x 5m per hectare so as to not cover underlying vegetation, prevent new native seedlings from sprouting, and cause soil/seed bank sterilization. Spreading of chips may extend beyond these parameters with permission from Parks Canada.
- 7.25. To facilitate chipping of woody debris, all trees/shrubs/vines can be left temporarily along the road shoulders and laid facing the same direction.
- 7.26. In some cases, logs from newly cut trees may be set aside for use elsewhere as directed by local park site managers and the ESO.
- 7.27. Store removed vegetation on already disturbed areas to minimize disturbance area.
- 7.28. In appropriate areas re-establish native vegetation where it has been completely removed/damaged.

## Integrated Pest Management

- 7.29. A Field Unit Integrated Pest Management Plan (IPMP) must be completed and approved prior to the use of herbicides to ensure the most effective and least harmful substances are properly used.



## 8. Excavations, Soil Stripping and Overburden Removal

### Mitigations Module

Construction projects often involve excavations. To successfully complete reclamation of disturbed areas, and protect areas from erosion proper soil handling and backfilling procedures must be followed. Post excavation and stripping soil and vegetation restoration mitigations should be applied. See section of this BMP for [Soil and Vegetation Restoration](#).

#### Timing of Works

- 8.1. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 8.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

#### Excavation

- 8.3. Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation.
- 8.4. All sediment control measures must be in place before starting work in the vicinity of rivers, water bodies, watercourses, and wetlands.
- 8.5. Special precautions may have to be taken during excavation in the vicinity of intermittent or active drainage channels.
- 8.6. Excavation plans must be compared to local archaeological resource inventories, if available. If no archaeological information is available for the work area, an Archaeological Overview Assessment (AOA) may be required to determine the archaeological potential of the work area. Based on the results from the AOA, an Archaeological Impact Assessment might be required. It would be time and cost efficient to refer the plan to Parks Canada's Terrestrial Archaeology section before conducting any excavation to determine the appropriate course of action.
- 8.7. If cultural resources (eg. archaeological resources) are discovered, immediately cease work, and alert SO.
- 8.8. Minimize changes to the ground surface that affects its infiltration and runoff characteristics and maintain/re-establish effective surface drainage on completion of the project
- 8.9. Backfill and compact excavations as soon as possible. Optimize degree of compaction to minimize erosion and allow for re-vegetation.
- 8.10. All trenches or ditches left unattended overnight must be fenced or covered to prevent wildlife entrapment.

#### Soil Stripping

- 8.11. Strip topsoil under dry conditions, whenever possible.
- 8.12. No stripping shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest.



- 8.13. In the event of a work program shutdown during inclement weather (e.g. winter conditions unfavourable for construction, heavy rain events, construction delays, etc.) erosion control of bared soils or excavated material stockpiles is required.
- 8.14. Stripping close to any watercourse, water body or wetland shall employ methods to ensure materials are not pushed, do not fall or erode into the water or wetlands.
- 8.15. Work within a 100 metre buffer from the high water mark of waterways or wetlands will require a site specific sediment and erosion control plan.
- 8.16. An erosion control plan is also needed to control dust generated from the construction site.

### Topsoil Salvage

- 8.17. Salvage topsoil at all excavation sites for reclamation purposes.
- 8.18. Usually the upper 15 cm of soil, below the sod layer if present, is considered topsoil, where depths exceed 15cm salvage the entire depth of topsoil.
- 8.19. Remove stumps and woody debris from topsoil, wherever possible.

### Excavated Material Storage

- 8.20. Allow space for separate storage of topsoil and spoil; where space is available separate stored topsoil from spoil by at least 1 m. Use appropriate material (e.g., geo-textile) to separate soil components where space is limited.
- 8.21. Topsoil may be stored on hardened surfaces, geo-textile material or directly on undisturbed vegetation. If storage occurs on vegetation, material recovery by hand may be required.
- 8.22. Cover all stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during precipitation events.
- 8.23. Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain.
- 8.24. Construct barricades to prevent losses on steep terrain ( $>18^\circ$ , 3:1) and within 100m of watercourses.

### Excess Materials and Waste (Overburden Removal)

- 8.25. Remove excess excavated material from site where it cannot be used for the final grading of the area. Site specific arrangements must be made for disposal locations and procedures of overburden.
- 8.26. Surplus excavated material may be used to fill depressions around the project site providing topsoil is stripped before filling, with approval from SO.

## 9. Slope Stabilization, Drilling and Blasting Mitigations Module

Where standard excavation is not sufficient, scaling, hydraulic hammers, drilling units or trim blasting are used to break up rock or soil for removal. Accumulations of debris in ditches reduce their effectiveness at trapping rock fall and reduce public safety. Ditches will be cleaned using a loader and back hoe. Guardrails and rock fences may be temporarily removed to permit this activity.



## Timing of Works

- 9.1. Time any vegetation removal work should adhere to the Migratory Bird windows for the area.
- 9.2. Time work to reduce impact to mammals, amphibians and reptiles using rock faces during sensitive life stages such as birthing and rearing of young. This often occurs during the spring. Confirm timing windows with local wildlife ecologists.
- 9.3. Avoid ditch clearing during wet periods and wait until ditches are dry to reduce impacts to amphibians and reptiles and limit sedimentation.

## Slope Stabilization-Scaling, Hydraulic Hammers

The use of hydraulic hammers attached to excavators is considered the ideal solution for rock disintegration. It avoids rock blasting where the parent rock is no longer rippable by the excavator's bucket but still has enough planes of weakness for economical operation and effective use of the hydraulic hammer. Scaling is the manual removal of loose material on rock slopes using pry bars, hydraulic press, brooms, shovels and power equipment operated by personnel using roped access to a rock face.

- 9.4. For vegetation clearing refer to the [vegetation removal mitigation module](#) of this BMP.
- 9.5. For slope-stabilization in soils, please refer to the Excavation section.
- 9.6. Survey the work site for cultural resources such as rock art (ex. pictographs, petroglyphs, etc. prior to the work commencing, establish site specific mitigations for their protection.
- 9.7. Measures shall be taken to control dust as much as possible during the removal and falling of rock materials down slope.
- 9.8. Placement of rip rap and backfill on shorelines shall be undertaken without contacting the watercourse, wetted margins and must not be below the High Water Mark.
- 9.9. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately- sized, clean rock is used, and rock is installed at a similar slope to maintain a uniform bank.
- 9.10. Direct concentrated surface water (runoff) away from cut and fill slopes.
- 9.11. Immediately stabilize banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through vegetation restoration with native species suitable for the site-refer to [soil and vegetation restoration section of BMP](#).

## Drilling and Blasting for Slope Stabilization and Geotechnical Investigations

Trim blasting is used for controlled blasts in which explosive charges are placed in predetermined pattern of holes drilled into the rock face and then detonated. Potentially unstable masses of rock can sometimes be stabilized using rock bolts and long steel rods drilled into the rock to bind it together. Drilling is a common method of investigation to obtain geotechnical reports required for engineering design.



## Drilling

- 9.12. Debris from drilling will be contained (screened or settle out) so it will not cover the surrounding area or enter any water course. All debris will be removed, [see section on overburden removal](#) for further mitigations.
- 9.13. The cuttings from all drilling will be contained so they can be removed entirely from the site. If contaminated, the cuttings are to be disposed at an approved waste disposal facility.
- 9.14. Control of spoil and sediment loaded water is required on the drill site. Dyking will be required to retain the deposit on non-vegetated surfaces. If contaminated, the spoil pile must be disposed at an approved waste disposal facility.
- 9.15. During aquifer tests, the water must be piped so it does not erode any soil or any part of the ground. If the water from the tests is piped to a creek, stream, or river, the pipe is to be situated so that there is no erosion of the stream bank or bed. If any sand or similar material is discharged during the aquifer test, care must be taken that the sand does not cover any vegetation.
- 9.16. All test wells will be filled in after the testing is completed. The proponent will be responsible for rectifying any future problems associated with any of the wells or test wells.

