

# **Manitoba Floodway and East Side Road Authority**

## **APPENDIX 7.1**

### **ENVIRONMENTAL PROTECTION GUIDELINES**

**Draft**

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## Introduction

### 1. Corporate Commitment to Environmental Protection

The Manitoba Floodway and East Side Road Authority recognizes the importance of commitment to environmental protection during the construction of the East Side Road Project (the Project). Accordingly the Corporate Environmental Policy states that:

*The Manitoba Floodway and East Side Road Authority, Consultants, Contractors, Contract Administrators and agents are committed to being a positive and creative force for the protection and enhancement of the environment; having respect for the public that could be affected by our decisions and actions; and being responsible stewards of the environmental resources in our care. In recognition that our construction activities could affect the environment we are committed to a proper understanding of these potential environmental effects and have adopted measures aimed at protecting and preserving our environment and promoting sustainable development in accordance with the following fundamental principles:*

*We will undertake construction activities in a manner that protects, conserves and enhances resources, prevents pollution, reduces wastes, and promotes recycling as far as technically and economically practicable in all aspects of our construction activities.*

*We will comply fully with environmental laws, regulations, permits and agreements, and will incorporate our own criteria in the interests of environmental protection where no other requirements exist.*

*We will undertake environmental awareness and information dissemination so that all workers and the local community understand the significance of our environmental protection measures.*

*We will routinely monitor our environmental performance to evaluate the effectiveness of our environmental protection plan and practices and to identify areas where improvement can be made.*

*We will take due care and caution at all times to anticipate and prevent environmental accidents on the project, and to have in place a plan to respond if necessary, in a safe, effective, efficient, and timely manner.*

*We will carry out these environmental protection measures and interactions with our regulators and the neighbouring community in an honourable, respectful, open, and transparent manner.*

## 2. Purpose

The purpose of this document is to provide a suite of “Environmental Protection Guidelines” (EPGs) from which the appropriate measure(s) can be chosen. This document is a general guideline only and does not provide information related to specific east Side Road projects, worksites or facilities. At any given time, any or all of the EPGs listed in this document may be used to minimize the negative impact on the physical, terrestrial, and aquatic environments during construction of the East Side Road. Measures to protect the environment shall be applied as appropriate on a site specific basis. This suite of measures is not an exhaustive list of all possible EPGs and under the adaptive management approach additional measures or changes to the proposed measures will be made as required.

This document also ensures that our employees and contractors are aware of their responsibilities in the protection of the environment during work on the Project.

In addition to the EPGs contained herein, consideration must also be given to the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat, prepared jointly by the Manitoba Department of Natural Resources (DNR) and the Department of Fisheries and Oceans (DFO), 1996.

## **Manitoba Floodway and East Side Road General Environmental Protection Guidelines**

### **1. General**

Specifications, licences, and permits required for each Contract relating to the Project must be in possession of the contractor and the Manitoba Floodway and East Side Road Authority prior to the commencement of construction.

The Manitoba Floodway and East Side Road Authority requires that its employees and contractors comply with all Federal and Provincial Regulatory requirements at all times.

### **2. Physical Environment**

Maintain all equipment in good working order.

Ensure equipment is effectively sound reduced by means of proper silencers, mufflers, acoustic linings, acoustic shields or acoustic sheds.

Adhere to all noise and hours of operation by-laws of adjacent Communities.

Conduct all work by methods that minimize the raising of dust.

Use water or approved dust suppressants to control dust on the construction sites. The use of waste petroleum or petroleum by-products is not allowed.

Maintain soil stockpiles and spoil piles in such manner as to minimize wind erosion.

Re-use top soil that is stripped from areas to be used for such things as equipment parking or material storage areas shall be stockpiled for site restoration.

Appropriate measures will be taken to eliminate all types of refuse from the work sites. Garbage will be removed from the work sites for disposal at an approved landfill site.

Natural drainage shall be maintained to the extent possible

Runoff will be directed away from disturbed, erosion susceptible areas.

Alterations to existing surface and subsurface drainage patterns will be avoided to the extent possible.

Vehicle, machinery, and pedestrian traffic will be restricted to project related access routes and cleared project sites.

Designate specific haul roads or travel areas for construction equipment to minimize damage to existing vegetation and wildlife habitat.

In general, construction sites including road right-of-ways, pits and quarries and temporary access roads, shall be stabilized to minimize erosion immediately after initial disturbance.

Areas with the potential to contain species of interest will be inspected prior to the start of construction or pre-construction activities to assess presence. If species of interest are found, appropriate mitigative measures will be taken (realign route, relocate species, etc.). Follow-up investigations will be undertaken as appropriate for the species that are relocated to monitor success and adjust methods as required.

Since vegetation is the best method of controlling soil loss, disturbed areas shall be seeded or re-planted as soon as practicable after the final grade and trimming are completed. That is, seeding or re-planting excavated areas will be done as they are brought to final grade instead of waiting to the completion of the entire Project to start re-vegetation. Native vegetative species will be used for this Project.

Monitor re-vegetated areas to determine the success of the re-vegetation program. Where necessary, apply herbicides to control weed growth in newly planted areas and re-seed or re-plant areas where the initial re-vegetation fails.

Schedule construction activities in such a manner as to minimize the impact on wildlife. For example, to perform clearing and grubbing operations between September of one year and April of the following year so there will be no disruption of nesting songbirds.

Areas that will be used only temporarily and require clearing shall be stripped of all organic material prior to any work being done. This organic material shall be stock piled at the site and once the site is no longer required the site will be graded and the organic material will be spread over the site to encourage re-growth of native vegetation.

Aggregate material shall **NOT** be obtained by removing it from any stream or waterway.

Snow storage areas, if required, shall be located at least 100 m (110 yds) from any stream, waterway or source of drinking water. Following the spring melt, debris at the snow storage area shall be collected and removed to an appropriate landfill site.

Only approved melting agents for snow/ice covered roads will be used. Chemical melting agents shall not be used at stream crossings or near sensitive habitats.

### 3. Spill and Emergency Response

- 3.1 All personnel responsible for the handling of dangerous goods and hazardous wastes shall be familiar with the on-site response and containment plan.
- 3.2 All spills of quantities less than those reportable and without a potential impact to the environment shall be contained and cleaned up immediately by on-site personnel in accordance with the on-site emergency response and containment plan. Such spills are reported to the Field Inspector within 24 hours.
- 3.3 The following actions shall be taken by the person in charge of the spilled material or by first person(s) arriving at the scene of a hazardous material accident or by the on-site emergency-response coordinator:
  1. Notification and Spill Assessment
    1. Notify the emergency-response coordinator
    2. Identify exact location and time of accident
    3. Request assistance as required by magnitude of accident from Manitoba Conservation (24-hour Spill Response Line (204) 945-4888), Police, Fire Department, or Ambulance and Company backup
    4. Notify Manager of Environmental Services for the MFA
  2. Attend to Public Safety
    1. Secure the area from public access
    2. Eliminate ignition sources
    3. Initiate evacuation of immediate area if necessary
  3. Gather and Assess Information on Status of Situation, noting:
    1. Personnel on-site
    2. Cause(s) and effect of spill
    3. Estimated extent of damage
    4. Volume and type of material involved
    5. Proximity to waterways
  4. If Safe to do so, and in Accordance with the On-Site Response and Containment Plan Try to Stop the Dispersion or Flow of Spill Material by:

