



***Best Management Practices
Handbook for Activities
In and Around the City's
Waterways and Watercourses***



November 2005



THE CITY OF WINNIPEG

COUNCILLORS' OFFICE

CIVIC CENTRE • 510 MAIN STREET • WINNIPEG • MANITOBA • R3B 1B9

HARRY LAZARENKO

COUNCILLOR
Mynarski Ward
Deputy Speaker
Lord Selkirk-West Kildonan
Community Committee
Telephone: 986-5188
Fax: 986-3726
hlazarenko@winnipeg.ca

November 16, 2005

Members of the Riverbank Management Committee:

At its meeting of March 11, 2004, the Riverbank Management Committee commissioned that a Consultant be engaged to prepare a Best Management Practices Handbook for construction activities along the waterways in the City of Winnipeg.

The enclosed Handbook is intended to serve as a resource to guide City of Winnipeg employees in conducting their activities near water and as a reference to sources of more detailed information.

This "living document" will be updated regularly as new information on best management practices becomes available and as changes occur to regulatory requirements for construction activities along the City's waterways.

Yours truly,

Councillor Harry Lazarenko
Chair
Riverbank Management Committee

Encl.

WINNIPEG
ONE GREAT CITY!

Preface

The City of Winnipeg is fortunate to be situated on the Red and Assiniboine Rivers. These large rivers, and their tributaries, add considerable aesthetic, environmental, and recreational appeal and benefit to City residents, businesses and visitors.

Collectively, these waterways and watercourses have become an integral part of the City's infrastructure network providing pathways for drainage, pedestrians and vehicles. To ensure the proper function of this infrastructure network, the City is committed to an ongoing maintenance program, as well as to the construction of new capital works to accommodate growth. The City is also committed to the protection and stewardship of the important natural assets and values represented by its waterways and adjacent lands.

While City of Winnipeg staff take a leading role in the protection and management of its natural values, environmental protection and stewardship are truly the responsibility of all Winnipeggers. This *Best Practices Handbook* is intended to assist City staff in undertaking required maintenance activities in and around the City's waterways and watercourses in a manner that protects and sustains these environmental values.

Acknowledgements

This document was developed with the assistance of a number of City of Winnipeg staff. In particular, the following Steering Committee representing various City Departments and Divisions provided guidance and specific input to its direction and development:

Committee Chairman and Project Team Leader:

Don Kingerski, Riverbank Management Engineer, Planning, Property and Development

Steering Committee Members:

Tom Fred, Project Management Coordinator, Planning, Property and Development

Cheryl Heming, City Naturalist, Public Works

Jack Lubinski, Superintendent of Park Services (North), Public Works

Brad Neirinck, Bridge Planning & Operations Engineer, Public Works

Darcy Strandberg, Engineering Technologist, Water and Waste

Project Consultants:

Paul Schaap, Dillon Consulting Limited

Janet Scott, Dillon Consulting Limited



City of Winnipeg
Best Practices Handbook for Activities
In and Around the City's Waterways and Watercourses

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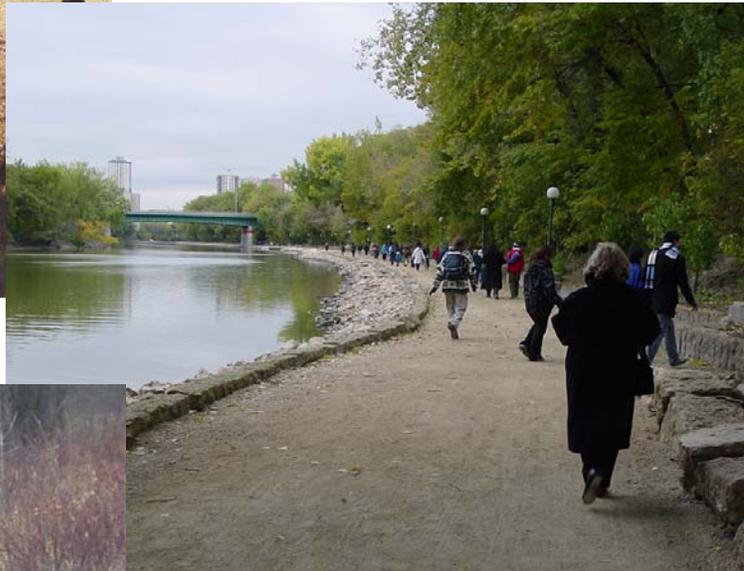
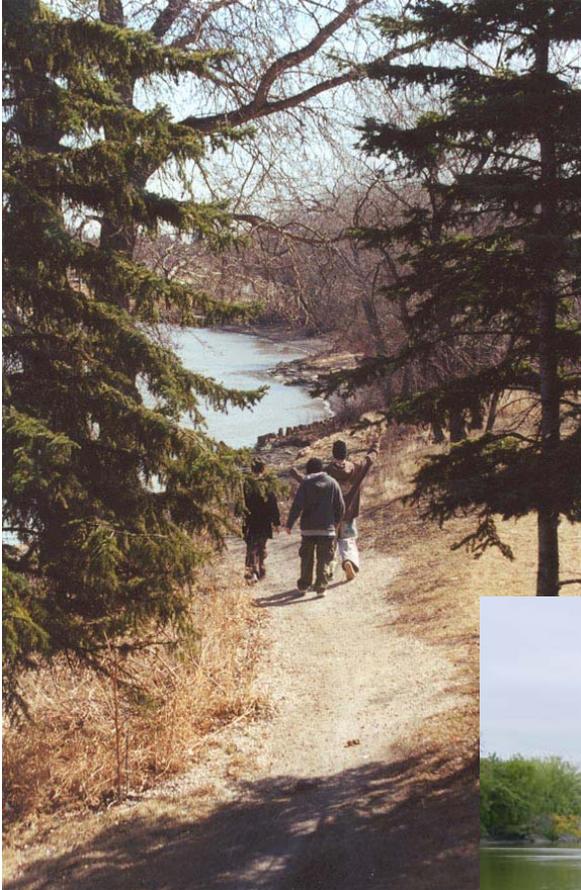
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APPROVED PROTOCOLS FOR ACTIVITIES IN AND AROUND THE CITY'S
WATERWAYS AND WATERCOURSES

PROTOCOLS UNDER DEVELOPMENT FOR ACTIVITIES IN AND AROUND THE
CITY'S WATERWAYS AND WATERCOURSES

PART I: Introduction & Background



1.0 Introduction

The City of Winnipeg is fortunate to be situated on major waterways that add considerable aesthetic, environmental and recreational appeal. The City's history is strongly linked to these rivers – most notably, the junction of the north-flowing Red River and the east-flowing Assiniboine River, or locally know as “The Forks”. Today, Winnipeg residents continue to enjoy the City's 128 kilometers (77 miles) of riverbank frontage along these two major waterways. When other waterways and watercourses are included, over 240 kilometers (149 miles) of rivers and creeks are found within the City's limits (Figure 1).