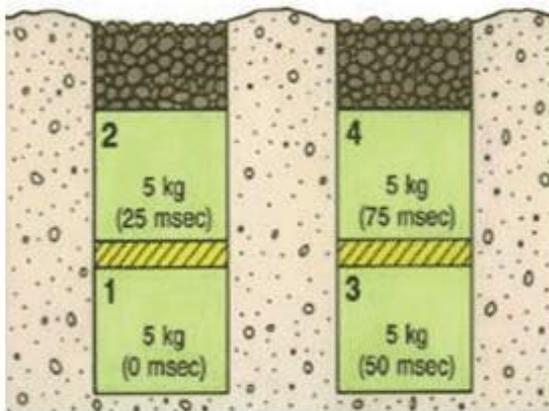
## Blasting

- 9.17. The Parks Canada Representative will identify a magazine location for explosives should a factory site or "ready-to-use" explosives storage site be required
- 9.18. The blasting supervisor will ensure no damage to infrastructure, people, surrounding vegetation or wildlife by mitigating risk of fly rock.
- 9.19. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.
- 9.20. If explosives are required as part of a project (e.g., removal of structures such as piers, pilings, footings; removal of obstructions such as beaver dams; or preparation of a river or lake bottom for installation of a structure such as a bridge or culvert), the potential for impacts to fish and fish habitat will be minimized by implementing the following measures:
  - Time in water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries [timing windows](#).
  - Isolate the work site to exclude fish from within the blast area by using bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams.
  - Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting.
  - Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e. Decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1).



- Back-fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.
- Place blasting mats over top of holes to minimize scattering of blast debris around the area.
- Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products. Remove all blasting debris and other associated equipment/products from the blast area.

Figure 1: Sample Blasting Arrangement



Per Fig. 1: 20 kg total weight of charge; 25 msecs delay between charges and blast holes and decking of charges within holes. (Fisheries and Oceans Canada, 2015)

## 10. Soil and Vegetation Restoration Mitigations Module

Almost all projects activities included in this BMP will require some ecological restoration- *the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed*. The restoration plan can be a simple application of the following mitigations and can be at the site or both at the site and in concert with another site designated to offset the permanent impact of a project. For disturbance areas greater than a hectare a restoration plan is required. The restoration works can be often be considered projects in and of themselves. Soil and vegetation restoration must apply the principles of effective, efficient and engaging solutions.

### Timing Windows

- 10.1. Develop restoration plan as part of the project scoping and specifications prior to project approvals.



- 10.2. Vegetation restoration is most effective if seeded in the fall, this allows for full scarification of the seed over the winter and adequate moisture available. Spring and early summer will also work, consider using seed that requires shorter scarification times for these applications. Transplants will do best in the spring and summer and will require adequate watering.

## Topsoil Replacement

- 10.3. Implement restoration plan for the disturbed area immediately following completion of construction.
- 10.4. Replace topsoil to all areas immediately following fine grading.
- 10.5. Do not compact topsoil.
- 10.6. Where insufficient topsoil is available imported soil may be used as a last resort. Imported topsoil must be certified completely free of non-native seeds and compost developed from sewage treatment plants. Methods of improving vegetation succession using locally sourced, weed and contaminant free materials are preferred.
- 10.7. Slopes to be seeded should be no steeper than 2 horizontal to 1 vertical (2:1) and covered with a minimum of 5 cm (2 inch) of topsoil. Finish grading should always follow top soil placement.
- 10.8. Where remaining soils are unstable due to steepness or soil characteristics, immediate installation of sod or erosion control blanket is required.
- 10.9. Methods of bioengineering such as terracing, willow staking, live pole drain systems should be assessed as solutions where soils are steeper or remain unstable.

## Soil Amendments

### Fertilizer Application

- 10.10. Avoid use of fertilizer to limit non-native vegetation growth and allow for local species to use available nutrients.
- 10.11. If needed use locally sourced mycorrhizae compost teas to improve vegetative success.

### Topsoil substitute

- 10.12. Apply an organic cellulose only amendment as a soil substitute if reclamation standards are not being met within the defined time frame.
- 10.13. Determine the type of organic amendment based on the site-specific requirements (e.g., peat moss, compost).

## Seedbed Preparation

- 10.14. The seedbed will be scarified by hand or, with the approval of the SO, by machine on large areas (i.e., roadbeds) where it is accessible and appropriate.
- 10.15. The seedbed will be scarified if seeding takes place more than 7 days after final grading or if there has been a rainfall between final grading and the seeding date.



- 10.16. The cleats of a tracked vehicle or a harrow device will be used, where possible, to prepare an adequate seedbed with seedling safe-sites (microsites) substantially free of soil crusts.
- 10.17. Align cleat marks at right angles on slopes to trap seed and sediment and reduce erosion.

## Species Selection

- 10.18. When selecting species and varieties:
  - Use species of local native plant communities.
  - Species viability in proposed environment and climatic conditions.
  - Capability to effectively control erosion, where required.
  - Adaptation to the variable site conditions of undulating topography.
  - Consider palatability of some species to herbivores and avoid growing attractants in areas of increased risk to wildlife and visitors.
  - Variable life expectancy to produce variable, delayed die-out of seeded species and replacement with indigenous native plants.

## Seed Lot Selection

- 10.19. Select seed lots based on indigenous species variety and quality (guaranteed weed seed free content and highest purity and germination), consult with vegetation restoration specialist or fire/vegetation ecologist.
- 10.20. Reject any seed lots containing any seed of undesirable crop or weed species.

## Seed Mixture Composition

- 10.21. The proportion of each species should be calculated to provide an adequate quantity of pure live seed (PLS) per unit area of each key component.
- 10.22. Aim for density of about 140 seedlings/m<sup>2</sup> at the end of the first growing season to provide adequate ground cover and allow native species to re-colonize the site over time.
- 10.23. Consider that parameters such as seed lot purity, seed germination, seedling establishment, seed size and seeding method affect the final stand composition.

## Seeding

- 10.24. Use approved native seed mixes developed for site-specific conditions for various elevations.
- 10.25. Seed and stabilize (e.g. mulch/tackifier) bare areas as soon as possible after disturbance, preferably as soon as a significant area is graded and finished and before the next rain event. If there is a risk of seedling mortality as a result of fall frost stabilize until appropriate growing conditions exist.
- 10.26. Use sod in high traffic areas or places that need extra erosion control. Source sod grown from native species (often called fescue sod) and ensure adequate anchoring and watering is in place.
- 10.27. Use temporary seeding when outside the seeding dates for permanent vegetation
- 10.28. Apply a seed mixture which is appropriate for the climate, soil, and drainage conditions of the site.
- 10.29. Apply seed at a rate appropriate to the seed mixture, seeding method and existing vegetation conditions.