1. Approach from upwind
2. Stop or reduce leak if safe to do so
3. Dyke spilled material with dry, inert sorbet material or dry clay
4. Prevent spill material from entering waterways, utilities or other openings by dyking

#### 4. Borrow Pits and Quarries

- 4.1 Regarding activities related to pit and quarries, reference will be made to the following:
- The provincial “*Mines and Minerals Act*”
  - “*Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters.*” Department of Fisheries and Oceans. 1998.
- 4.2 New borrow pits and quarries shall be located as close to existing access routes as possible while maintaining an adequate visual screening. A visual screen generally consists of a vegetated buffer area between a public use area and a work-site. Borrow areas must be located a minimum of 150 m from a provincial trunk highway or provincial road unless suitable vegetated berm is provided to shield the pit or quarry from view.
- 4.3 The work face of the quarry should be oriented away from sensitive wildlife and people and ensure safety of the workers. Spring (first open water to the end of July) is the most important season for wildlife as it is the critical reproductive period for most species
- 4.4 Garbage, debris, or refuse shall not be discarded into the excavated areas.
- 4.5 A deep quarry excavation is preferable to a shallow excavation since a deep site minimizes the amount of surface disturbance relative to the amount of material excavated. Caution must be taken not to adversely affect groundwater quality.
- 4.6 Before excavation starts in pits or quarries, runoff control measures shall be designed to redirect surface runoff away from access routes and pit and quarry walls.

#### 5. Clearing

- 5.1 Where practical and viable, merchantable timber will be salvaged and utilised. Where timber is salvaged, harvesting activities will be conducted in accordance with “The Forest Act” and Manitoba Conservation “*Timber Harvesting Practices for Forestry Operations in Manitoba*” (1996) guidelines.

- 5.2 All Crown owned productive forest lands cleared will be subject to the Manitoba Conservation *“Forest Damage Appraisal and Valuation Policy”* (2002).
- 5.3 Right-of-way clearing will be limited to the area required for construction, operations and maintenance of temporary access routes and permanent roads.
- 5.4 Right-of-way boundaries and sensitive areas shall be clearly marked with flagging tape prior to clearing.
- 5.5 Clearing and disturbance shall be limited to project areas and associated access routes. Whenever possible, existing access routes will be utilised and machinery will not operate outside of the project areas and associated access routes. Storage areas shall be contained within the project areas and associated access routes.
- 5.6 Vegetation will be removed by mechanical means except where other selective clearing methods are stipulated.
- 5.7 Areas requiring selective clearing (i.e. buffer zones, sensitive sites) shall be marked prior to clearing. The Contractor or a designate will supervise the equipment operators to ensure these areas are not missed or unduly disturbed by construction equipment and related activities.
- 5.8 Cleared trees or vegetation shall not obstruct waterways during any season, and will be stored above the ordinary high water mark if close to water bodies.
- 5.9 Where practical and feasible, clearing in known permafrost areas will be minimised, but where required shall retain the top layer of organic soil and ground vegetation and an insulating cover to prevent or minimise disturbance.
- 5.10 Vegetation buffer zones shall be maintained between construction areas and natural water bodies to the extent possible.

## 6. Grubbing

- 6.1 Where possible, grubbing will not occur within 2 m (2.5 yards) of standing timber in order to prevent damage to root systems of adjacent to standing trees and reduce the occurrence of blow down.
- 6.2 Where appropriate clipping shall be preferred disposal method for slash. Chippings shall be used on the project site for planting. Slash windrows that will be disposed of by burning shall be stacked the maximum distance possible from standing timber.
- 6.3 Where possible special care shall be taken when grubbing in areas of fine-grained soils (clays, silts, fine sands, etc) to minimise erosion, particularly during wet weather, to prevent rutting and erosion.

- 6.4 When grubbing in areas susceptible to erosion into water bodies, erosion control blankets and/or silt fences may need to be installed.
- 6.5 A minimum 100 metre (110 yds) non-grubbing zone will be maintained around streams and waterways except where stream crossings are to be constructed.

## 7. Blasting

- 7.1 The blasting contractor must be in possession of all required permits/certificates. Notification will be given to affected parties including site employees and the local general public prior to each blasting event.
- 7.2 Reference will be made to Department of Fisheries and Oceans document “*Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters*” 1998. Blasting plans will be submitted to DFO and Manitoba Conservation prior to commencement of blasting in areas that could affect fish habitat.
- 7.3 Blasting plans will comply with blasting regulations and reflect the appropriate timing of life cycle events as they relate to critical life functions of fish and wildlife species i.e. migration, calving, nesting and spawning. Therefore, to reduce impacts to birds and other wildlife, blasting activities should be restricted to outside the most sensitive breeding and brood rearing months (i.e. May to late July) as much as possible.
- 7.4 Storage facilities and personnel handling explosives shall be in accordance with regulations under the provincial Workplace and Safety Health Act.
- 7.5 Whenever possible, drilling/blasting and supporting activities shall be scheduled during winter months to minimise permafrost degradation.
- 7.6 Whenever possible, large charges shall be divided into smaller multiple time-delayed charges.
- 7.7 Drilling sites will be clearly marked with flagging tape and the flagging tape will be removed at the completion of the work.
- 7.8 Transportation of explosives shall comply with the federal Explosives Act.
- 7.9 Blast rock shall be stockpiled for subsequent use or disposal on site.
- 7.10 Vehicles, machinery, and equipment shall be kept in good working condition and free of fluid leaks. Motorised equipment will be equipped with spark-retarders.
- 7.11 No blasting is permitted within the distance and for the time(s) identified by regulatory authorities near sensitive wildlife habitats.

- 7.12 Directional drilling may occur at water crossings. Refer to the DFO document “*Manitoba Operational Statement Habitat Management Program for High Pressure Directional Drilling*” describing fish and fish habitat protection measures. The measures may be used as a general guideline for Horizontal Bores, Horizontal Punches and Directional Drilling at worksites.
- 7.13 In accordance with the blasting plans, site remediation will occur as soon as possible after the blast and where appropriate, surplus excavated soils will be disposed of at a registered site.
- 7.14 Excessive volumes of debris that enters a waterway as a result of blasting shall be removed prior to the completion of the blasting program.

## 8. Temporary Camps and Facilities

- 8.1 The first choice for selecting a site for the start-up camps shall be previously cleared sites or natural openings. This will minimise unnecessary clearing. The maximum distance possible from a waterway or water body will be maintained.
- 8.2 Fuel shall be stored in a secure dedicated area.
- 8.3 Sewage and grey water shall be collected in holding tanks, sullage pits, chemical toilets or pit privies. These tanks will be registered with Manitoba Conservation.
- 8.4 The use of pit privies is acceptable in remote areas where no plumbing is available. All privies must conform to the *Public Health Act*. Use of privies shall be subject to the approval of the local public health officer or NRO.
- 8.5 Garbage shall be collected and stored in covered containers and removed daily to an approved landfill site or storage facility.
- 8.6 Liquid and solid wastes shall be held in tanks and regularly removed to licensed disposal areas.
- 8.7 Firebreaks shall be constructed around temporary campsites.
- 8.8 Pit privies shall be backfilled when the camp is decommissioned.
- 8.9 All buildings, infrastructure, waste and debris shall be removed from the road start-up camp during decommissioning.

## 9. Wildlife

- 9.1 Wildlife is attracted to untidy campsites. Cleanliness, proper storage of food and garbage and common sense are the best avoidance practices.