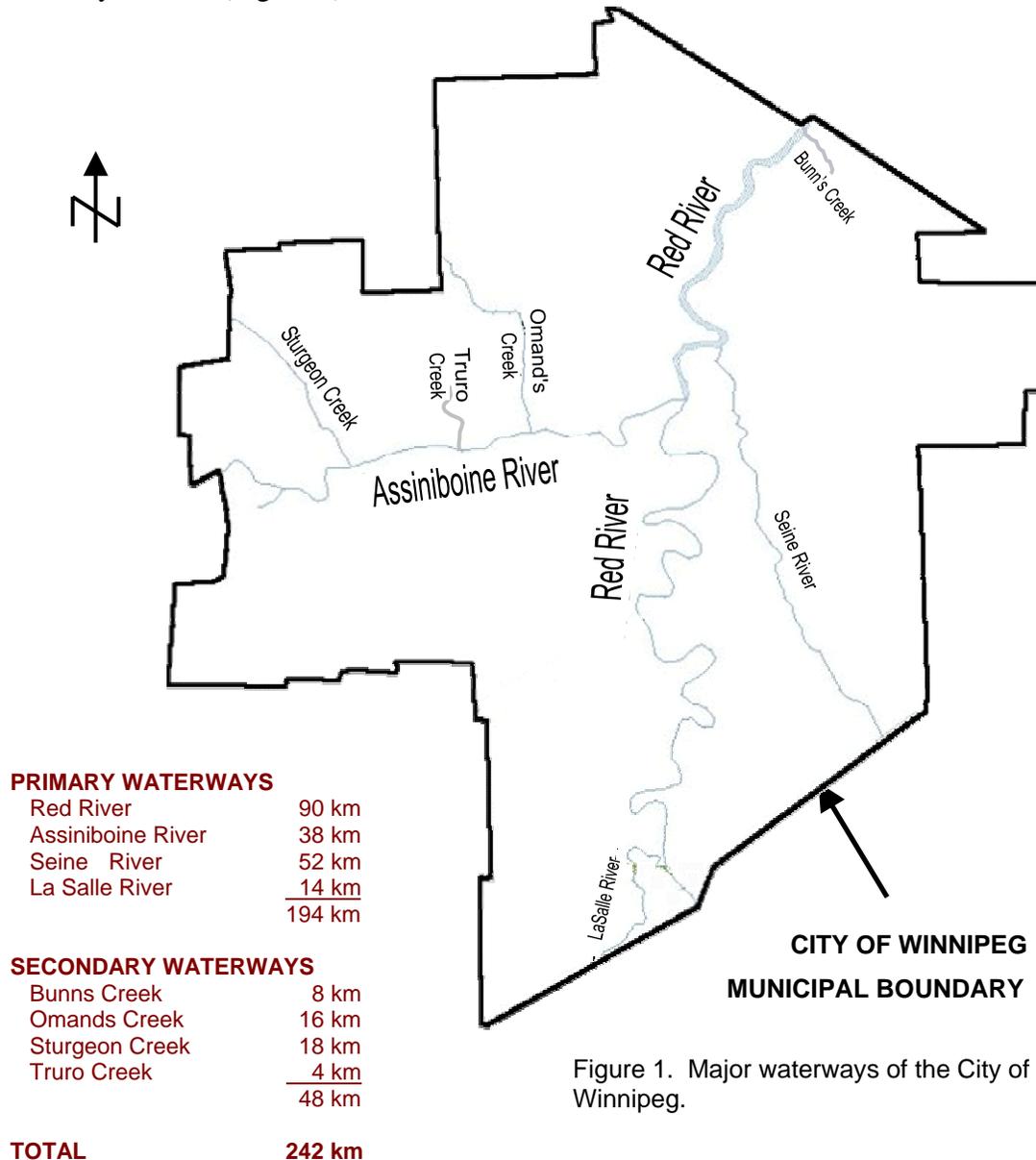


Figure 1. Major waterways of the City of Winnipeg.

In addition to their aesthetic and recreational appeal, Winnipeg's waterways have also become an integral part of the City's infrastructure network. However, ongoing maintenance of existing municipal infrastructure and the construction of capital projects to accommodate urban growth have the potential to lead to conflict when these activities are undertaken in or near water.

Since 2000, the Department of Fisheries and Oceans (DFO) has taken a much more active role in the management of fish habitat and the enforcement of the *Fisheries Act* in the City of Winnipeg. This has necessitated a change in the manner by which City staff plan and conduct both capital and operations and maintenance activities near the City's waterbodies and watercourses.

With a corporate responsibility to comply with the *Fisheries Act*, and to support the protection of the City's natural riparian (or streamside) habitat, Winnipeg is confronted with the competing objectives of cost-effectively operating and maintaining municipal services while providing environmental protection and enhancement when working near water. Recognizing this challenge, the City has developed this Best Management Practices (BMP's) Handbook to assist City of Winnipeg staff in undertaking routine operations and maintenance activities along the City's many waterways and watercourses. It has been developed to bring consistency to how these activities are undertaken, while at the same time achieving compliance with the *Fisheries Act* and other relevant legislation.

1.1 Does this Handbook Apply to My Work?

If you are undertaking a project or routine maintenance activity near a waterway, watercourse or riparian area, this Handbook applies to your work.

“Waterway” means a river, stream, creek or canal, whether natural, constructed or altered, and includes the frozen surface and bed of the hydraulic channel. A “watercourse” means a drain, ditch, drainage ditch, culvert, water channel, retention pond or waterway, whether natural, constructed, or altered.

Major construction projects are not specifically covered in this Handbook. Typically, major construction projects have stand-alone environmental management plans and conditions that are established with the environmental regulators and must be followed as part of the construction phase. However, for contractors working on major construction projects,

the BMP's presented in this Handbook offer valuable information that can assist in the development of environmental protection measures to meet regulatory requirements.

1.2 Purpose of the Handbook

This Handbook provides information that builds on the existing knowledge base of City of Winnipeg staff with regard to the protection of aquatic and riparian resources. It focuses on current environmental requirements, responsibilities and techniques relevant to routine operations and maintenance activities being conducted in and around the City's waterways and watercourses.

The Handbook is intended to serve the following purposes:

- To provide a resource that will guide and support City of Winnipeg staff in conducting their routine activities near water; and
- To provide staff with a reference document that will direct them to more detailed sources of information when necessary.

From a due diligence perspective, the Handbook is also intended to provide City of Winnipeg staff with sufficient knowledge to:

- Perform their duties in a manner that respects applicable laws, regulations, and guidelines related to environmental protection;
- Prepare for potential risks to the aquatic environment that a thoughtful and reasonable person would foresee; and
- Respond to these risks and incidents as effectively and quickly as is practicable.

The Handbook is a "living document". It will be regularly updated as new information on best practices becomes available or there are changes in the regulatory requirements for work activities near waterways and watercourses. If a discrepancy arises between this document and legislation, the legislation will always take precedence.

1.3 Overview of the Handbook

For ease of use, this Handbook has been divided into three distinct parts:

Part 1. Background and Introduction: Provides the context to the development of the Handbook including relevant environmental legislation and an overview of environmentally sensitive areas within the City of Winnipeg.

Part 2. Best Management Practices: Provides a listing of activities undertaken by City of Winnipeg staff and links them to a comprehensive set of BMP's. This portion of the Handbook also includes a listing of contacts and technical resources available.

Part 3. Protocols to Guide City Activities: Provides protocols for specific City activities in and around Winnipeg waterways and watercourses that have been approved by local environmental regulators or are under development. Please note that, as of September 2005, no specific protocols have been approved by local environmental regulators.