- 10.30. Conduct broadcast seeding under calm wind conditions. Hydro-seeding is acceptable where access is available.
- 10.31. Do not exceed 30 kg/ha for the broadcast method, ensure seed is integrated with the soil by light rake or harrow. Broadcast method seeding rate is 25 kg/ha (2.5g/m<sup>2</sup>) (e.g., 1x25 kg bag will cover 10,000m<sup>2</sup> or 1 hectare).
- 10.32. For hydro-seeding do not exceed 75 kg/ha with light mulch rates (500 kg/ha- of mulch with hydro-seeding) and 150 kg/ha with heavy mulch rates (1500 kg/ha of mulch with hydro-seeding).
- 10.33. Do not increase the seeding rate to compensate for poor seedbed conditions.
- 10.34. Monitor temporary erosion control measures to prevent seed loss.
- 10.35. Some seeding procedures may have to be completed or repeated in subsequent years.

### Alternatives to Seeding

- 10.36. Use topsoil seed bank in small areas when there is no risk of erosion or competition from invasive species (i.e., natural regeneration).
- 10.37. Use native transplants in areas where conventional seeding applications are not applicable or where slope stability is an issue.
- 10.38. Use conventional forestry planting methods for container grown transplants, see website for guidance.

### Reclamation Standards

- 10.39. Minimum standard for plant density is 25 plants/m<sup>2</sup>, with 90% frequency.
- 10.40. Minimum standard for plant cover is 80% ground cover, with 90% frequency.
- 10.41. Minimum standard for plant community composition standard is 50% cover and 90% frequency of native species.
- 10.42. Exclude species designated as weeds in the work sites from the plant density standard consult local vegetation ecologist for current site specific non-native vegetation management program.
- 10.43. Rock, plant litter and non-vascular species are included in the cover standard.
- 10.44. Remaining plant cover of seeded native species is acceptable.

### Reclamation Plot Evaluation

- 10.45. Select any site within reclamation area measuring 10 x 10 m, providing 100 plots of 1 square meter.
- 10.46. Measure the plant density, cover and composition in each of the 100 square meter plots.
- 10.47. The reclamation standard will have been met if 90 of the 100 plots match or exceed the criteria.
- 10.48. No fertilizer will be applied one year before the reclamation standard is evaluated.

### Time Limits

- 10.49. Inspect site annually during the growing season.
- 10.50. Minimum reclamation standard, as above, to be met within one season post planting.
- 10.51. Apply amendments annually, depending on reclamation progress.



- 10.52. Re-seed site if the plant density standard is not expected to be achievable within 5 years.
  - A new restoration plan will be prepared and implemented when reclamation standards have not been met after 5 years.

## 11. Drainage Structures Mitigations Module

Drainage structures on roadway, highway and parkways are structures such as culverts, ditches and drains. Drainage structure management activities are undertaken to ensure that surfaces are safe and efficiently drained, water is efficiently channeled to ditches and watercourses, and erosion of highways and adjacent properties is prevented. These mitigations include the cleaning and maintenance of drainage structures and related hardware, as well as the repair or replacement of existing and installation of new drainage structures.

### Timing of Works

- 11.1. Time work in water to respect **timing windows** to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics specialists and DFO offices for further information on **timing windows** in your region.
- 11.2. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- 11.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 11.4. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

### Drainage Structures

- 11.5. Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.
- 11.6. Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks when using earth-moving equipment.
- 11.7. For smaller scale debris and sediment removal activities, remove materials by hand.
- 11.8. To assist with bank stability and invasive plant prevention, leave topsoil and root systems intact on channel banks surrounding your work area.
- 11.9. Ensure any works to repair damaged structures retain the pre-repair channel conditions (e.g., streambed profile, substrate, channel cross section) and do not constrict the stream width.
- 11.10. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

### Culverts

If a proposed culvert crosses a stream where fish are present, the crossing should be designed or upgraded to provide fish passage and avoid interference with fish habitat. To mitigate the



impact of culverts on fish movement technical assessment of the water flows and fish species is required to establish a culvert design that will allow for passage of fish. Often there are regional or provincial best practices available online and qualified professionals can assist with designs. Some best management practices for installation or replacement of culverts follows.

#### Culvert Design and Alternatives

Utilize alternative crossing structures (e.g. clear span bridges, lock blocks and concrete decks) as a replacement for culverts, where possible.

- 11.11. Ideally, crossings should have natural streambed material through them to allow continuous substrate that matches the streambed below and above the crossing. Open bottom crossings are ideal for maintaining natural substrate.
- 11.12. Utilize a single large culvert design over a multiple culverts design (i.e. several smaller culverts) to reduce debris blockage and increased fish and wildlife passage, where hydrologically feasible
- 11.13. Design culvert bottoms to be placed at least 30cm below the stream bed elevation to ensure culverts remain passable by fish and wildlife by preventing culverts from becoming perched.
- 11.14. A minimum water depth of 200 mm should be provided throughout the culvert length. To maintain this water depth at low flow periods an entrance/downstream pool can be constructed. In some cases, an upstream pool may also be necessary.
- 11.15. The culvert slope should follow the existing streambed slope where possible.
- 11.16. The culvert, inlet(s) and outlet(s) should be adequately protected with rip-rap to prevent erosion and scour around the culvert during high runoff events. The following measures should be incorporated when using replacement rock to stabilize the culvert:
  - Place appropriately-sized, clean rocks into the eroding bank area by hand or machinery operating outside the water course.
  - Do not obtain rocks from below the ordinary high water mark of any water body.
  - Where possible, install rock at a slope similar to the stream bank to maintain a uniform stream profile and natural stream alignment. Otherwise, install the rock at the closest slope required to ensure it is stable.
  - Ensure rock does not interfere with fish passage or constrict the channel width.
- 11.17. Trash racks should not be used near the culvert inlet. Accumulated debris may lead to severely restricted fish passage and potential injuries to fish. Where trash racks cannot be avoided in culvert installations, they must only be installed above the water surface indicated by bank full flow. A minimum of 9 inches clear spacing should be provided between trash rack vertical members. If trash racks are used, a long term maintenance plan must be provided along with the design, to allow for timely clearing of debris.
- 11.18. Natural or artificial supplemental lighting should be considered in new or replacement culverts that are over 150 feet in length.
- 11.19. Ensure designs locate culvert structures in areas that minimize impacts to riparian vegetation and associated wildlife.



### Culvert Installation

- 11.20. It may be necessary to exclude fish from the immediate construction site while a culvert is being installed. If this practice is necessary, fish shall be salvaged by a qualified aquatics professional from within the exclusion area.
- 11.21. If dewatering is required refer to the [dewatering mitigation module](#) of this BMP for appropriate mitigations.
- 11.22. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.
- 11.23. Remove any old structures to a suitable upland disposal facility away from the riparian area and floodplain to avoid waste material from re-entering the watercourse

### Wildlife Considerations for Culverts

At times, culverts are placed along portions of highways that bisect wetlands or specific habitats that support an abundance of wildlife. Consider building natural rock ledges through culverts to allow for small and medium-sized animals to walk on during periods of high flow.

## 12. Bridge Maintenance Mitigations Module

Bridge structure management activities include the cleaning and painting of bridge structures as well as the repair, rehabilitation, and replacement of bridge elements including decks, railings, abutments, and bearings. Works may include asphalt, concrete works, chipping, painting, grouting, timber truss, abutment and piling maintenance. These activities help ensure bridge structures remain structurally sound and safe for public use.

### Timing of Works

- 12.1. Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics ecologists, provincial jurisdictions and DFO offices for further information on [timing windows](#) in your region.
- 12.2. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
- 12.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 12.4. Cover or otherwise contain stockpiled materials during heavy rain events or extended absences.
- 12.5. If the work schedule requires working in the rain, the area of work must be isolated with appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

### Bridge Cleaning

- 12.6. Schedule bridge-cleaning activities to coincide with the watercourse's spring freshet when possible. At freshet or during periods of high flow a large watercourse will often have its highest background levels of sediment. At this time, the introduction of a small amount of sediment to a watercourse (from bridge cleaning) will have a lower risk of potential impact when considered against those high natural background levels.