- 9.2 Wildlife shall not be fed or harassed. Project personnel are prohibited from hunting, fishing, harvesting, feeding or harassing wildlife (furbearers, big game, birds, fish), on the project site, designated access routes or borrow areas.
- 9.3 Nuisance wildlife will be immediately reported to the Natural Resources officer (NRO).
- 9.4 Trees containing large nests of sticks and areas where active dens or burrows occur will be identified, left undisturbed and reported to the NRO.
- 9.5 Whenever it is necessary to remove existing beaver dams reference will be made to the DFO document *"Manitoba Operational Statement Habitat Management Program DFO Beaver Dam Removal"*.
- 9.6 To reduce the possibility of vehicle and wildlife collisions, vehicle speed shall not exceed posted speed limits and wildlife warning signs shall be installed where appropriate.
- 9.7 Any wildlife killed or injured in collisions with vehicles shall be reported to the NRO.
- 9.8 No temporary roadbed borrow operations will occur within 2 km of known caribou calving areas along access roads from mid-May to early-July.

## 10. Petroleum Products Handling and Storage

- 10.1 Petroleum products shall be transported in accordance with the Manitoba Provincial *"Dangerous Goods Handling and Transportation Act"* and federal *"Transportation of Dangerous Goods Act"*.
- 10.2 Construction, installation or removal of petroleum product storage tank systems shall only occur under the supervision of a registered licensed petroleum technician.
- 10.3 Petroleum products shall be labelled as to their contents and stored and handled within dedicated areas at marshalling yards in accordance with Manitoba Regulation 188/2001 respecting *"Storage and Handling of Petroleum Products and Allied Products"*. Petroleum products storage and equipment servicing areas shall be located a minimum of 100 meters (110 yds) from a water body.
- 10.4 Dedicated petroleum storage areas shall provide spill containment and facilitate clean up through measure such as:
  - maximum separation from environmentally sensitive features;
  - clear identification of the materials present;
  - access restricted to authorised vehicles only and employees;

- impervious bermed storage areas; and
  - dedicated spill response equipment.
- 10.5 Storage sites for petroleum products shall be secured and signs including hazard warnings, who to contact in case of a spill, access restrictions and under whose authority the access is restricted will be posted.
- 10.6 All employees involved in the handling and storage of fuels and hazardous materials shall have WHMIS training.
- 10.7 All new and existing underground and all above ground tanks with a capacity greater than 5000 L shall be registered with Manitoba Conservation. New tanks must be registered before installation. Tanks shall be designed, installed, and operated in accordance with the Manitoba Provincial "Dangerous Goods Handling and Transportation Act" and Federal "Transpiration of Dangerous Goods Act". Smaller stationary and portable tanks shall adhere to requirements of the Manitoba Fire Code.
- 10.8 Aboveground storage tanks shall be used for the storage of bulk petroleum products. The tanks shall be equipped with overfill protection and spill containment consisting of the perimeter dykes or secondary containment in the tank design. If dykes are used, the containment areas shall be dewatered after a rainfall event and the containment water disposed of as specified by Manitoba Conservation. Product inventory shall be taken weekly by the owner/operator on all aboveground tanks greater than 5000 L and retained for inspection upon request.
- 10.9 Bulk waste oil shall be stored in aboveground oil tanks, which shall have secondary containment and a weatherproof cover. Waste oil will be recycled by a reputable recycling agency. Waste oil shall never be used as a dust suppressant.
- 10.10 Petroleum product containers shall be inspected daily by the Contractor. Product inventory shall be taken daily and retained for inspection upon request by regulatory authorities.
- 10.11 The Contractor shall designate on-site Emergency Spill Response Coordinators.
- 10.12 Contractors shall prevent fuel, lubricants or compounds from being released. All empty containers from equipment refuelling and servicing shall be removed to a licensed disposal site. Contractors shall be thoroughly familiar with provincial/federal spill response compliance procedures.
- 10.13 Materials required for spill containment and clean up shall be available at all sites where construction related activities occur. All vehicles hauling fuel shall carry materials and equipment for emergency spill containment.
- 10.14 At locations where stationary oil filled equipment is used, oil containment

measures such as secondary containment shall be incorporated (i.e., berms).

- 10.15 Oil contaminated soils resulting from releases shall be remediated or disposed of in a manner approved by regulatory authorities.
- 10.16 Fuel barrels will be securely fastened to the vehicle during transport and if possible during refuelling operations.
- 10.17 All petroleum product storage sites and mobile transportation units, will at all times be equipped with the appropriate categories of equipment and volumes of fire suppression products.
- Prepare a spill contingency plan;
  - Report all spills to: **Manitoba Conservation 24 Hour Spill Reporting Line at 945-4888**
  - Ensure creosote treated and pressure treated lumber is completely dry (no evidence of seepage of treatment materials) before use in or near watercourse;
  - Lumber used in construction should be treated and painted at a site well removed from the watercourse (maintain a minimum 100 meter separator);
  - Use bridge skirts or other appropriate measures to prevent material from entering watercourse when painting, cleaning or resurfacing bridge deck and superstructures;
  - Do not use ammonium nitrate-fuel oil (ANFO) based explosives.

## 11. Hazardous Materials and Workplace Hazardous Material Information (WHIMS)

- 11.1 All applicable laws, regulations and standards for the safe use, handling and storage, disposal and emergency response procedures for hazardous waste will be followed (Dangerous Goods Handling and Transportation Act, Compliance Guide to Manitoba's Hazardous Waste Legislation).
- 11.2 In accordance with "*Workplace Safety and Health Regulation (M.R. 217/2006)*" Part 35: Workplace Hazardous Materials Information Systems Application, Materials Data Safety Sheets (MSDS) must be available for all controlled products. Under Part 36: Chemical and Biological Substances Application all information available to the employer must be assessed to determine if the substance creates, or may create a hazard to employees safety or health and safe work procedures must be developed and implemented as required.
- 11.3 Adherence to WHIMS requires proper labelling and current MSDSs for chemical products. This includes an inventory list of controlled product(s) used, stored, handled or disposed of to be maintained at the workplace.
- 11.4 Employees must have WHIMS training in compliance with regulatory requirements.
- 11.5 Where possible, non-hazardous materials will be used in place of hazardous products.
- 11.6 Hazardous materials will be stored within dedicated areas at work camps and storage areas in full compliance with the regulations. Temporary storage of hazardous materials at remote sites must be located a minimum of 100 metres (110 yards) from a waterway.
- 11.7 Areas dedicated for hazardous storage shall provide spill containment and facilitate clean up through such measures as:
- maximum separation from sensitive features
  - clear identification of the materials
  - access restricted to authorized personnel and vehicles only
  - Bermed storage areas
  - dedicated spill response equipment
- 11.8 Other Potentially Toxic Materials:
- Use bio-friendly hydraulic fluids in equipment operating in or adjacent to watercourse;
  - Store fuel, lubricants, hydraulic fluid and other potentially toxic materials at locations well isolated from the watercourse (maintain a minimum 100 m separator);

- Isolate storage areas so that spilled fluids are contained such that they cannot enter the watercourse;

## 12. Fish and Fish Habitat

### 12.1 In Stream Work

- Plan the project so that the amount of in stream work is kept to a minimum;
- Where possible, plan in stream work to occur as a single event;
- Restrict in stream work to low flow periods where possible;
- Limit machinery access to a single point on one bank;
- Limit distance between machinery access point and work site;
- Adhere to timing restrictions for the area; DFO has identified timing windows in their Manitoba Operational Statement Habitat Management Program during which no instream work is to occur except under site specific review and with implementation of protection measures. The timing windows for Manitoba are:

**Table 1: Timing Windows when no in-water work is to occur in order to protect spawning fish and developing eggs.**

	Spring Spawning Fish	Summer Spawning Fish	Fall Spawning Fish
<b>Northern Manitoba</b>	April 15 - June 30	May 15 – July 15	September 1 – May 15
<b>Southern Manitoba</b>	April 1 – June 15	May 1 – June 30	September 15 – April 30

- Minimize flow constriction;
- Use in stream pad built of washed gravel where in stream equipment activity would generate excess sediment.