If you are already familiar with this document, you may opt to turn directly to Part 2 for information about the BMPs that apply to your type of work or to Part 3 for specific work protocols. Remember, this Handbook will be periodically updated so it is important to refer back to the document whenever you are undertaking activities along the City's waterways and watercourses.

Ultimately, it is hoped that the full range of environmental values associated with Winnipeg's waterways and watercourses will be recognized, protected and enhanced with the application of this Handbook.

1.4 Call Card

If you have questions concerning this document, or for further information on working in and around the City's waterways and watercourses, the following "Call Card" contacts have been identified to assist you.

2005/2006 Call Card

Activities In and Around the City's Waterways and Watercourses

Public Works Department

Customer Services Centre **986-7623**

- Ecological Sensitive Areas
- Naturalist Services
- Urban Forestry
- Parks and Open Spaces
- Streets Maintenance
- Permits

Water & Waste Department

Customer Services Centre **986-5858**

- Wastewater Collection, Treatment and Disposal
- Land Drainage Collection
- Flood Protection
- Permits

Planning, Property & Development Department

General Enquiry **986-3500**

- Riverbank Management
- Parks & Open Space Planning – Land Design & Construction
- Permits

Winnipeg Police Services, River Patrol Unit

General Enquiry **986-8504**

- Waterway Enforcement

Department of Fisheries and Oceans

Regional Headquarters **983-5000**

Habitat Management, Manitoba - Winnipeg District **983-5220**

Manitoba Conservation

Headquarters Operations **945-6647**

Red River Region **945-7081**

2.0 Environmental Legislation

There are three “driving forces” that guide all works conducted in and around water.

- First and foremost is **environmental legislation** (including federal, provincial and municipal legislation, regulations, guidelines and by-laws). These regulate or direct aspects of works that may have environmental impacts. City of Winnipeg employees, contractors, and all project proponents must meet these legal requirements. Compliance is not an option – it is a mandatory requirement and a responsibility that limits the City's liability. If you don't comply with the legal requirements, you are breaking the law.
- The second is **public expectation**. The citizens of Winnipeg, and the public in general, expect that City staff will do their part in protecting the City's environmental values – and sometimes even demand that these requirements go beyond what is required by law. Public scrutiny can be both formal and informal. You are probably familiar, for example, with local environmental groups who serve as public stewards and “watchdogs” within the City.
- The final driving force is the City's own **corporate commitment** to environmental protection. Through the development of plans, policies, and procedures, legal and public requirements are formally customized for implementation throughout the municipality.

Legislation and policy framework applicable to works proposed in and around watercourses in the City of Winnipeg are listed in Table 1. In addition to legislation that pertains to fish and fish habitat, it also includes details on other relevant legislation to consider when proposing activities in or around the City's waterways and watercourses. Note that, depending on the project, other legislation and policies may also apply, beyond those listed in Table 1. A detailed summary of the federal *Fisheries Act* has also been provided, since this is the key piece of legislation governing operations and maintenance activities undertaken by City staff along watercourses.

When working in and around water that supports, or has the potential to support, fisheries and aquatic resources it is every person's responsibility to:

- Be aware of the legal, public and municipal requirements and expectations;

Table 1. **Environmental legislation applicable to works in and around a waterway and watercourse**

Statute	Section(s) / Regulations	Regulating Agency	Area of Regulation	Potential Approval or Permit Requirements	Maximum Penalties
Canada Fisheries Act	Sections 35(1), 35(2)	Fisheries and Oceans Canada	Prohibits the harmful alteration, disruption or destruction (HADD) of fish habitat	Application to DFO for an Authorization for a HADD of fish habitat may be required	Summary convictions – fines of up to \$100,000 per offence per day or up to 1 year of imprisonment. Indictable offences – fines of up to \$500,000 per offence per day or up to 2 years of imprisonment, or both. Court orders may require the restoration of impacted areas.
	Sections 34(1), 36(3)	Fisheries and Oceans Canada; Environment Canada	Prohibits the deposit of deleterious substances into waters frequented by fish	No permit or approval may be obtained for the deposit of a deleterious substance	Summary convictions – fines of up to \$100,000 per offence per day or up to 1 year of imprisonment. Indictable offences – fines of up to \$500,000 per offence per day or up to 2 years of imprisonment, or both. Court orders may require the restoration of impacted areas.
Canada Navigable Waters Protection Act	Sections 5(1), 6(1), 6(4), 10(1), 10(2)	Transport Canada	Prohibits the construction of marine projects and projects on navigable freshwater without approval under the <i>Act</i>	Application may be required for an Approval under the <i>Act</i>	Summary convictions – fines not more than \$5,000. Costs may also be assessed for the removal of works.
Canada Migratory Bird Convention Act	Section 12	Environment Canada	Prohibits the injury, molestation, and destruction of migratory birds and their nests	A permit must be issued for all activities affecting migratory birds	Summary convictions – fines of up to \$100,000 for a corporation, up to \$50,000 and/or 6 months imprisonment for individuals. Indictable offences – fines of up to \$250,000 for a corporation, up to \$100,000 and/or up to 5 years imprisonment for individuals.

Table 1. **Environmental legislation applicable to works in and around a waterway and watercourse (continued)**

Statute	Section(s) / Regulations	Regulating Agency	Area of Regulation	Potential Approval or Permit Requirements	Maximum Penalties
Canada <i>Species at Risk Act</i>	Sections 32, 33	Fisheries and Oceans Canada; Environment Canada; Canadian Heritage (through the Parks Canada Agency)	Prohibits the destruction, injury, possession, sale, disturbance or interference with endangered or threatened species, or extirpated species that have been reintroduced, as well as their habitat and the natural resources on which they depend	Agreements, permits or licenses may be issued for scientific research, an activity that benefits the species or enhances its chances of survival in the wild or an activity whose effect on the listed species is incidental	Summary convictions – fines of up to \$300,000 for a corporation, up to \$50,000 for a non-profit corporation and up to \$50,000 and/or up to 1 year imprisonment for individuals. Indictable offences – fines of up to \$1,000,000 for a corporation, up to \$250,000 for a non-profit corporation and up to \$250,000 and/or up to five years imprisonment for individuals.
Manitoba <i>Environment Act</i>	Section 11	Manitoba Conservation	Requires environmental assessment and licensing for projects defined as developments.	Environmental Act licenses may be issued for projects along riverbanks that affect fish habitat and fish mobility, projects that modify a water surface area greater than 2 square kilometers, or flood control projects protecting areas greater than 1 square kilometer.	For corporations, fines of \$500,000 for first offenses and \$1,000,000 for subsequent offenses. Each day is a separate offense.
Manitoba <i>Endangered Species Act</i>	Section 10	Manitoba Conservation	Prohibits the destruction, injury, possession, disturbance or interference with endangered or threatened species, or extirpated species that have been reintroduced, as well as their habitat and the natural resources on which they depend	Application is needed for circumstances that require an exemption from the Act	Summary convictions – fines of up to \$50,000 for a corporation, and up to 6 months imprisonment and/or up to \$5,000 in fines for an individual, depending on the species affected. Subsequent offences have even harsher penalties.