- 12.7. If works are planned outside the freshet or if your region does not experience a freshet, discuss the protocol and timing of these works with your local aquatic ecologist and/or DFO Officer.
- 12.8. Dry sweep and collect loose material off bridge surfaces before washing the bridge. Adequately seal drains and any open joints on the bridge deck before sweeping or washing to prevent material or sediment-laden wash water from entering any watercourse
- 12.9. If dry sweeping and preventing direct runoff to waterway is not a feasible way to clean the surface, discussion and planning with local aquatic ecologists will be required.
- 12.10. Use water alone. If your cleaning activities require degreasers or any other chemical, approval for use must be obtained from local aquatic specialists and/or DFO.
- 12.11. Contain any wash water or runoff to the bridge deck. Direct wash water towards the bridge approaches and away from the watercourse, then to a vegetated area or contained settling area (e.g., dry ditch channel unconnected to a watercourse) where it can infiltrate.
- 12.12. If superstructure cleaning is undertaken above or on the bridge deck level, prevent potentially harmful materials from entering into road drains. Block deck drains with suitable barriers (e.g., polyethylene or drain blocks) to prevent direct discharge to a watercourse, or re-route runoff through temporary piping onto adjacent settling pond or structure, using a hydro vacuum would be another option.
- 12.13. If water for cleaning is extracted from a watercourse, refer to [water withdrawal section](#) of this BMP.

## Repairs Using Treated Wood Products

- 12.14. Untreated wood products are recommended, if treated wood is to be used, ensure it has been treated with a wood preservative appropriate for the project. Refer to the [Parks Canada Guide for the Use, Handling and Disposal of Pressure Treated Wood 2009](#) and any further updates from [Parks Canada Real Property – Environmental Management](#).
- 12.15. If treated timber must be cut to size, ensure cutting takes place away from the bridge and watercourse. Sawdust from treated wood is harmful to aquatic organisms and must be prevented from entering any watercourse.
- 12.16. Wood preservatives should be applied in a contained area and not be applied over or within 200m of water.

## Bridge and Structure Painting

- 12.17. Ensure paint flakes, abrasive grits and abrasive/paint flake mixtures do not enter the watercourse as they may leach toxic heavy metals into receiving waters and/or be ingested by fish.
- 12.18. Install ground covers and/or vertical drapes such as sheets of plastic or air-permeable cloth (e.g., burlap or canvas) prior to removal activities to capture falling debris. Floating barges may be deployed in watercourses to capture falling debris, such as paint flakes and dust.
- 12.19. Waste materials collected during removal and application of protective coating operations (e.g., blasting abrasives, paint particles, rust and grease) should be



collected and retained for disposal at appropriate locations. Waste materials must not be deposited into watercourses or riparian areas.

- 12.20. Use hydro blasting or manual techniques, where possible, when removing road dirt, soluble salts and loose paint to minimize impacts to the watercourse.
- 12.21. Use water without cleaning agent additives if grease film removal is necessary.
- 12.22. Avoid use of toxic liquid paints, primers, solvents, degreasers and rust inhibitors.
- 12.23. Minimize spill potential by storing, mixing and transferring paints and solvents on land.

## 13. Water Withdrawal and Dewatering Mitigations Module

Construction often requires the use of water, many common methods of excavation and site isolation require dewatering. Temporary, short term water withdrawal provides an efficient uncontaminated water source for local project sites. Dewatering can allow sites to be effectively dry during construction, reducing the impact of sediment laden water entering fish bearing waters.

### Timing Windows

- 13.1. As a general guide to prevent taking more water than aquatic system can support, limit total take of water to less than 5 successive days and less than 10 days in any period of 30 days.
- 13.2. Avoid water withdrawal during breeding seasons of amphibians and reptiles to avoid destruction of egg masses, consult local aquatics ecologist for site specific guidance.

### Water Withdrawal

- 13.3. Water should not be withdrawn from a wetland or stream less than 5 metres wide at the surface or a lake less than one hectare in area.
- 13.4. Water withdrawal should follow the 10/90 rule which allows for up to 10% of the stream flow to be withdrawn, as long as the stream flow does not fall below the 90% exceedence flow (eg. 1 in 10 chance in a given year).
- 13.5. No permanent or semi-permanent works for water withdrawal should be placed in the stream channel.
- 13.6. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish, amphibians and/or reptiles. Entrainment occurs when a fish or amphibian is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish, reptile or amphibian is held in contact with the intake screen and is unable to free itself.

### Pump Screens

- 13.7. In freshwater, fish-bearing waters design and installation of intake end-of-pipe fish screens:
  - Locate screen in areas and depths of water with low concentrations of fish throughout the year away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
  - Orient the screen face in the same direction as the flow of water.
  - Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.



- Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
- Provide structural support to the screen panels to prevent sagging and collapse of the screen. Large cylindrical and box type screens should have a manifold installed to ensure even water velocity distribution across the screen surface. The end of the structure should be made of solid materials and the end of the manifold capped.
- Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where debris loading (woody material, leaves, algae mats, etc.) is a concern. A 150 mm (6 in.) spacing between bars is typical.
- Provision should be made for the removal, inspection, and cleaning of screens.
- Ensure regular maintenance and repair of cleaning apparatus, seals, and screens to prevent debris fouling and impingement of fish.
- Pumps must be shut down when fish screens are removed for inspection and cleaning.

## Dewatering

- 13.8. A site specific dewatering plan is required be provided before commencing a pump-out sump to dewater excavation sites with specific details on how and where the water will be discharge.
- 13.9. Site specific mitigations may be required depending on the conditions of the discharge area, freezing conditions operation, overflow avoidance, decanting and settlement pond reclamation.
- 13.10. Water containing suspended materials shall not be pumped into watercourses, drainage systems or on to land, except with the permission of the SO.
- 13.11. Soil and vegetation erosion protection is required for water pumped on to land.



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## Appendix 1 Regulatory Guidance

### Jurisdictions

While all projects on lands managed by Parks Canada must adhere to Federal law and regulation, it is considered best practice to refer to local community, regional, provincial regulation and best practices where federal guidance is silent and/or attempt to meet those targets if it can reduce the overall impact of the project.

Some of the project activities reviewed have potential environmental impacts that are addressed by various provincial, federal and territorial acts and regulations. All activities must meet current environmental law and regulations in their design and construction. The following is a brief description of some of the key federal acts and regulations. Further review, understanding and application of other federal, provincial and territorial environmental laws are part of a rigorous approach to project planning and execution.

#### ***Canada National Parks Act and Regulations-Parks Canada***

All work inside National Parks and Protected Areas must be performed in accordance with the laws and regulations set out in the *Canada National Parks Act* and Regulations. This includes the requirement for most activities described to only be done under a permit such as: business licence for contractor, disturbance of natural objects, travel in restricted areas, special events or use of disposal sites.

#### ***Fisheries Act - Fisheries and Oceans Canada***

If a project is to be conducted near water, it is the proponent's responsibility to ensure they avoid causing [serious harm to fish](#) in compliance with the *Fisheries Act*. The [advice in on the Fisheries and Oceans website](#) will help a proponent avoid causing harm and comply with the Act.