### 12.2 Right-of-Way Work

- Keep right-of-way for watercourse crossings as narrow as possible within the constraints of safety and construction requirements;
- Limit removal of vegetation to the width of the right-of-way;
- Clear vegetation from unstable or erodible banks by hand, avoiding the use of heavy machinery;
- Develop sediment control plans and install sediment control measures before starting work;
- Inspect sediment control measures regularly and make necessary repairs immediately after damage has been discovered;

- Stockpile top soil removed from the right-of-way outside of the active floodplain and use;
- Implement measures such as silt fences and holding ponds to prevent stockpile runoff from entering the watercourse;
- Minimize the length of time that unstable erodible soils are exposed;
- Direct runoff containing sediment away from the stream into a vegetated area;
- Construct suitably sized settling ponds to precipitate suspended sediment before water is discharged into the watercourse;
- Stabilize erodible soils as soon as practical by seeding or planting, spreading mulch or installing erosion control blankets;
- Allow at least 4 to 6 weeks of growing season when using seeding or planting to stabilize erodible soils;
- Maintain a vegetated buffer strip between the work site and watercourse except at the actual crossing location.

### 12.3 Machinery

- Machinery should arrive on site in a clean, washed condition, and free of fluid leaks;
- Install stabilized entrances at vehicle and machinery access points;
- Limit the amount and duration of in stream work with heavy machinery. Work from the banks where possible;
- Refuel machinery at locations well removed from the watercourse (maintain a minimum 100 m separation);
- Wash and service vehicles and machinery at locations well removed from the watercourse;
- Work on in stream pads composed of washed gravel to minimize sediment entrainment.

### 12.4 Cofferdams and Beams

- Use cofferdams (earth fill, sheet pile or other proprietary designs) to separate instream work site from flowing water;
- Use clean, washed material for construction and face berms with clean granular material;
- Design cofferdams to accommodate the expected flows of the watercourse;
- Limit cofferdams to one side of the watercourse at any one time and ensure that they block no more than one-third of the channel;
- Restore the original channel bottom grade after removing cofferdams;
- Treat all water pumped from behind the cofferdams to remove sediment before discharge.
- Whenever it is necessary to remove existing beaver dams reference will be made to the DFO document *“Manitoba Operational Statement Habitat Management Program DFO Beaver Dam Removal”*.

- Conduct fish salvage as required under a provincial “live fish handling permit” under the federal and provincial “*Fisheries Act*”, “*Manitoba Fisheries Regulation*”, “*Fisheries License Fee Regulation*”.

#### 12.5 Temporary Diversion Channels

- Construct temporary diversion channels in the dry, starting from the downstream end;
- Design temporary diversion channels to accommodate expected watercourse flow from storm events (generally 1 in 5 year event, although the 1 in 2 year event may be used for noncritical situations);
- Use erosion control methods where appropriate;
- Leave the existing channels untouched until the temporary diversions are constructed;
- Open diversion channels from the downstream end first;
- Use clean, washed material to close existing channels and divert water to temporary diversion channels.
- Use gradient controls to ensure that diversion channel slopes correspond to the existing channel gradients;
- Protect unstable bends from erosion.

#### 12.6 Pumped Diversions

- Used where a channel must be completely blocked to allow work ‘in the dry’;
- Must not be used where there are fish passage concerns;
- Intakes must be sized and screened to prevent debris blockage and fish mortality;
- Pumping system should be sized to accommodate expected watercourse flow from storm events (generally 1 in 5 year event, although the 1 in 2 year event may be used for non-critical situations);
- Discharge point should be armoured with clean rock to prevent erosion.

#### 12.7 Reclamation and Site Cleanup

- Begin reclamation and site cleanup as soon as construction has been completed;
- Remove all waste material from the active floodplain;
- Recontour, stabilize, and re-vegetate disturbed areas to suit original conditions;
- Remove all temporary facilities and structures;
- Stabilize all slopes leading directly to the watercourse;
- Re-vegetate exposed slopes immediately if there are at least 4 weeks remaining in the growing season. If this is not possible, slopes should be re-vegetated immediately in the next growing season.

## 12.8 Fish Passage

- Contact the Canada Department of Fisheries and Oceans early in the design process. Construction of a culvert on a fish-bearing channel may require an Authorization from DFO;
- Identify fish passage requirements, including species, life stage and timing;
- Determine the fish passage design discharge, based on local or regional hydrology;
- Calculate fish passage culvert hydraulics to determine flow velocities;
- Perform swimming performance assessment to compare fish swimming capability to culvert velocities;
- Select appropriate mitigation methods for fish passage if required;
- Design culvert with appropriate inlet and outlet details and erosion control measures.

## 12.9 In Stream Crossings

- Construction of all stream crossings shall be in accordance with the *“Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat”* published by Manitoba Conservation and DFO.
- Streams shall be crossed at right angles to minimize shoreline disturbance to the extent possible.
- Backfill installed adjacent to water bodies shall consist of clean and well graded granular material.
- Temporary and permanent access across water bodies shall be constructed and if applicable, decommissioned in consideration of the following Manitoba Guidelines:
  - *“Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat”*
  - *“Recommended Buffer Zones for Protecting Fish resources in Lakes and Streams in Forest Cutting Areas”*
  - *“Timber Harvesting Practices for Forestry Operations in Manitoba”*
  - *“Consolidated Buffer Management Guidelines”*
- Any disturbance of the right-of-way approach to any watercourse related to the project and associated activities is kept to a minimum, and immediately stabilized and reclaimed to pre-construction conditions;
- Only clean coarse material (gravel or larger rock) is used for fill. All fill material is obtained from off-site and not from below the average high water level of any watercourse;
- If riprap is used, the riprap is clean, free of fine materials, of sufficient size to resist displacement during peak flood events and extends to at least the level of bankfull discharge. Riprap is placed at the original stream bank grade to ensure that there is no infilling or narrowing of the watercourse at the crossing site;

- The watercourse bed and bank is returned to their original pre-construction configuration. Avoid realignment of the watercourse or changes to its hydraulic characteristics;
- Where water is pumped from fish habitat for any purpose, intakes are screened according to the Department of Fisheries and Oceans' *"Freshwater Intake End-of-Pipe Fish Screen Guideline"* (1995).

### 12.10 Trenchless Crossing Methods

- Monitor drilling fluid volume used and returned to detect any significant fluid losses. Drilling fluid pump pressure should be continuously monitored;
- An emergency monitoring and response plan is developed in the event of a frac-out;
  - i. If drilling fluids are entering a waterbody, drilling will cease. The appropriate environmental regulatory agencies are notified immediately;
  - ii. Make adjustments to the drilling mud mixture to prevent further loss of fluid;
  - iii. Where conditions warrant and permit and where a frac-out is visually detected, isolate the fluid release and conduct clean up.
- Dewatering from ditches or bore holes is done such that the water is released into a well vegetated area or settling basin and does not directly re-enter the watercourse. Water returning to the watercourse is equal to or exceeds the background water quality of the watercourse.