Table 1. Environmental legislation applicable to works in and around a waterway and watercourse (continued)

Statute	Section(s) / Regulations	Regulating Agency	Area of Regulation	Potential Approval or Permit Requirements	Maximum Penalties
Manitoba Wildlife Act Manitoba Wildlife Act	Section 49	Manitoba Conservation	Prohibits the destruction of the nest or eggs of any game bird, bird species listed in the <i>Act</i> and bird species covered by the federal <i>Migratory Birds Convention Act</i>	License or permit must be issued for activities affecting bird species identified under the Act	Fines of up to \$10,000, and/or imprisonment for up to 6 months.
	Section 50	Manitoba Conservation	Prohibits the destruction or damage of habitat on Crown lands. Allows the Crown to recover damages for any costs that the government may be required to expend for rehabilitation of the habitat	License or permit must be issued for activities affecting habitat on Crown land	Fines of up to \$10,000, and/or imprisonment for up to 6 months.
Manitoba Water Protection Act					For summary convictions of individuals, fines of up to \$50,000 or 6 months imprisonment, or both for a first offence. For each subsequent offence, fines of up to \$100,000, imprisonment for a term of not more than one year, or both. For summary convictions of corporations, fines of \$500,000 for first offenses and up to \$1,000,000 for subsequent offenses. Each day is a separate offense.

Table 1. **Environmental legislation applicable to works in and around a waterway and watercourse (continued)**

Statute	Section(s) / Regulations	Regulating Agency	Area of Regulation	Potential Approval or Permit Requirements	Maximum Penalties
City of Winnipeg Waterway By-Law No. 5888/92	Part 4	Planning, Property and Development Department	Identifies regulated waterway areas and establishes a procedure for dealing with Waterway permits and orders within the regulated areas of the City	A Waterway Permit is required for construction or demolition of all buildings; deposition, removal, alteration or disturbance of any material; alteration of drainage and the diversion or alteration of a waterway within the City's regulated area. Waterway permits may be found at http://www.winnipeg.ca/ppd/riverbank.stm	Summary convictions – individual fines of up to \$5,000, depending on the number offences and/or imprisonment of up to 6 months.
City of Winnipeg Frozen Waterways By-Law No. 6581/95	Section 2	Chief of Police	Prohibits the use of vehicles on the frozen surface of any waterway within the City other than City or public utility vehicles	Permits are required for the use of vehicles on frozen waterways, unless exempt from the by-law	Summary convictions – individual fines of up to \$5,000, depending on the number offences and/or imprisonment of up to 6 months.
City of Winnipeg Anti-Litter By-Law No. 1075/75	Section 3.1	Community Services Department	Prohibits littering on public and private property and on or into local waterbodies	Littering is prohibited with no exception.	Summary conviction – fines of up to \$1,000 and/or imprisonment for a term of not more than 6 months for an individual; fines of up to \$5,000 for a corporation.

Table 1. **Environmental legislation applicable to works in and around a waterway and watercourse (continued)**

Statute	Section(s) / Regulations	Regulating Agency	Area of Regulation	Potential Approval or Permit Requirements	Maximum Penalties
City of Winnipeg Sewer By-Law No. 7070/97	Part 5, Section 25	Water and Waste Department	Restricts the materials that can be discharged into the City of Winnipeg sewer system without a license. Restricted materials include, among other things, those with a biochemical oxygen demand concentration greater than 300 mg/L, those with a total suspended solids concentration greater than 350 mg/L, those containing any solids which will not pass a 6.0 mm screen and any hazardous waste	An Overstrength Wastewater Discharge License may be issued by the City for discharge of restricted materials	Summary conviction – fines of at least \$1,000 and up to \$50,000. An individual may also be liable on summary conviction to imprisonment for up to 6 months.
City of Winnipeg Sewer By-Law No. 7070/97	Part 10, Section 63	City of Winnipeg Sewer Utility	Prohibits the discharge of wastewater onto or into any waterbody or local drainage works, and prohibits the discharge of land drainage onto or into any waterbody.	A Wastewater Discharge License and/or a Land Drainage Discharge License is required for these activities	Summary conviction – fines of at least \$1,000 and up to \$50,000. An individual may also be liable on summary conviction to imprisonment for up to 6 months.
City of Winnipeg Parks and Recreation By-Law No.3219/82	See all	Public Works Department	Regulates the operation and control of parks and facilities used for recreation. Prohibits the disturbance to animals and habitat, bodies of water, soils, and vegetation within a park. An employee, agent or other person authorized by The City of Winnipeg is exempt from the provisions of this bylaw.	Application may be made to the Board of Commission for permission to undertake an activity prohibited by this bylaw.	Not available

Table 1a. **Environmental guidelines applicable to works in and around a waterway and watercourse**

Guideline	Responsible City Department	Area of Guidance	Requirements
<i>Plan Winnipeg 2020 Vision</i>	Planning, Property & Development Department	Long-range policy plan guidance document addressing broad physical, social, economic and environmental issues in Winnipeg.	Civic activities must be consistent with the objectives and policy statements included in Plan Winnipeg.
City of Winnipeg Safe Work Plan	Numerous Departments	The City provides guidance on the requirement for, purpose and content of Safe Work Plans submitted by contractors.	Expectations and requirements for safe work procedures, including documents and templates, are provided at http://www.winnipeg.ca/finance/matmgt/safety/default.stm
City of Winnipeg Tree Protection Guidelines	Public Works Department, Urban Forestry Branch	Guides the retention, protection and replacement of trees within the City of Winnipeg.	Requires the payment of costs associated with replacement of impacted vegetation

- Recognize the potential impacts of their actions;
- Ensure that the appropriate permits and authorizations from regulatory bodies are in place prior to proceeding with maintenance and construction activities; and
- Conduct their work activities in a manner that complies with the law and protects the resource.

2.1 Fisheries Act

While City of Winnipeg staff should be familiar with all legislation identified in Table 1, the federal *Fisheries Act* is the key piece of legislation that applies to all types of activities carried out in and around the City's watercourses. The *Fisheries Act* is one of Canada's oldest laws demonstrating the importance that has always been placed on the management of fisheries and fish habitat in Canada. The *Act* primarily serves to protect:

- Fish;
- Fish habitat; and
- The use of fish (*i.e.*, through quotas, licenses).

Because the *Fisheries Act* is intended to apply to the full extent of Canada's fisheries (*i.e.*, freshwater and saltwater species and habitat from coast to coast to coast), the definitions of fish and fish habitat contained in the *Fisheries Act* are very broad. The *Act* defines fish and fish habitat as follows:

Fish and Fish Habitat Definitions

Fish: *All fish, shellfish, crustaceans and marine animals, and the eggs, spawn, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.*

Fish Habitat: *Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.*

Based on the definition of fish habitat, any area that contributes in any way (*i.e.*, directly or indirectly) to one or all life stages of a fish can be considered fish habitat.

The *Fisheries Act* is administered by Fisheries and Oceans Canada (DFO). To ensure the conservation of fish and fish habitat, DFO enforces a number of rules to protect fish and fish habitat from land and water use activities and projects. The sections of the *Act* that are applicable to construction and maintenance activities conducted in and around a watercourse are:

Subsection 34 (1), Subsection 36(3)

These Subsections address impacts to fish and fish habitat caused by the addition of a *deleterious substance* to water. The *Fisheries Act* Subsection 34(1) defines a **deleterious substance** as:

“Any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.”