If the water body in the project area has fish or is connected to waters at any time that have fish the project must meet the [self assessment criteria on the Fisheries and Oceans website](#), if not a project review can be made by Fisheries and Oceans Canada to assess whether the project requires authorization or authorization can be requested directly. Given the level of detail required for a review and/or authorization request the EIA officer may need to consider a more involved EIA pathway in those circumstances.

#### ***Migratory Bird Convention Act – Environment Canada***

The purpose of this Act is to implement the Convention by protecting and conserving migratory birds - as populations and individual birds - and their nests. Section 6 - prohibits the disturbance, destruction, or taking of a nest, egg, or nest shelter of a migratory bird.

In Canada, the general nesting period may start as early as mid-March and may extend until end of August. This is a general nesting period that covers most federally protected migratory bird species. This period varies regionally across Canada mainly due to differences in species assemblages, climate, elevation and habitat type. Generally, the nesting period is delayed in more northerly latitudes, corresponding to vegetation development and food availability. (Environment Canada, 2014). To help with determining regionally relevant periods where



nesting is likely to occur, Environment Canada is publishing estimated regional nesting periods within large geographical areas across Canada referred as "nesting zones". These periods are estimated for each zone and consider the time of first egg-laying until the young have naturally left the vicinity of the nest. Field Units may wish to refine this section and add their known local nesting periods.

### ***Species at Risk Act***

If a species listed under the *Species at Risk Act* (SARA) is found within the project area, any potential adverse effects from the proposed project to the individuals of the species, their residences and/or their critical habitat must be understood. Species at risk considerations require specific expertise, due to additional legal requirements under the SARA and CEAA 2012. If the projects or activities to be addressed by the BMP could affect a listed species or its critical habitat, the EIA officer may need to consider a more involved EIA pathway in those circumstances.

## APPENDIX 3

### **Blasting Permit**

**(Superintendent Sign-off Required Prior to Issuance)**



## Permit for Explosives in Cape Breton Highlands National Park

Pursuant to the Canada National Parks Act General Regulations, Section 35

*(To be completed by Parks Canada just prior to blasting operations)*

For continued protection and management, the Cape Breton Highlands National Park Superintendent hereby authorizes X: \_\_\_\_\_ permission to use the explosive *primacord* sometime between November 15, 2015 to March 30, 2016.

Blasting will occur on sloped sections of the Cabot Trail between Trout Brook Day Use Area and the Corney Brook Campground. All blasting activity covered within this Permit is directly related to the Cabot Trail Road Realignment Project (File #: CBFU2015-043).

The need for the Permit is based on logistical concerns associated with the above-mentioned project and in consultation with of Public Works and Government Services Canada.

This Permit is subject to adherence of enclosed conditions and may be revoked at any time.

Signature: X \_\_\_\_\_ Date: \_\_\_\_\_

Superintendent of Cape Breton Highlands National Park  
37486 Cabot Trail, Ingonish Beach, NS B0C 1L0  
Telephone 902-285-3016

### **Permittee**

Print name: \_\_\_\_\_

Position: \_\_\_\_\_

Signature X: \_\_\_\_\_

Date: \_\_\_\_\_





## Conditions

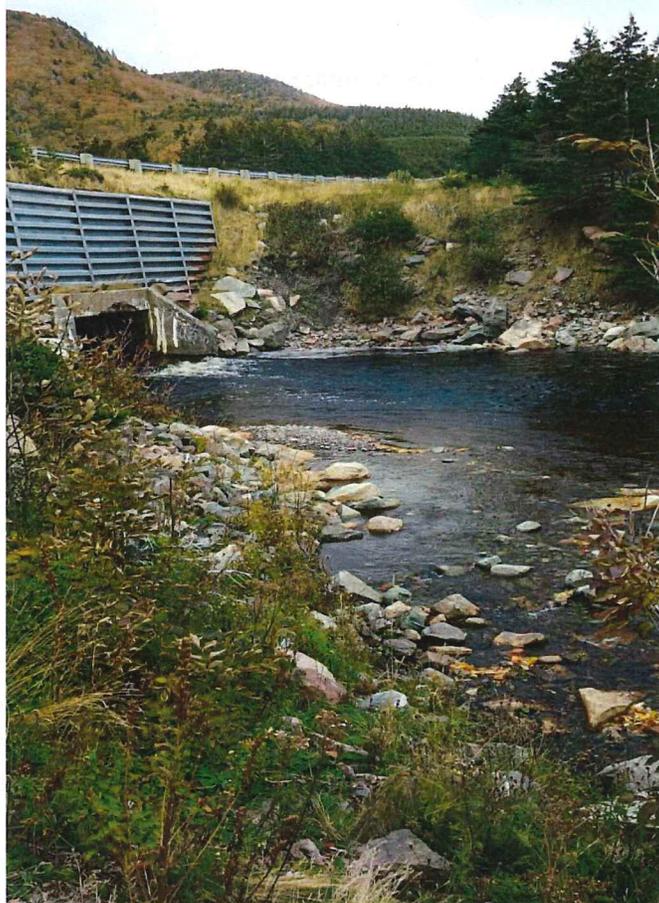
- 1) Public Works and Government Services Canada must notify Parks Canada prior to planned activities.
- 2) All applicable laws and regulations will be followed, including federal <http://www.nrcan.gc.ca/explosives/acts-regulations/9841> and provincial legislation <https://www.novascotia.ca/just/regulations/regs/ohsblasting.htm>.
- 3) All personnel with access to explosives as defined in the Canada National Parks Act General Regulations (Section 35) must hold a Government of Canada security certificate.
- 4) The blasting supervisor will comply with all instruction and direction provided by Public Works and Government Services Canada.
- 5) Material inadvertently falling outside the work limits will be removed promptly.
- 6) Prior to completion of work, remove all blasting debris and other associated equipment/products from the blast area.
- 7) A copy of this Permit will be kept on site by qualified personnel during blasting operations.
- 8) Failure to comply with conditions below may result in revocation of Permit and/ or legal action.



April 2015



**Parks Canada Basic Impact Analysis (BIA)**



**Corney Brook Culvert Replacement**

**Project # CBFU2015-038**





**1. PROJECT TITLE & LOCATION – Corney Brook Culvert Replacement - CBHNPC**

**2. PROPONENT INFORMATION**

Kate McCarthy, P.Eng.  
Project Manager Public Works and Government Services Canada  
email: [kate.mccarthy@pwgsc.gc.ca](mailto:kate.mccarthy@pwgsc.gc.ca)

**3. PROPOSED PROJECT DATES**

Planned commencement: 2016-02-01  
Planned completion: 2016-09-31

**4. INTERNAL PROJECT FILE #**

CBFU2015-038

**5. PROJECT DESCRIPTION**

Corney Brook is located approximately 18 km north of Cheticamp along the Cabot Trail in Cape Breton Nova Scotia. The existing Corney Brook crossing is a concrete box structure with concrete wing walls, a steel bin wall earth retaining structure at both the inlet and outlet ends. The culvert is approximately 25 metres long. The inspection completed by AMEC in 2011 described the culvert as being in poor condition and noted severe delaminating, spalling and exposed rebar on the top of the culvert, severe erosion of the concrete along the bottom of the culvert, and extensive map cracking over a large area.

Inspection of the culvert site also provides evidence that the existing structure is severely undersized. At the inlet end, there is significant displacement of riprap material and exposure of geotextile fabric resulting from excessive velocities. Furthermore, there is woody debris located on the upper slope and deformation of the steel bin wall indicating impact from debris. On the downstream side, there is a large scour hole indicating excessive outlet velocities.