### 12.11 Open Cut and Isolated Crossings

- No construction activity occurs within the wetted portion of the channel during the closed construction timing window;
- Isolated crossings are conducted as follows:
  - i. Maintain 100% of downstream flow at all times;
  - ii. Water from flumes, pump-around, diversions or other methods used to maintain downstream flow do not cause erosion or introduce sediment into the channel. Examples of options for preventing erosion include flow dissipaters, protection of the substrate with geotextile, and releasing water onto vegetation if it can be done without erosion;
  - iii. If a pump-around method is used to maintain downstream flow, back-up pumps with adequate capacity to maintain 100% of downstream flow at all times are on- site and ready to take over pumping if the operating pumps fail. The pumps are continually monitored to ensure downstream flow is maintained at all times until the dam materials are removed and normal flows restored to the channel;
  - iv. Pump intakes do not disturb the streambed. Pumps are screened with a maximum mesh size of 2.54 mm and a maximum screen approach velocity of 0.038 m/s;
  - v. All berms and berm material are completely removed from the channel and the streambed and stream bank profiles returned to preconstruction conditions at the end of the project;

- vi. Fish salvage is conducted using a seine net and/or electrofishing and the fish released unharmed downstream. The fish salvage is undertaken within any isolated areas prior to and during dewatering activities. In addition, fish salvage is undertaken on any bypass structures such as diversion channels and flumes prior to them being dewatered after use. Fish salvage will require a permit from the Province;
  - vii. No isolation is required if the channel is dry or frozen to the bottom at the site of the crossing construction.
- Crossings are located on straight sections perpendicular to the bank. Crossings at meanders or bends are avoided;
  - All open cut and isolated crossings on water bodies with a bankfull width greater than 5 m should be submitted to DFO for review.

#### 12.12 Deleterious Substances

- All spoil materials are disposed of above the high water mark and located such that they do not re-enter any watercourse;
- During construction and until re-vegetation is sufficient to prevent sediment erosion, effective sediment and erosion control measures are in place and they are functioning properly and are maintained and/or upgraded as required to prevent sediment from entering fish habitat;
- All construction equipment arriving on the right-of-way is clean of oils, mud and vegetative debris prior to entering the right-of-way to minimize the risk of the deposit of a deleterious substance into the waterbody;
- All materials and equipment is operated, maintained and stored in a manner that prevents any deleterious substances (fuel, oil, grease, hydraulic fluids, and coolant) from entering fish habitat;
- Fuel trucks, fuel storage areas, pumps, generators and other sources of deleterious substances are within a containment system of sufficient capacity to ensure that deleterious substances do not enter fish habitat;
- A spill response plan is in place that will prevent deleterious substances from entering fish habitat.

#### 12.13 Temporary Road Crossings

- The installation of a culvert road crossing to be submitted to DFO for a case specific review;
- Any temporary crossings and associated debris is removed immediately after completion of the pipeline crossing, and the disturbed area restored to pre-construction conditions;
- Time the placement and removal of the bridge to avoid periods of high fish movement;
- Temporary bridges and culverts should be sized to accommodate flows expected during the period of use and to provide for fish passage;
- Sufficient openings for fish and water to pass and to prevent excessive water backup;

- Logs used to create temporary bridges should be de-limbed. Untreated log poles are acceptable. Logs should be chained together on the ends for stability and to facilitate removal of the logs;
- If material such as gravel is used to fill in gaps between planking on the bridge deck, it should be held in place and separated from the decking by geotextile fabric or a natural mat;
- Only clean ice/snow is used for the construction of ice bridges;
- Ice bridges do not interfere with or impede winter flows;
- Sand or gravel is not used for the ice bridge approaches. Approaches are constructed of compacted snow and ice of sufficient thickness to protect the stream and riverbanks;
- Ice/snow bridges are broken up prior to spring freshet and any associated debris removed from the watercourse. Banks and approaches are stabilized and restored to pre-construction conditions;
- Logs used for ice bridges are always cabled or chained together. All logs are removed prior to spring break-up. Logs are not to be used to fill in the channel;
- At a minimum, ice/snow bridges are breached down to the natural ice level prior to spring break up;
- Excavation of the stream bed does not occur and any bank disturbance is restored;
- If water extraction is necessary for the construction of temporary road crossings, no more than 10% of the instantaneous stream flow is withdrawn at any given time;
- Pump intakes do not disturb the streambed. Pumps are screened with a maximum mesh size of 2.54 mm and a maximum screen approach velocity of 0.038 m/s;
- Construct and use ford crossings during the driest time of the year;
- Ensure that fords will not be used during fish spawning, incubation, or migration periods;
- Seek fording sites with low, stable approaches and a firm stream bed or rock or coarse gravel;
- Select an area with a natural water depth of less than 100 cm but maintain a minimum water depth of 20 cm to allow fish passage;
- Minimize the area disturbed by building crossing that are perpendicular to the stream and not more than 10 m wide;
- Prevent erosion by minimizing the amount of vegetation removed from the stream bed and banks;
- Stabilize approaches if necessary with non-erodible material 15 m up the bank on both sides.

### 13. Accidents and Malfunctions

- 13.1 The bulk storage of dangerous goods and hazardous wastes will be within dyked containment areas in addition to the provision of secondary containment storage vessels.

- 13.2 Develop and employ an Emergency Response Plan in case of accidental spills.
- 13.3 Maintain a Workplace Hazardous Materials Management Information System (WHMIS) at each work site.
- 13.4 Maintain a full inventory of hazardous and dangerous goods at each work site at all times in case of an accident or fire.
- 13.5 Maintain a supply of proper absorbent material and spill containment supplies at each work site.
- 13.6 Provide proper training to staff who will be involved in the handling of hazardous and dangerous goods.
- 13.7 Employ a Frac-out response plan for horizontal directional drilling works.
- 13.8 Maintain an updated list of key contacts at the individual work sites to be contacted in case of an accident or malfunction.
- 13.9 Ensure that designated personnel, who have the authority to redirect manpower and equipment in order to respond to an accident, are onsite at all times that work is being carried out.
- 13.10 Report all accidents or malfunctions to the appropriate environmental regulatory agencies (Manitoba Conservation, Environment Canada);
- 13.11 Near built up areas or as traffic levels warrant, prepare a traffic management plans for the bridge and road works designed to maintain proper traffic flow through or around the work sites at all times. This would ensure the quick passage of emergency vehicles, such as fire/rescue trucks, through construction areas at all times.

## **14. Erosion and Sediment Control**

### **14.1 Erosion Control Measures**

1. Preservation of Existing Vegetation – Areas with a well established vegetation cover will not be prone to erosion. This is generally the first, best and most economical erosion control measure. Prior to construction all vegetated areas that are to be preserved or untouched during the Project are well marked and noted.
2. Schedule and Timing – The Construction Schedule can be a powerful BMP in the Erosion and Sediment Control Plan. “just-in-time” Grading is the concept of grading or excavating only areas needed for the immediate construction activities. This will leave the ground cover in place for as long as possible, minimizing exposed soil and potential erosion.