Obvious deleterious substances that can impact fish and fish habitat include compounds like gasoline, oil and paint. Less obvious substances that are also considered to be “deleterious” include sediment, nutrients, wet concrete or concrete wash water and chlorinated water.

Subsection 36(3) addresses the release of deleterious substances within fish habitat and states that:

“No person shall deposit deleterious substances in any type of water frequented by fish or in any place under any conditions where the deleterious substance may enter any such water.”

Subsection 35(1)

This Subsection of the *Fisheries Act* addresses direct and indirect effects on fish and fish habitat and states that:

“No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat.”

Routine maintenance activities in and around a waterway or watercourse that involve disturbance on the banks or within the wetted perimeter can have a profound impact on fish and fish habitat, both in the immediate area and downstream. Impacts to riparian (streamside) vegetation and changes to instream character may reduce habitat complexity and lower the productive capacity of fish habitat in the work area.

***Important
Fisheries Act
Subsections***

Subsection 37(1)

This Subsection of the *Fisheries Act* addresses **direct** and **indirect** effects on fish habitat. It states that if any work has the potential or is likely to result in the harmful alteration, disruption, or destruction (HADD) of fish habitat, then a notification must be submitted to DFO with applicable plans and details pertaining to the proposed works. These plans must include the appropriate information to allow DFO staff to determine whether proper mitigation measures have been incorporated into the project design to ensure the protection of fish and fish habitat. If the work to be carried out cannot avoid the HADD even with mitigation, and if the HADD is determined to not significantly affect fish and fish habitat, then an Authorization may be issued by DFO pursuant to Section 3(2) of the *Fisheries Act*. When issuing an Authorization, DFO typically applies the **“no net loss of productive capacity”** guiding principle from their *Policy for the Management of Fish Habitat*. This means that an equivalent or greater amount of habitat, similar to that altered, disrupted or destroyed by a project, must be created to achieve “no net loss” of fish habitat.

3.0 Environmentally Sensitive Lands

Environmentally sensitive lands are wetlands, steep slopes, watercourses, waterways, underground water recharge areas, riverbanks, natural plant and animal habitats, flood plains, and other landforms that are easily disturbed by development. These areas are important for their values in supporting fish and wildlife species. They may also contain rare or locally diminished ecosystems and landforms as well as sites of natural diversity that need protection.

In its long-range policy plan guidance document, “Plan Winnipeg 2020 Vision”, the City of Winnipeg outlines strategies to protect environmentally sensitive lands that contain important pockets of natural flora and fauna or that are susceptible to damage from flooding or erosion. These include:

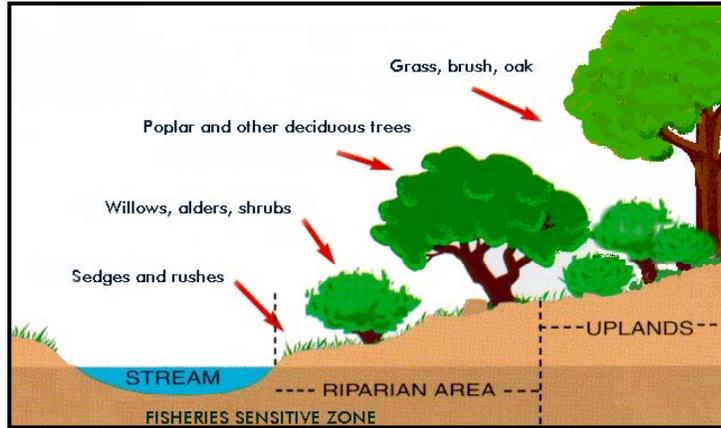
- i. evaluating proposed developments that affect high-quality natural areas and encouraging the protection and preservation of such lands to the greatest extent possible;
- ii. developing a lands plan which designates natural areas that are environmentally-sensitive and/or significant and provides measures for the possible acquisition, preservation, protection, and maintenance of such lands;
- iii. protecting flood plains and unstable riverbank slopes by identifying susceptible areas and employing protective and preventive measures, including the possible acquisition of such lands, to reduce the risk of property damage where appropriate; and
- iv. encouraging private landowner participation in support of riverbank management.

3.1 Waterways and Watercourses

Waterways and watercourses do not exist in isolation but as part of a larger ecosystem composed of the wetted in channel habitat and stream bank riparian habitat. From a fisheries perspective, the area comprising both the watercourse or waterway and the riparian zone is known as the fisheries



sensitive zone (FSZ) and is protected under legislation. This is the case for both natural and created waterways and watercourses that provide fish habitat, regardless of size.



The City's Waterway Bylaw specifically identifies the riverbed and lands extending 350 feet on each side of the Red, Assiniboine, Seine and La Salle Rivers and the creek bed and lands extending 250 feet on each side of Bunn's, Omands, Sturgeon and Truro Creeks as ESA's requiring protection (Figure 2). While these identified areas include the main riparian and fisheries sensitive zones in the City, smaller creeks such as Normand Creek, Beaver Dam Creek, and Beaujolais Coulee, as well as many retention basins also, constitute fish habitat and require protection.

Any proposed works on environmentally sensitive land must protect fish and wildlife habitat and other environmental values.

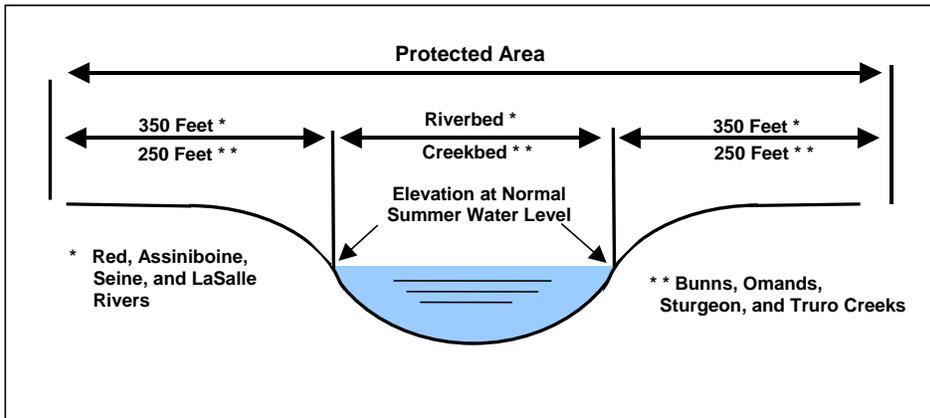


Figure 2. Regulated areas under the Waterways Bylaw

3.2 Riparian Zone Functions

The riparian zone found adjacent to Winnipeg's waterways and watercourses plays an indirect, but nonetheless, important role in supporting fish populations in that it serves as a buffer zone between the watercourse/water body and upland land uses.

Riparian zones provide:

- **Erosion Control:** Riparian vegetation is known to stabilize channel banks and reduce erosion, protecting fish from the harm caused when eroded sediment clogs gills, covers spawning grounds, and obstructs or displaces food sources.
- **Filtering Function:** Riparian vegetation serves as a filter for surface water, protecting water quality by trapping contaminants and sediments contained in runoff and reducing inputs of unwanted nutrients and other pollutants to the watercourse.
- **Dissipation Function:** Riparian areas help to dissipate the energy of floods by storing floodwaters and helping to retain water in soils.
- **Climate Control:** Riparian vegetation provides temperature regulation by shading waterways, keeping them cool for fish during hot weather.
- **Habitat Function:** Mature trees adjacent to the stream, in addition to being a source of terrestrial insects that serve as fish food, create habitat diversity for songbirds, raptors, small mammals and other wildlife species through woody debris accumulation, vertical snags, nest and perch sites and winter and summer dens.
- **Sustainability Function:** Riparian zones support aquatic and terrestrial food webs for both fish and wildlife.
- **Corridor Function:** Riparian zones serve as integral travel and migration corridors between habitats for many wildlife species.