One of the key objectives of the culvert replacement was to restore fish passage upstream of Corney Brook since the existing structure currently does not provide adequate fish passage. The prefabricated corrugated metal arch structure chosen, provides a replacement solution that can be installed within the required dates stipulated by DFO for in stream work. See Appendix 1 – Corney Brook Proposal, 8 October 2015 for images of the culvert to be installed. See Appendix 2 – Aerial photo of Corney Brook Proposed Worksite for an overview of the proposed worksite.





The culvert replacement project will include:

- The mobilization of equipment and supplies to the site
- Installation of environmental controls along the water corridor, clearing and grubbing of vegetation within the worksite area.
- Installation of temporary bridge abutments and Bailey bridge placement for traffic diversion below the work site.
- Excavation around old culvert, and creation of a temporary brook diversion.
- Streambed Rebuilding, Retaining Wall Install, Removal of Existing Culvert and Binwalls
- New Culvert Installation, Reinstatement of Brook from diversion, Backfill and Road Embankment, Pavement Structure and Road Stabilization
- Guiderail and Pavement Markings
- Removal of Bailey Bridge and Approaches
- Removal of Traffic and Environmental Controls, Demobilization

## 6. VALUED COMPONENTS LIKELY TO BE AFFECTED

The worksite area is within the Cabot Trail corridor and is a highly impacted area due to its close proximity to a campground and trail head. Though the work takes place in and around the waters of Corney Brook the project is seen as an enhancement to the natural aquatic environment of the area due to the replacement of an undersized road culvert.

### Water Resources:

- Corney Brook is found in the Gulf Slope Water District and is a Third Order Brook. Its drainage basin (2700 ha) delineation is shown in Figure 4 of the document in Appendix 1. Flow calculations were determined for the drainage basin for a rain event of 41 minutes (time of concentration for that basin) at 53 mm/hr and the culvert was designed for this intensity. This would be classed a 1 in 200 year event.
- The correct culvert size will avoid scouring, brook bed and slope damage as a result of the presence of a man-made structure in the river, during a large rain occurrence. The culvert will be more stable during a large event to protect public safety.

### Flora:

- Trees – Acadian Forest Species - Ironwood, Black Ash may be in the area.

### Fauna:

- The American Eel (*Anguilla rostrata*), is a COSEWIC listed species of concern and is located in Corney Brook as well as most rivers and brooks of the park. The replacement of the culvert will be a benefit for the species as the current culvert has created a barrier to eel and fish movement up river. The replacement culvert will return the river bed to a more natural state and will allow for unimpeded fish access.





**Cultural Resources:**

- Known farming and heritage building area, and there is a possibility of in-situ resources being affected.
- Corney Brook Trail is old farm road so the worksite area is part of that old road.

**Visitor Experience**

- The worksite is near Corney Brook Campground which is operational from May to October of each year. This 18 site self-registration campground will be impacted by the noise and air quality associated with the worksite.
- The campers also have no available water on site (potable or non-potable) and use Corney Brook as a source of non-potable water for such activities as bathing, swimming, dish washing etc.
- The entrance to the campground may be inside the limits of the traffic lights/flagperson personnel which may result in safety concerns for traffic exiting the campground.
- The worksite is also adjacent to the Corney Brook Trail, and trail head parking area. The worksite and Bailey bridge will impact the parking lot and visitors will be required to park in the parking area/campground and cross the road near the worksite to access the trail. Again this entire area may be inside the confines of the traffic light/flagperson zone and may cause safety concerns as visitors try and access the trail.

Use the Effects Identification Matrix ([Appendix 1](#)), as required, to identify potential interactions between the project and the surrounding environment.

**7. EFFECTS ANALYSIS**

**Biophysical Resources:**

- Adverse modifications to surface drainage patterns
- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO<sub>2</sub> and other pollutants
- Damage to and/or removal of vegetation in immediate or adjacent areas. The area around the stream crossing was old field and currently is forested with white spruce with a few hardwoods (maple, pin cherry) near the brook.
- Mortality of fish and benthic invertebrates in the project area





**Cultural Resources:**

- Impacts to in-situ resources as the result of digging in an area that had been inhabited prior to the establishment of the National Park

**Visitor Experience:**

- Disruption of facility usage (trail and campground) due to access limitations.
- Sensory impacts to visitor due to noise, air quality and machinery presence.
- Disruption of water usage as the brook is the only water source for non-potable purposes for the campground (bathing, dishwashing).

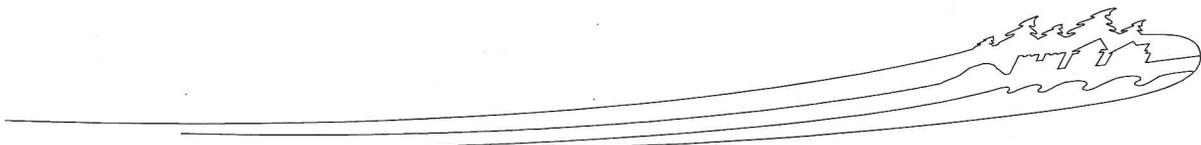
**8. MITIGATION MEASURES**

**General Mitigation Measures:**

1. All employees must attend a briefing with an Impact Assessment Officer (IAO) before beginning work at the site to review and explain the mitigations that are conditions of the project approvals.
2. Minimize vegetation-clearing activities and ground disturbance by staging on existing hardened areas wherever possible.
3. Avoid or terminate activities on site that attract or disturb wildlife.
4. Control materials that might attract wildlife (e.g. petroleum products, human food and garbage).
5. Delineate the work zone; clearly mark the limits to active construction and the access and egress locations.
6. When work involves the disturbance of soils or the use of erodible materials (e.g. sands, topsoil), prevent the transport of sediment by the installing of appropriate erosion and sediment control.
7. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken in proximity to watercourses, wetlands or riparian environments.

**Vegetation Removal**

1. Avoid all vegetation removal during this time. If vegetation removal is scheduled to occur within these times a qualified professional biologist/ecologist should further clarify the species presence and timing particular to the work site and any occupied bird nests, eggs, or nests of species protected under the Migratory Bird Convention Act (MBCA).
2. If a nest is found during the pre-work surveys, the vegetated area will be left intact with a suitable sized buffer of shrubs/trees around it until the young have fledged and left the nest.
3. Clearing activities shall be avoided during nesting seasons for birds, reptiles and amphibian species in the project area (April 15th – June 1st).
4. If wildlife is observed during work, if possible, give animals the opportunity to escape the work area to the surrounding forest or elsewhere to seek new shelter.
5. Retain 30 metre vegetated buffer around water bodies, where disturbance is necessary and unavoidable, restoration is required as much as possible in riparian zone locations.





6. Debris will not be deposited in water bodies.

#### **Disposal of Vegetation Debris**

1. All vegetation debris must be removed as soon as possible from the right-of-way, either by transporting off-site for disposal or piling and burning on-site.
2. All vegetation containing non-native species will be piled and burnt or bagged and removed off site to disposal facility.
3. Store removed vegetation on already disturbed areas to minimize disturbance area.
4. In appropriate areas re-establish native vegetation where it has been completely removed/damaged.

#### **Equipment Operations:**

1. Equipment movements and workers' private vehicles shall be restricted to the 'footprint' of the construction area.
2. Ensure machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, noxious weeds and soils from off-site.
3. Operate machinery on land above the high water mark, or in another manner that minimizes disturbance to the banks and bed of any water body.