3. Seeding and Replanting (Re-Vegetation) – Seeding and replanting is carried out to stabilize disturbed areas and to establish a vegetation cover. Re-vegetation methods appropriate to the local site will be applied. Vegetation established by seed is an economical and efficient method to reduce erosion. Temporary seeding uses quick growing plants to stabilize disturbed areas that may be disturbed again. Annual cover which is not invasive and free of weeds will be used as appropriate. Plugs and bare root material will be used for woody vegetation and for species that do not respond well to seeding for establishment. Permanent vegetative cover protects the soil on a permanent or long term basis. All seed mixes and replanting will use species indigenous to the area.
4. Mulching – Mulching refers to the application of organic material or other suitable substances to the soil surface to conserve a desirable soil property or to promote plant growth. Mulches conserve soil moisture, prevent surface compaction, reduce runoff and surface erosion, control weeds, and help establish plant cover. Mulching can be used to provide both short and long term erosion control. Organic mulches used primarily for this project will include raw wood fibre, peat moss, wood chips, bark, pine needles, and compost. To minimize risk of importing invasive species, mulch shall be manufactured from removed vegetation found along the route alignment where appropriate. Organic mulches can be applied by hand or machine and in most cases steps must be taken to anchor or bind the mulch to the soil. Biodegradable tackifier products shall be used where appropriate to hold mulch in place.
5. Rip-Rap – Rip-rap made up of large, loose stones can be used to provide a durable erosion resistant ground cover. Rip-rap can protect and stabilize areas prone to erosion, erodible soils and drainage channels. Stone rip-rap is durable, heavy and flexible and is the most popular material used in constructing revetments. The popularity is due to the fact that the rip-raps are flexible as the stone rip-rap adjusts to changes resulting from erosion beneath the stone and the rough surface of the stones dissipates part of the energy of the flowing water. The most common locations for rip-rap are stream channel banks, slopes of dykes, at culverts, inlet and outlet structures carrying water and bridge abutments.
6. Aggregate Cover – Aggregate cover refers to the use of crushed stone or gravel applied directly to the soil surface. Aggregate secures the soil, reduces erosion and provides a continuous all weather cover. Aggregate as a cover may be used to stabilize soil surfaces and to reduce erosion by construction traffic in wet weather or on slopes. It is used to stabilize large, flat disturbed areas where the site is being prepared as a temporary parking facility or an equipment storage site. The use of aggregate to reduce erosion on permanent roadways during construction helps minimize the amount of regrading necessary between the initial grading and permanent stabilization.

Aggregate is particularly suitable for areas where groundwater emerges through the surface soil.

7. Soil Tackifiers – Soil tackifiers or chemical stabilization refers to the use of chemical substances that change the properties of the soil surface, generally by aggregating the finer soil particles. Soil stabilizers, of a chemical nature, are used in place of temporary mulch materials and in combination with mulch materials to act as both a mulch tack and a soil binder. Chemical stabilizers can be used to provide temporary erosion protection before re-vegetation is started. It is advantageous to use chemical soil stabilizers in areas where the use of vegetation as a soil stabilizer is not possible, but it should be noted that long term protection is not achieved by the use of chemical soil stabilizers. Biodegradable products will be used for this Project.
8. Erosion Control Netting (ECN) – Erosion control netting is used to stabilize the soil and protect the soil from precipitation in moderate site conditions where erosion control blankets are not warranted. ECNs can be used over top of loose mulch, freshly placed sod, and hydroseeding as a reinforcement.
9. Erosion Control Blanket (ECB) – Erosion Control Blankets (ECBs) typically consist of degradable netting enclosing straw, wood fiber or coconut fiber. ECBs stabilize and protect the soil from raindrop impact, increase infiltration, decrease soil compaction and crusting, and conserve soil moisture. They are typically used on short, steep slopes where there is high erosion potential and slow vegetation establishment and they assist in the establishment of grassed channels.

## 14.2 Sediment Control Measures

1. Vegetative Buffer Strip – A vegetative buffer strip is a strip of dense vegetation situated between disturbed and sensitive areas. Sediment, organic matter and other pollutants are removed from the runoff by filtration and absorption. Buffer strips may be planted or seeded using locally appropriate native species, but where possible, vegetation that occurs naturally should be retained. Planted or seeded vegetation strips require a substantial time before becoming effective. Buffer strips are typically not suited for concentrated flows.
2. Silt Fence – A silt fence is a sediment barrier that utilizes a standard strength or extra-strength filter fabric attached to support posts. Silt fences slow the flow rate of the runoff substantially and act as a filter to remove suspended sediment. They are suitable for controlling sedimentation from sheet and rill erosion. Properly installed, silt fences can be cost-effective for runoff detention and sediment settling. Silt fence fabric may be composed of natural or synthetic material. Woven and non-woven fabrics are commercially available with the woven fabrics generally having the higher strength. The height of a silt fence should not exceed 1 m so as not to impound dangerously large volumes of water.

3. Rock Filters and Brush Barriers – Filters remove sediment and reduce the velocity of flowing water. Aggregate for rock filters shall be composed of clean, hard, durable mineral particles free from organic matter, clay balls, soft particles or other substances that would interfere with their free-draining properties. In channel flow applications the center of the rock filter shall be lower than the outer edges. Brush barriers are constructed by piling brush, stone and root mates into a mounded row. Filter fabric may be used in conjunction with the brush barrier to enhance the effectiveness of the brush filter.
4. Check Dams – Check dams are used to prevent channel; erosion by reducing water velocities, lengthening detention times and increasing cross-sections. The structures can be made of straw, straw/silt fence, rock or rock gabions, wood or other durable materials, depending upon site conditions. Check dams are usually constructed across the channel, perpendicular to the contours.
5. Geosynthetic Permeable Berms – Geosynthetic permeable berms are low profile, uni-body permeable berms used to reduce water (or wind) velocity over soil, with the intent of reducing or preventing transport of fine soil particles. They provide portable drainage control for construction sites, channels, roads and slopes. Porous berms allow a smoother and less damaging release of water through the berms as opposed to allowing water to cascade over a solid berm. By controlling the velocity of the water, the migration of sediment is controlled.
6. Sediment Traps – A sediment trap is a small temporary ponding area that is used to collect and store sediment-laden runoff. Typically, there is a gravel outlet. Sediment traps are used to slow runoff flow velocity, prior to entering a drainage inlet, in order to settle out some sediment.
7. Sediment Ponds – Sediment ponds or basins are temporary ponding areas that are used to collect and store sediment-laden runoff. They function similar to sediment traps in that runoff velocity is slowed to promote sedimentation. The difference is that the contributing drainage area a sediment pond services is much larger than the area a sediment trap services.
8. Fibre Rolls – Fibre rolls (sediment logs, wattles) consist of biodegradable fibres wrapped in photodegradable netting. They are porous so they allow water to filter through and trap sediment. There are many variations of the materials and functional properties.
9. Geosynthetic Matting – Geosynthetic matting is a sediment transport control measure used in channels where water velocity exceeds what natural vegetation can withstand. It can also be used in newly constructed channels or swales to protect against erosion prior to the establishment of vegetation and at the inlet and outlet of drainage channels.

10. Energy Dissipaters – Energy dissipaters are used at outlet points as an erosion/velocity control measure. They prevent scouring at discharge points, such as culverts or swales, where high concentrated flow velocities occur.
11. Silt Curtains – Silt curtains or turbidity screens are floating barriers placed in the waterway to control the dispersion of silt and sediment in the water way downstream of a potential sediment source. Silt curtains are typically used downstream of open construction areas, dredging, marine construction and remediation projects.
12. Stabilized Construction Entrance – The construction entrance/exit must be stabilized to reduce tracking of mud and dirt from the site onto public roads and streets. Typically a gravelled area will be constructed at the entrance/exit point.