Riparian Areas Definition:

Riparian areas are the transitional zones that are found along our streambanks, lakeshores and wetlands. Often described as "wetter than dry, but drier than wet" these areas develop unique plant communities. Healthy riparian areas may have any combination of trees, shrubs, and grasses, depending on the local conditions. They produce vegetation that is lushier than the surrounding dry land because of better soils and water availability. Healthy riparian areas have many important functions in our watersheds.

- Excerpt from *The Role and Importance of Riparian Areas in Manitoba*, Manitoba Water Stewardship.



Seine River

3.3 Fish Habitat in The City of Winnipeg

As described in Section 2.1.1 of this Handbook, fish habitat is any area upon which “fish depend directly or indirectly in order to carry out their life processes” (*Fisheries Act* Subsection 34(1)). The definition is very broad and can therefore make the identification of fish habitat difficult. Different types of fish habitat may be required at different life stages, seasons or even times of the day by many fish species. As a result, changes to any component of fish habitat can mean the difference between healthy fish populations or no population at all.



Fish habitat can be divided into five general components: food, cover, spawning habitat, migration access, and water quality (DFO, 1997). The value habitat provides is a reflection of the quality of these components. They are briefly discussed below:

FOOD: Fish require food of many different types to satisfy dietary requirements throughout all of their life stages. Food requirements can range from small, microscopic organisms (*e.g.*, plankton, algae) to invertebrates and other fish.

COVER: Cover is important in protecting fish from high water flows, from their predators, and from their prey. It can come in many forms including overhanging vegetation or instream elements such as woody debris and boulders. Overhanging cover also provides shade that helps regulate water temperatures. The function of temperature regulation is especially important during hot weather, when overhanging vegetation shades the water and keeps it cool.

SPAWNING HABITAT: Each fish species has specific requirements for spawning and egg incubation that include bottom substrate size, water velocity and temperature.

ACCESS: Most fish migrate at certain times of the year or during particular life stages. For example, white sucker, a species found in the Red River and its tributaries, migrates up rivers and streams in the early spring to spawn in gravelly areas or riffles. Restrictions in access, such as from improperly designed culverts, can prevent fish from reaching these critical habitats.

WATER QUALITY: Good water quality is an important habitat requirement for fish. If the water quality becomes poor, such as through the introduction of chemical or physical substances (*e.g.*, sediment) or by a change in temperature or dissolved oxygen, fish may be harmed or weakened to such a state that they are no longer able to carry out life processes such as feeding or spawning. Poor water quality may even kill.

During the project planning stage, fish habitat areas that may be affected by site activities should be identified. It is important to exercise caution when examining a potential work site for its value as fish habitat because an area that appears to hold little value at one time of the year may have a very important fisheries function at another time. The value of seasonal habitats must not be overlooked and should be an important consideration when planning and scheduling construction and maintenance activities. As a rule of thumb, assume that all ditches, creeks and sloughs provide fish habitat until you are advised otherwise.

**WHEN IN DOUBT AS TO WHETHER AN AREA CONTAINS
FISH HABITAT, ALWAYS ASSUME THAT IT DOES.**

PART II: Best Management Practices



4.0 Linking Municipal Activities In or Near City Waterways and Watercourses with Best Management Practices



All work carried out in and around a waterway or watercourse has a potential risk of affecting water quality and quantity, fish and other aquatic organisms, and fish and riparian habitats. Primary impacts are associated with the discharge of contaminants and pollutants, reductions in flow, and the physical alteration of the watercourse and waterway channels and banks. Some of these effects may not directly or immediately kill fish or other wildlife, but they are none-the-less significant because they weaken populations over time by affecting their ability to perform basic life functions, such as foraging and reproducing.



Potential negative impacts to fish habitat.

This Handbook provides guidance on how to plan and implement routine operations and maintenance activities along waterways and watercourses in the City of Winnipeg so that these types of effects are minimized or avoided.

The Activity Table on the following pages provides an overview of routine maintenance works carried out by City of Winnipeg staff working in or near waterways, as well as their potential impacts to fish and/or fish habitat. Maintenance activities are listed alphabetically and are linked to the applicable best management practices (BMPs) identified in Section 5.0 of this Handbook. The list of activities is evolving and not all maintenance activities in or near waterways are included.

Remember, all activities undertaken in or near waterways or watercourses have the potential to affect fish and fish habitat. It is therefore your responsibility to be aware of the potential impacts that your actions may have and the measures that can be implemented to mitigate these effects.

**Activity Table: Operations and Maintenance Activities In and Around Waterways and Watercourses–
 Potential Impacts and Best Management Practices**

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
Bridge-related Construction, Repair and Maintenance		
<p>Bridge Deck Repairs</p> <p>Concrete deck patching involves the localized repair of existing concrete deck, barriers, sidewalks, girders and diaphragms. Work may include concrete cutting, sandblasting, application of surface patches and shotcrete.</p>	<p>All work with cement-containing compounds (e.g., concrete, cement, grouts) carried out over or near a waterway has the potential to harm fish and other aquatic organisms through the chemical alteration of water quality. As such these compounds are considered deleterious substances under the <i>Fisheries Act</i>. Materials of concern used or generated in deck patching include, but are not limited to:</p> <ul style="list-style-type: none"> • Raw material (concrete patching compounds, asphalt) • Curing compounds • Sealants • Concrete leachate • Contaminated wash water <p>The introduction of a small amount of these materials can result in fish death. During the preparation of deck surfaces, concrete dust, asphalt, sandblasting material, accumulated sediment or other contaminants from the bridge may be washed into a waterway where they can harm fish, aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Equipment Selection ▪ Site Monitoring ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Bridge Repairs- Structural Steel Elements</p> <p>Structural steel bridge repairs include the installation of temporary bridge supports, removal and installation of steel, and surface preparation for painting.</p>	<p>Surface preparation, steel removal and steel installation may release materials that have the potential to harm fish, other aquatic organisms and vegetation. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Materials of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • Welding debris • Paints, sealants and other steel coatings • Accumulated winter aggregate, de-icing compounds <p>Temporary supports erected in or near the waterway may disturb fish and aquatic organisms, banks, vegetation and bottom material.</p> <p>Machinery used for structural steel repair (e.g., cranes) operated in or near the waterway or on its banks may leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Erosion and Sediment Control
<p>Bridge Pier Rehabilitation</p> <p>Concrete pier rehabilitation involves the repair and restoration of existing concrete piers, including the installation of isolation measures such as cofferdams or sheet piling.</p>	<p>Concrete pier rehabilitation may involve the use of cement-containing compounds and the generation of cement-containing wastes (e.g., concrete, cement, grouts) over or near a waterway. These materials have the potential to harm fish and other aquatic organisms through the chemical alteration of water quality and as such, are considered deleterious substances under the <i>Fisheries Act</i>. The introduction of a small amount of these materials can result in fish death. Materials of concern that may be used or generated in concrete pier rehabilitation include, but are not limited to:</p> <ul style="list-style-type: none"> • Raw material (cement, concrete patching compounds); • Curing compounds and sealants; and • Concrete leachate and contaminated wash water. <p>During the surface preparation of concrete piers, sediment (gravel, sand and silt) or other contaminants (e.g., concrete dust) may be washed into a waterway where they can harm fish, aquatic organisms and vegetation. If sheet piling, piles or caissons are installed, species and habitat found on waterway bottoms may be disturbed. Machinery used may also disturb banks, vegetation and bottom material; decrease bank stability; and leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Erosion and Sediment Control.