#### **Water Control during Construction**

1. During the construction phase of the culvert replacement there will be a portion of time when the brook water will be diverted through a small culvert to allow machinery to excavate the old culvert and prepare footings for the new one.
2. Ensure that this diversion culvert has its lower end (closest to ocean) submerged in the pool under the Bailey bridge so that any migrating eels have an avenue to bypass the work site and reach the upper levels of the brook.
4. **The IAO must be present when the diversion takes place** to ensure fish species that may be left behind in the de-watered area are transported and moved to other parts of the stream bed.
5. The stream diversion will be monitored daily for blockages, and leakage that would cause unnecessary erosion, siltation and any other concerns for the fish downstream or attempting to return to the ocean from upstream.

#### **Excavations and Overburden Removal**

1. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.





### **Excavations**

1. In the event of archaeological resource discovery, all work shall cease in the immediate area until such time as FOL personnel have been notified.
2. Authorize resumption of work when deemed necessary by Cultural Resource personnel [Maura.McKeough@pc.gc.ca](mailto:Maura.McKeough@pc.gc.ca) (902.733.3530)
3. All sediment control measures must be in place before starting work in the vicinity of rivers, water bodies, watercourses, and wetlands.
4. Special precautions may have to be taken during excavation in the vicinity of intermittent or active drainage channels.
5. Minimize changes to the ground surface that affects its infiltration and runoff characteristics and maintain/re-establish effective surface drainage on completion of the project
6. Backfill and compact excavations as soon as possible. Optimize degree of compaction to minimize erosion and allow for re-vegetation.
7. All trenches or ditches left unattended overnight must be fenced or covered to prevent wildlife/visitor entrapment.

### **Excavated Material Storage**

1. Allow space for separate storage of topsoil and spoil; where space is available separate stored topsoil from spoil by at least 1 m.
2. Topsoil may be stored on hardened surfaces, geo-textile material or directly on undisturbed vegetation.
3. Cover all stockpiled material to prevent erosion during precipitation events.
4. Construct barricades to prevent losses on steep terrain and within 100m of watercourses.
5. Remove excess excavated material from site where it cannot be used for the final grading of the area.
6. Site specific arrangements must be made for disposal locations and procedures of overburden.
7. Surplus excavated material may be used to fill depressions around the project site providing topsoil is stripped before filling.

### **Culvert Design**

1. Ideally, crossings should have natural streambed material through them to allow continuous substrate that matches the streambed below and above the crossing.
2. Utilize a single large culvert design over a multiple culverts design (i.e. several smaller culverts) to reduce debris blockage and increased fish and wildlife passage where hydrologically feasible
3. The culvert slope should follow the existing streambed slope where possible.
4. The culvert, inlet(s) and outlet(s) should be adequately protected with rip-rap to prevent erosion and scour around the culvert during high runoff events.





### **Fuel Storage and Refueling/Emergency Plans**

1. A Spill Response Plan will be prepared and detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products in accordance with all applicable federal and provincial legislation. The Plan shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
2. Spill kits shall be provided at re-fuelling, lubrication, and repair locations that are capable of dealing with 110% of the largest potential spill and shall be maintained in good working order. Site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
3. If potentially hazardous materials (e.g. cement-based products, sealants or paints) are used on site ensure raw material, mixed compounds and wash water are not released to any watercourse or soils.
4. Hazardous or toxic products shall be stored no closer than 100 metres from streams, wetlands, water bodies or waterways.
5. Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The IAO shall be notified immediately of any spill. In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.

### **Site Clean Up/Waste Disposal**

1. Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.
2. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site.
3. Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Parks Canada protected heritage places.
4. Sanitary facilities, such as a portable container toilet, shall be provided and maintained in a clean condition.

### **Concrete Handling**

1. Temporary concrete washout facilities shall be located a minimum of 30m from storm drain inlets, open drainage facilities, and watercourses.
2. Temporary concrete washout facilities shall be temporary pit or bermed areas constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.





4. Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.
6. Perform washout of concrete mixer trucks in designated areas only.
7. Wash concrete from mixer truck chutes into approved concrete washout facility or collect in an impermeable bag for disposal.
8. Pump excess concrete in concrete pump bin back into concrete mixer truck.
9. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.

#### **Paving, Resurfacing, Grading**

1. Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of contaminated runoff and sediment.
2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.
3. During grade construction conducted close to any watercourse, water body or wetland ensure materials are not pushed, fall or are eroded into the water or wetlands.
4. No grade building shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest.
5. Retain a 30 metre vegetated buffer around water bodies or install runoff management structures.
6. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface waters.

#### **Pavement Marking and Barrier and Guardrail Reinstatement**

1. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface water
2. Pavement marking shall be undertaken pursuant to standard methods applied in National Parks for control of paint products, both in transport and handling. The Contractor shall present a description of methods to be employed for transporting and controlling paint and hazardous products, application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products, etc. the satisfaction of the Parks Canada Representative.
3. Asphalt works are preferably undertaken during periods of dry weather as this allows easier control of contaminated runoff and sediment.





**Visitor Safety**

1. The work site will be properly marked and delineated by fencing to ensure nearby camper and trail users do not enter the work site either during or off work hours.
2. The brook adjacent to the campground will be blocked off and signed to ensure use by the campers and visitors do not occur during the construction period (swimming, bathing, other water use).
3. A temporary crosswalk will be installed from the campground leading to the nearby Trailhead that allows the visitor to access the trail and which creates a safe hiking environment.

**9. PUBLIC/STAKEHOLDER ENGAGEMENT & ABORIGINAL CONSULTATION**

**9 a)** Indicate whether public/stakeholder engagement was undertaken in relation to potential adverse effects of the proposed project:

X No

Yes (describe the process to involve relevant parties and indicate how comments were taken into consideration).

Due to the limited scope of this proposal, public participation is not called for. This project is in the better interest of the public and therefore any feedback would be expected to be positive.

**9 b)** Indicate whether Aboriginal consultation was undertaken in relation to potential adverse effects of the proposed project:

X No

Yes (describe the process to involve relevant parties and how the results were taken into consideration).

Formal Aboriginal Consultation on this project was initiated with the representatives of the Mi'kmaq of Nova Scotia. Based on the Mi'kmaq response, several measures to mitigate impacts on archeological resources are set out in this BIA.

**10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS**

**11. SURVEILLANCE**

Surveillance is not required

X Surveillance is required

- The IPO is to be on site when flow controls of the brook occurs. The IPO will stop by the site for on-site monitoring at other times when available.





**12. FOLLOW-UP MONITORING**

Follow-up monitoring is:

- not required
- legally required (e.g. under the *Species at Risk Act* or *Fisheries Act*)
- required in accordance with the *Parks Canada Cultural Resource Management Policy*

**13. SARA NOTIFICATION**

Notification is:

- not required
- required under the *Species at Risk Act* (outline the nature of and response to any notification).

**14. EXPERTS CONSULTED**

Include Parks Canada experts. Add as many entries as necessary for the project.

Department/Agency/Institution: Parks Canada	Date of Request: 2015-10-22
Expert's Name & Contact Information: James Bridgland	Title: Park Ecologist
Expertise Requested: Opinion on De-watering of stream bed at worksite and affect water diversion would have on American Eel migration.	
Response: Verbal response by telephone – Ensure diversion culvert has the lower end submerged into the lower pool to facilitate any eel migration upstream.	
Department/Agency/Institution: Parks Canada	Date of Request: 2015-10-22
Expert's Name & Contact Information: Archie Doucette	Title: Environmental Assessment and Ecosystem Restoration
Expertise Requested: Review of document and feedback	
Response:	





15. DECISION

Taking into account implementation of mitigation measures outlined, the project is:

- Not likely to cause significant adverse environmental effects.
- Likely to cause significant adverse environmental effects.