## 15. Transportation

- 15.1 Where the road is open to traffic maintain traffic flow through the construction areas and over the bridges as well as possible. When applicable guidelines such as the Work Zone Traffic Control Manual developed by Manitoba Transportation and Government Services are available when establishing traffic control plans. Provide detours to ensure continuous access for vehicular traffic during the demolition of existing highway bridges and the construction of the new highway bridges.
- 15.2 Maintain all roadways in a clean and safe condition for construction and public use as appropriate.
- 15.3 Maintain continuous supply of services for any utilities that are installed under or adjacent to the construction area.
- 15.4 Where the road is open to traffic ensure appropriate traffic control and traffic safety measures are in place prior to initiating construction activities. The following identifies key considerations for progressive levels of traffic safety and control which may be drawn upon as required:
  - a. Level I
    - i. Supply, installation and maintenance of necessary traffic control devices and non portable signs, equipment warning lights, and a watchman.
    - ii. When detours are associated with the work, the Contractor shall barricade the area as deemed necessary.
  - b. Level II
    - i. Supply, installation and maintenance of applicable signs, barricades and channelization devices at each work area and hazardous area.

- ii. Provision of gateway assemblies, equipment warning lights, and a watchman.
- c. Level III
  - i. Supply, installation and maintenance of applicable signs, barricades and channelization devices at each work area and hazardous area.
  - ii. Provision of flagmen (one flagman at each end of each work area), gateway assemblies, equipment warning lights, and a watchman.
- d. Level IV
  - i. Supply, installation, and maintenance of applicable signs, barricades and channelization devices at each work area and hazardous area.
  - ii. Provision of a safety coordinator, flagmen (one flagman at each end of each work area), gateway assemblies, equipment warning lights, and a watchman.
- e. Level V
  - i. Supply, installation, maintenance of applicable signs, barricades and channelization devices at each work area and hazardous area.
  - ii. Provision of relief flagmen, safety coordinator, flagmen (one flagman at each end of each work area), gateway assemblies, equipment warning lights, and a watchman.

## 16. Heritage Resources

- 16.1 Heritage and culturally sensitive areas known by the province and local residents were mapped and known areas were avoided as part of the route selection process. Areas near known heritage or cultural resources of interest will be inspected prior to the start of construction to confirm presence and extent.
- 16.2 Other areas where heritage or cultural resources of interest are suspected of being present such as along major waterways at crossings will be inspected prior to the start of construction to confirm potential presence and extent.
- 16.3 If it is determined that further site investigation is required, a heritage resource specialist will examine the area and develop a site specific appropriate response program.
- 16.4 If archaeological artifacts are encountered during construction activities, the work at that location will immediately cease and the discovery will be reported to the Field Supervisor. The Field Supervisor will ensure that a heritage resource specialist be brought to the site to assess the situation prior to work resuming.
- 16.5 Neither the Contractor nor his employees will have any right, title, or interest to any artifacts discovered during construction.

## 17. Bridge Maintenance

Bridge maintenance is undertaken to extend the life of the structure and to ensure that it functions as designed, thus ensuring public safety.

Bridge maintenance activities have the potential to negatively impact fish and fish habitat by introducing sand, sediments, deck surface materials such as concrete and asphalt, and other deleterious substances (e.g., salt, paint, solvents, oil and grease) into watercourses. Removal of woody debris and riparian vegetation may alter natural habitat features and flows that exist in the watercourse. Operation of machinery may impact habitat on the banks and bed, and result in erosion and sedimentation. Placement of rock to stabilize structures may alter natural habitat and flows, and block fish passage.

The following identifies the measures that should be followed to protect fish habitat when maintaining the ASR bridges constructed for this Project.

The following measures have been identified by DFO's - *Manitoba Operational Statement: Bridge Maintenance (version 3, accessed August 2009)* and apply to:

- deck sweeping and washing to remove traction material (e.g., sand and salt residue),
- cleaning of all bridge components (substructure, superstructure and deck);
- the removal and application of protective coatings, deck wearing surface replacement; and
- the removal of debris to protect piers and abutments, and structural repairs.

### Measures to Protect Fish and Fish Habitat when Maintaining a Bridge

#### 17.1. Deck Sweeping

- Adequately seal drains and open joints before sweeping to prevent material from falling into the watercourse.
- Clean and remove debris and sediment from drainage devices and dispose of the material in a way that will prevent it from entering the watercourse.

#### 17.2. Deck Washing

- Sweep decks, including curbs, sidewalks, medians and drainage devices to remove as much material as practical before washing.
- Adequately seal drains and open joints before washing to prevent sediment-laden washwater from entering the watercourse.

- Direct wash-water past the ends of the bridge deck to a vegetated area to remove suspended solids, dissipate velocity and prevent sediment and other deleterious substances from entering the watercourse. If this cannot be achieved, use silt fences or other sediment and erosion control measures to prevent wash-water from entering the watercourse.
- When extracting water from a watercourse, ensure the intakes of pumping hoses are equipped with an appropriate device to avoid entraining and impinging fish. Guidelines to determine the appropriate mesh size for intake screens may be obtained from DFO (*Freshwater Intake End-of-Pipe Fish Screen Guideline* (1995), available at [www.dfo-mpo.gc.ca/Library/223669.pdf](http://www.dfo-mpo.gc.ca/Library/223669.pdf) (PDF Version, 2.93 Mb)).
- Where possible, avoid using small streams as a source for water.

### 17.3. Removal and Application of Protective Coatings

- Remove paint or protective coatings in a manner that prevents any paints, paint flakes, primers, blasting abrasives, rust, solvents, degreasers or other waste material from entering the watercourse.
- Use measures such as barges or shrouding to trap and prevent blasting abrasives, protective coatings, rust and grease from entering the watercourse.
- Contain paint flakes, abrasives, and other waste materials for safe disposal.
- Store, mix and transfer paints and solvents on land and not on the bridge to prevent these materials from entering the watercourse in the event of a spill.
- Do not clean equipment in the watercourse or where the wash-water can enter the watercourse.

### 17.4. Removal of Debris (e.g., including woody debris, garbage and ice build-up)

- Unless the debris accumulation is an immediate threat to the integrity of the piers and abutments, time debris removal to avoid disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Manitoba In-Water Construction Timing Windows*), with the exception of ice build-up removal.
- Limit the removal of material to that which is necessary to protect piers and abutments.
- Remove debris by hand or with machinery operating from shore or a floating barge.
- Emergency debris removal using hand tools or machinery (e.g., backhoe) can be carried out at any time of year. Emergencies include situations where carrying out the project immediately is in the interest of preventing damage to property or the environment, or is in the interest of public health or safety. DFO is to be notified immediately. **You should follow all other measures to the greatest extent possible.**
- A separate Operational Statement exists for the removal of beaver dams and associated debris, and it applies to dams that are not directly connected or immediately adjacent to the bridge structure.