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Bridge Surface Sweeping</p> <p>Bridge sweeping involves the collection of accumulated winter aggregate and debris from bridge surfaces.</p>	<p>Accumulated winter aggregate (gravel, sand and silt) and debris found on bridge surfaces are likely to contain contaminants that have the potential to cause harm to fish, other aquatic organisms, and vegetation if swept into a waterway or deposited in riparian areas. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Contaminants of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • De-icing compounds (road salts) • Vehicle fluids (oils and fuels) • Brake dust <p>In addition to the harmful effects of chemically-active contaminants, any sediment and debris that is released into the waterway by bridge sweeping may also:</p> <ul style="list-style-type: none"> • Affect fish directly through exposure or indirectly through changes in habitat. • Reduce the number and diversity of bottom dwelling organisms (fish food) as sediment collects on the bottom of the waterbody. • Clog fish spawning areas with sediment. • Reduce the survival of eggs and fry (newly-hatched fish) by smothering them. 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Bridge Drain Cleaning</p> <p>Drain cleaning involved the removal of accumulated sediment and debris from bridge catch basins. A vacuum suction truck is used to collect material from bridge drains.</p>	<p>Accumulated winter aggregate (gravel, sand and silt) and debris found on bridge drains are likely to contain contaminants that have the potential to cause harm to fish, other aquatic organisms, and vegetation if released into a waterway or deposited in riparian areas. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Contaminants of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • De-icing compounds (road salts) • Vehicle fluids (oils and fuels) • Brake dust <p>In addition to the harmful effects of chemically active contaminants, any sediment and debris that may be released by drain cleaning may also harm fish, other aquatic organism, and vegetation.</p> <p>Machinery used to collect accumulated material from bridge drains that is operated over or near waterways may leak or spill fuel or hydraulic fluids into a waterway, affecting fish, other aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Bridge Pier Cleaning</p> <p>Pier top cleaning involves the removal of accumulated winter aggregate (containing de-icing compounds) and bird feces from pier tops and adjacent structural bridge elements.</p>	<p>Accumulated winter aggregate (gravel, sand and silt) and debris found on bridge piers are likely to contain contaminants that have the potential to cause harm to fish, other aquatic organisms, and vegetation if released into a waterway or deposited in riparian areas. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Contaminants of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • De-icing compounds (road salts) • Vehicle fluids (oils and fuels) • Brake dust <p>In addition to the harmful effects of chemically active contaminants, any sediment and debris that may be released to a waterway by pier top cleaning may also harm fish, other aquatic organism, and vegetation. Machinery used to clean accumulated material from bridge piers may leak or spill fuel or hydraulic fluids into a waterway, affecting fish and aquatic organisms.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Bridge Superstructure Washing</p> <p>Bridge superstructure washing involves the high-pressure washing of structural bridge elements, traffic barriers, railings, and sidewalks and the cleaning of bridge drains.</p>	<p>Accumulated winter aggregate (gravel, sand and silt) and debris found on bridge surfaces are likely to contain contaminants that have the potential to cause harm to fish, other aquatic organisms, and vegetation if washed into a waterway or deposited in riparian areas. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Contaminants of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • De-icing compounds (road salts) • Vehicle fluids (oils and fuels) • Brake dust • Chlorine (if chlorinated water is used in pressure washing). <p>In addition to the harmful effects of chemically-active contaminants, any sediment and debris that is released into the waterway by bridge washing may also:</p> <ul style="list-style-type: none"> • Affect fish directly through exposure or indirectly through changes in habitat. • Reduce the number and diversity of bottom dwelling organisms (fish food) as sediment collects on the bottom of the waterbody. • Clog fish spawning areas with sediment. • Affect the survival of eggs and alevins (newly-hatched fish) by smothering them with sediment. <p>The use of machinery on waterway banks and the collection of runoff from washed bridge surfaces may also disturb adjacent banks and vegetation, decreasing bank stability. The application of high-pressure spray to bridge structures may disturb nesting birds. When operated near waterways, machinery used in bridge washing may accidentally release compounds that are harmful, including fuels and hydraulic fluids.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Vegetation Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Bridge Abutment Cleaning</p> <p>Slope paving cleaning involves high-pressure washing and mechanical collection of accumulated sediment from paved slopes below bridges.</p>	<p>Accumulated winter aggregate (gravel, sand and silt) and debris found on paved slopes below bridges are likely to contain contaminants that have the potential to cause harm to fish, other aquatic organisms, and vegetation if swept into a waterway or deposited in riparian areas. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Contaminants of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • De-icing compounds (road salts) • Vehicle fluids (oils and fuels) • Brake dust <p>In addition to the harmful effects of chemically-active contaminants, sediment and debris that is released into a waterway by slope paving cleaning may also impact fish, other aquatic organisms and vegetation.</p> <p>Machinery operated on waterway banks that is used to collect sediment from paved slopes may:</p> <ul style="list-style-type: none"> • Disturb adjacent banks and vegetation. • Decrease bank stability. • Leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation. 	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Bridge Abutment Maintenance</p> <p>Bridge abutment maintenance includes the repair of paved slopes below bridges, the grouting of cracks and the removal of vegetation.</p>	<p>All repair work with cement-containing compounds (e.g., grouts) carried out near a waterway has the potential to harm fish and other aquatic organisms should material enter a waterway and chemical alter water quality. As such, these compounds are considered deleterious substances under the <i>Fisheries Act</i>. Grouting materials of concern used or generated in slope paving maintenance include, but are not limited to:</p> <ul style="list-style-type: none"> • Raw material (grout) • Leachate • Contaminated wash water 	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Vegetation Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Bridge Inspection</p> <p>Inspection of bridge structures involves the operation of a crane from the bridge deck and its extension over the waterway to allow inspection of the undersurface of the bridge.</p>	<p>The crane used for under bridge inspection may leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Equipment Selection
<p>Deck Sealing</p> <p>Deck sealing involves the installation of a polymer overlay on bridge deck and sidewalk surfaces.</p>	<p>Materials used for deck sealing have the potential to harm fish, other aquatic organisms and vegetation. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Materials of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • Sprayed concrete, or other cement-based products • Epoxy resins • Other sealants, paints or surface treatments <p>Deck sealing also involves the use of machinery. When operated near waterways, equipment may accidentally release compounds that are harmful, including fuels and hydraulic fluids.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Expansion Joint Maintenance</p> <p>Expansion joint maintenance involves the cleaning and inspection of joints, the reinstallation of rubber seals, and the welding of broken steel plates.</p>	<p>Cleaning and repair of expansion joints may release materials that have the potential to harm fish, other aquatic organisms and vegetation. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Materials of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • Chlorine (if chlorinated water is used in pressure washing) • Welding debris • Winter aggregate that has accumulated within the expansion joint. <p>Expansion joint maintenance also involves the use of equipment and machinery. When operated near waterways, machinery may accidentally release compounds that are harmful, including fuels and hydraulic fluids.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Bridge Bearings Lubrication</p> <p>The maintenance of bridge bearings requires the application of lubricants and grease.</p>	<p>Some bridge types have bearing systems that must be routinely lubricated. Grease is a material that has the potential to harm fish, other aquatic organisms and vegetation should it enter a waterway. As such, it is considered to be a deleterious substance under the <i>Fisheries Act</i>.</p> <p>The application of bearing grease may also involve the use of equipment and machinery. When operated near waterways, machinery may accidentally release compounds that are harmful, including:</p> <ul style="list-style-type: none"> • Fuels • Hydraulic fluids 	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<h2>Construction-related Works</h2>		