16. RECOMMENDATION AND APPROVAL

BIA Author

Name: Heather Davis, Resource Management Officer II, CBHNPC

BIA Recommender

Name: Archie Doucette Environmental Assessment Coordinator, CBFU

Signature: Archie Doucette Date: 26 October, 2015

BIA Recommender

Name: Maura McKeough, A/ Cultural Resource Manager, CBFU

Signature: Maura Mc Keough Date:

BIA Recommender

Name: Derek Quann, Resource Conservation Manager, CBHNPC

Signature: Derek Quann Date: 29 OCT 2015

Approved by:

Name: Derek Quann, A/ CBHNPC Superintendent

Signature: Derek Quann Date: 29 OCT 2015

Project Manager (Functional)

Name: Kate McCarthy PWGSC Project Manager (or designate)

Signature: Gerard Beaulac Date: 29 OCT. 2015  
for Kate McCarthy

I have read and commit to following the mitigations set out in this report

Comment:

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April 2015



**17. ATTACHMENTS**

Appendix 1 – Corney Brook Proposal, 8 October 2015

Appendix 2 – Aerial photo of Corney Brook Proposed Worksite.

**18. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM**

X Project registered in tracking system

- Not yet registered (*CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system **by the end of April** to enable reporting.*)

**\*\*\*Ensure that all required mitigation measures and conditions (e.g. follow-up monitoring requirements) are included in project permits and authorizations\*\*\***





**Appendix 1 Environmental Impact Analysis Tools: Effects Identification Matrix**

A. Direct Effects									
		Valued components potentially directly affected by the proposed project							
		Natural Resources					Cultural Resources		
		Air	Soil & landforms	Water (surface, ground,	Flora (specify, including SAR)	Fauna (specify, including SAR)	Insert heritage values	Insert heritage values	
Phase	Examples of Associated Activities								
Project Components	Preparation / Construction / Operation / Decommissioning	Supply and storage of materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Burning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Clearing	X	X	X	X	X	<input type="checkbox"/>	<input type="checkbox"/>
		Demolition	X	X	X	X	X	<input type="checkbox"/>	<input type="checkbox"/>
		Disposal of waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Blasting/ Drilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Dredging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Drainage	X	X	X	X	X	<input type="checkbox"/>	<input type="checkbox"/>
		Excavation	X	X	X	X	X	<input type="checkbox"/>	<input type="checkbox"/>
		Grading	X	X	X	X	X	<input type="checkbox"/>	<input type="checkbox"/>
		Backfilling	X	X	X	X	X	<input type="checkbox"/>	<input type="checkbox"/>
		Use of machinery	X	X	X	X	X	<input type="checkbox"/>	<input type="checkbox"/>
		Transport of materials/ equipment	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Use of Chemicals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Set up of temporary facilities	X	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

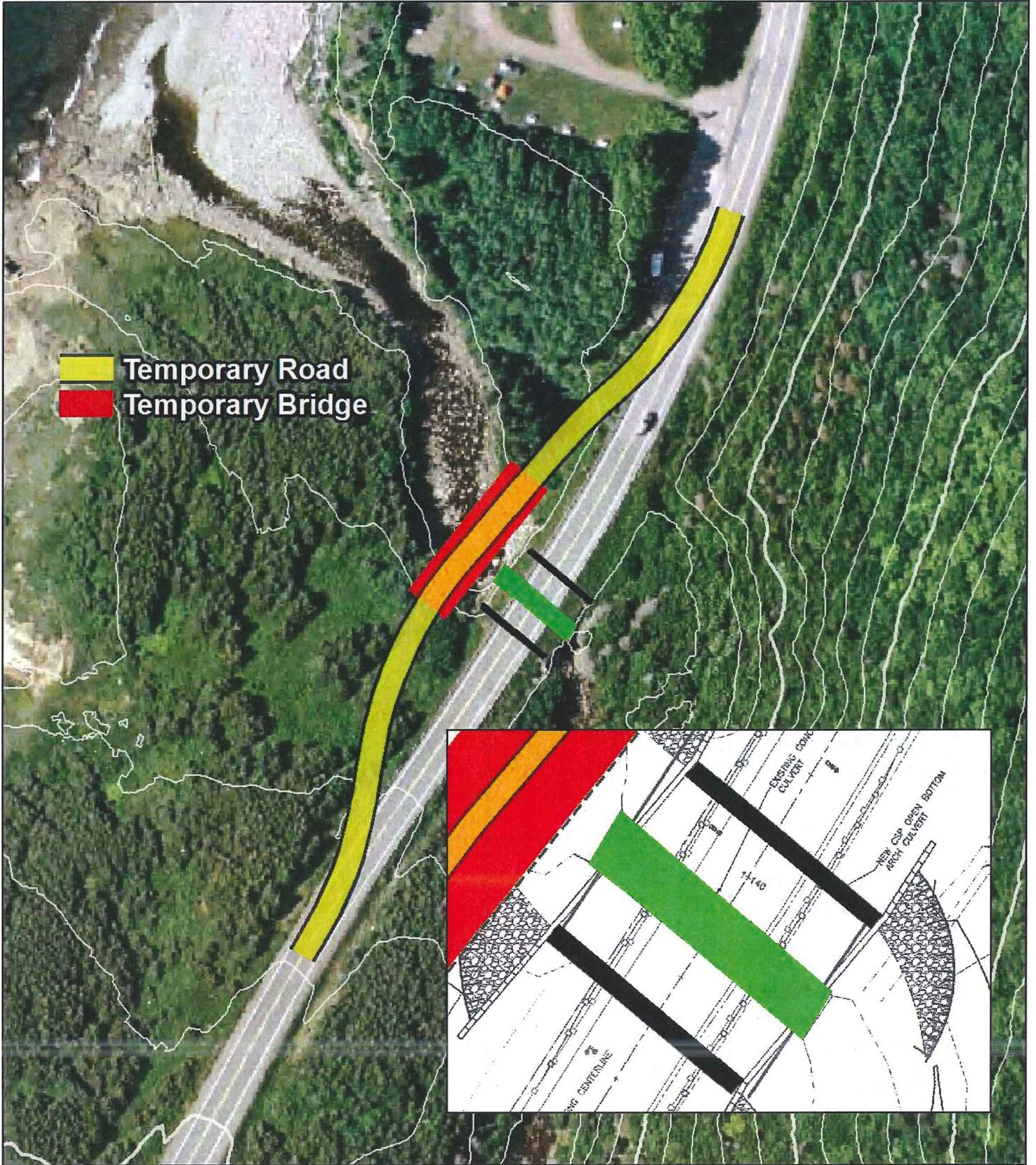




B. Indirect Effects (all phases)							
		Impacts as a result of changes to the environment					
		With respect to non-Aboriginal peoples:	With respect to Aboriginal peoples:		With respect to visitor experience		
		Health and socio-economic conditions	Health & socio-economic conditions	Current use of lands and resources for traditional purposes	Access & services	Recreation & accommodation opportunities	Safety
Phase	Natural resource components affected by the project						
Preparation /construction operation/implementation/decommissioning	Could impacts to <u>air</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>soils and landforms</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	X	X
	Could impacts to <u>water</u> (e.g. surface, ground water and water crossings) lead to adverse effects on...	X	<input type="checkbox"/>	<input type="checkbox"/>	X	X	X
	Could impacts to <u>flora</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>fauna</u> (including SAR) lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other...	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



 Cape Breton Highlands National Park Comey Brook Culvert (5 m contours)



0 20 40 80 Meters

NAD 1983 CSRS UTM Zone 20N