### 17.5. Structural Repairs and Reinforcements

- Use barges or shrouding to trap and prevent concrete and other bridge materials from Bridge Maintenance entering the watercourse.
- If replacement rock reinforcement/armouring is required to stabilize eroding areas around bridge structures (e.g., abutments and/or wing walls), the following measures should be incorporated:
  - Place appropriately-sized, clean rocks into the eroding area.
  - Do not obtain rocks from below the HWM of any water body.
  - Avoid the use of rock that is acid-generating. Also avoid the use of rock that fractures and breaks down quickly when exposed to the elements .
  - Install rock at a similar slope to maintain a uniform stream bank and natural stream alignment.
  - Ensure rock does not interfere with fish passage or constrict the channel width.
  - If any in-water work is involved, adhere to fisheries timing windows.

### 17.6. Other Requirements

- If working from land, install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
- If the removal of select plants is required, the removal should be kept to a minimum and limited to the right-of-way of the bridge.
- Operate machinery on land (from outside of the water) or on the water (i.e., from a barge or vessel) in a manner that minimizes disturbance to the banks or bed of the watercourse.
  - Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
  - Wash, refuel and service machinery and store fuel and other materials for the machinery
  - away from the water to prevent any deleterious substance from entering the water.
  - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
  - Restore banks to original condition if any disturbance occurs.

- Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.
- Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.
- Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Source: <http://www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/provinces-territoires-territoires/mb/os-eo04-eng.htm>

## 18. Culvert Maintenance

Culvert maintenance is undertaken to extend the life of the structure and to ensure that it functions as designed, thus ensuring public safety and safe fish passage. Culvert maintenance includes the removal of accumulated debris (e.g., logs, boulders, garbage, ice build-up) that prevents the efficient passage of water and fish through the structure. Culvert maintenance may also include the reinforcement of eroding inlets and outlets, but does not include the replacement of damaged or destroyed bevel ends. Culverts requiring regular maintenance should be considered for future remediation via redesign or reinstallation.

Culvert maintenance activities can affect fish and fish habitat by the removal of woody debris that is important for cover and food production, by causing flooding and excessive stream scouring if blockages are removed too quickly, excessive erosion and sedimentation from the use of equipment along the stream bank, and disruption of critical fish life stages. Replacement of eroded rock armouring can alter flows and fish movement patterns if done excessively.

The following mitigation measures have been recommended for protecting fish and fish habitat by DFO's Manitoba Operational Statement – *Culvert Maintenance*, (version 3, accessed August 2009) .

- 18.1.** Use existing trails, roads, or cut lines wherever possible to avoid disturbance to the riparian vegetation.
- 18.2.** Any clearing of riparian vegetation should be kept to a minimum.

- 18.3.** Unless accumulated material (i.e., branches, stumps, other woody materials, garbage, ice build-up, etc.) is preventing the passage of water and/or fish through the structure, time material and debris removal to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Manitoba In-Water Construction Timing Windows*). Any proposal to conduct such work under ice-covered conditions, with the exception of ice build-up removal, requires prior review by DFO.
- 18.4.** Emergency debris removal using hand tools or machinery (e.g. backhoe) can be carried out at any time of year. Emergencies include situations where carrying out the project immediately is in the interest of preventing damage to property or the environment, or is in the interest of public health or safety. DFO is to be notified immediately. **You should follow all other measures to the greatest extent possible.**
- 18.5.** Install effective sediment and erosion control measures before starting work to prevent sediment from entering the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.
- 18.6.** Limit the removal of accumulated material (i.e., branches, stumps, other woody materials, garbage, etc.) to the area within the culvert, immediately upstream of the culvert and to that which is necessary to maintain culvert function and fish passage.
- 18.7.** Remove accumulated material and debris slowly to allow clean water to pass, to prevent downstream flooding and reduce the amount of sediment-laden water going downstream. Gradual dewatering will also reduce the potential for stranding fish in upstream areas.
- For the removal of beaver dams and associated debris as it may affect culvert maintenance, DFO's Operational Statement on the Removal of Beaver Dams.
- 18.8.** Operate machinery on land (from outside of the water) and in a manner that minimizes disturbance to the banks of the watercourse.
- Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
  - Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
  - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
  - Restore banks to original condition if any disturbance occurs.
- 18.9.** If replacement rock reinforcement/armouring is required to stabilize eroding inlets and outlets, the following measures should be incorporated:

- Place appropriately-sized, clean rocks into the eroding area.
  - Do not obtain rocks from below the ordinary high water mark (see definition below) of any water body.
  - Avoid the use of rock that is acid-generating. Also avoid the use of rock that fractures and breaks down quickly when exposed to the elements.
  - Install rock at a similar slope to maintain a uniform stream bank and natural stream alignment.
  - Ensure rock does not interfere with fish passage or constrict the channel width.
  - If any in-water work is involved, adhere to fisheries timing windows, as outlined in Measure 3 above.
- 18.10.** Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.
- 18.11.** Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring. Maintain effective sediment and erosion control measures until re-vegetation of the disturbed areas is achieved.

Source: <http://www.dfo-mpo.gc.ca/regions/central/habitat/os-ee/provinces-territoires-territoires/mb/os-ee07-eng.htm>

## 19. Maintenance of Riparian Vegetation in Road Right-of- Way

Riparian areas are the vegetated areas adjacent to a water body and directly contribute to fish habitat by providing shade, cover and food production areas. Riparian areas are also important because they stabilize stream banks and shorelines. In order to minimize disturbance to fish habitat and prevent bank erosion, it is important to retain as much riparian vegetation as possible, especially the vegetation directly adjacent to the watercourse, in the right-of-way corridor.

Activities carried out to maintain riparian vegetation in existing right-of-way can negatively impact fish and fish habitat by causing excessive loss of riparian vegetation, erosion and sedimentation, disturbance to the banks and the bottom of the water body from use of heavy equipment, and introduction of deleterious substances as a result of inadequate containment of spoil piles and improper maintenance of equipment.

The following measures have been identified by DFO's - *Manitoba Operational Statement: Maintenance of Riparian Vegetation in Existing Rights-of- Way (version 3, accessed August 2009)* are summarized as follows:

- 19.1 **Combined maintenance activities** (e.g., mowing, brushing, topping, slashing, etc.) should affect no more than one third (1/3) of the total woody vegetation, such as trees and shrubs, in the right of-way within 30 metres of the ordinary high water mark (see definition below) in any given year.
- 19.2 **Alter riparian vegetation in the right-of-way by hand**, When practicable,. If machinery must be used, operate machinery on land and in a manner that minimizes disturbance to the banks of the water body.
- Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
  - Wash, refuel and service machinery and store fuel and other materials for the machinery,
  - which include hand tools, at locations away from the water to prevent any deleterious substance
  - from entering the water body.
  - Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
  - Restore banks to original condition if any disturbance occurs.
- 19.4. **Machinery fording the watercourse** to bring equipment required for maintenance to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. In these situations procedures in DFOs *A Temporary Stream Crossing* Operational Statement should be followed.
- If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- Grading of the stream banks for the approaches should not occur. If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
  - The one-time fording should prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Manitoba In-Water Construction Timing Windows*).
  - Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding. When altering a tree

that is located on the bank of a water body, ensure that the root structure and stability are maintained.

- Stabilize any waste materials removed from the work site to prevent them from entering the water body. This could include covering spoil piles with biodegradable mats or tarps. All long-term storage of waste materials should be kept outside of the riparian area.
- In order to prevent erosion and to help seeds germinate, vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

19.5 **Maintain effective sediment and erosion control measures** until re-vegetation of disturbed areas is achieved.

Source: <http://www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/provinces-territoires-territoires/mb/os-eo12-eng.htm>

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