<p>Sheet Pile Cofferdams</p> <p>Sheet pile cofferdams are isolation structures installed around bridge piers to permit dewatering of a work cell.</p>	<p>The placement of sheet piling around bridge piers may disturb bottom material within a waterway and generate sediment that can be harmful to affecting fish, other aquatic organisms and vegetation.</p> <p>Machinery needed to place sheet piling into a waterway during the installation and removal of a sheet pile cofferdam may:</p> <ul style="list-style-type: none"> • Disturb banks, vegetation and bottom material. • Decrease bank stability. • Leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation. 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Site Restoration ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Earth Cofferdams</p> <p>Earth cofferdams are constructed as an isolation measure for construction projects on waterways or watercourses. Pumps or flumes are used to divert flows and dewater the isolated area within the cofferdam.</p>	<p>Earth cofferdams, depending on their parent material, may release sediment into a waterway over the course of their use. Sediment may also be generated during construction of the cofferdam or following cofferdam removal. Sediment that is released in a waterway has the potential to fish, aquatic organisms, and vegetation.</p> <p>The isolation from flow and dewatering that occurs when cofferdam is used to contain a section of a waterway may also harm fish, other aquatic organisms and their habitats.</p> <p>During the installation, maintenance and removal of earth cofferdams, machinery that is operated in or near a waterway or on a waterway's banks may:</p> <ul style="list-style-type: none"> • Disturb banks, vegetation and bottom material. • Decrease bank stability. • Leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation. 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Vegetation Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Site Restoration ▪ Erosion and Sediment Control
<p>Rock Causeway</p> <p>Rock causeways are temporary work access roads and platforms within waterways. Large rock is placed into waterways with the use of heavy machinery and is removed following construction activity.</p>	<p>Rock material used in the construction of temporary causeways can contain sediment (sand and silt) that may be harmful to fish, other aquatic organisms, and vegetation if it is released into a waterway. The placement of rock may also disturb bottom material within a waterway and generate additional sediment.</p> <p>Machinery needed to place riprap into a waterway during the installation and removal of rock causeways may:</p> <ul style="list-style-type: none"> • Disturb banks, vegetation and bottom material. • Decrease bank stability. • Leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation. 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Site Restoration ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Ice Bridge Construction</p> <p>Ice bridge construction involves the creation of winter access routes on waterways by flooding water through holes in the ice onto the ice surface.</p>	<p>Ice bridge construction requires the operation of machinery on a waterway's ice surface. When operated on frozen waterway surfaces, machinery may accidentally release compounds that are harmful, including:</p> <ul style="list-style-type: none"> • Fuels • Hydraulic fluids <p>Any debris or spilled material left on the frozen waterway surface will enter the watercourse during spring thaw and may potentially harm fish and other aquatic organisms. Construction activity may also damage riparian vegetation and compromise bank stability during access onto the ice surface.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Winter Trail and Public Bank Access Construction and Removal</p> <p>Temporary winter trails and public bank accesses are constructed to permit recreational use of waterways in winter. These structures or trails are seasonally removed.</p>	<p>Construction activities in winter pose less risk to water quality and fish and wildlife species than works carried out at other times of the year. Snow blankets and temporarily protects banks, while frozen water surfaces contain materials such as sediment and prevent their entry to aquatic habitats. Despite this, winter trail and public bank access construction and removal activities can impact waterways and banks by:</p> <ul style="list-style-type: none"> • Depositing harmful materials or deleterious substances on frozen surfaces that will enter waterways or watercourse during thaw; • Altering banks and exposing soils that become destabilized during thaw; and • Damaging vegetation on banks during construction and removal. 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control ▪ Vegetation Management
<p>Erosion Protection-Permanent Measures</p> <p>Erosion protection includes the application of rock riprap and other surface protection techniques to prevent the disturbance and loss of soil exposed riverbanks.</p>	<p>Properly selected and installed erosion control measures will help to prevent the erosion of soils and banks, however, improperly selected and installed erosion controls may have unplanned and undesirable effects, including but not limited to:</p> <ul style="list-style-type: none"> • Increasing erosion • Sediment introduction to a watercourse 	<ul style="list-style-type: none"> ▪ Site Monitoring ▪ Site Restoration ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice(s)-see Section 5.0
<p>Riprap Installation</p> <p>The installation of riprap includes the placement of large angular rock both above and below the waterline and, during site preparation, may include riverbank regarding and installation of geotextile fabric. Also see Erosion Protection in the Erosion and Sediment Controls subsection of Section 5.0.</p>	<p>While rock riprap placed near or in a waterway or watercourse provides a hardened edge for erosion protection, it may remove valuable areas of cover (i.e., cut banks) and decrease the habitat value of the waterway.</p> <p>In the event that bank excavation is required for riprap placement flush with adjacent grades and/or the rock material is sediment-laden or unwashed; fish, other aquatic organisms, and vegetation may be harmed by sediment released into a waterway.</p> <p>During the installation of rock riprap, construction activity may disturb banks, vegetation and bottom material; decrease bank stability; and leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Site Restoration ▪ Erosion and Sediment Control
<p>Support Pile Installation</p> <p>The installation of support piles includes the addition of piles to bridge, docks, piers and other in-water structures.</p>	<p>Installation of additional support piles may harm fish, other aquatic organisms and vegetation through the release of substances considered deleterious under the <i>Fisheries Act</i>, including sediment generated through the disturbance of bottom material and banks, and materials used in support pile construction.</p> <p>Machinery operated in or near the waterway or on its banks, including heavy pile driving and drilling equipment, may:</p> <ul style="list-style-type: none"> • Disturb banks, vegetation and bottom material. • Decrease bank stability. • Leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation. 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Fish and Wildlife Management ▪ Material Management ▪ Equipment Selection ▪ Site Monitoring ▪ Erosion and Sediment Control

BEAVER DAM REMOVAL

An example of how BMP's evolve over time

From time-to-time, City staff are required to remove beaver dams as part of road, trail and sewer water main maintenance programs or to alleviate flooding on public and private property. Beaver dam removal has the potential to affect fish habitat as a result of the release of sediment and large volumes of water downstream, and the de-watering of the upstream pond, which may have provided fish habitat.

In the past, beaver dams on City of Winnipeg waterways were removed in their entirety using a backhoe on an as needed basis. Over the past number of years the accepted practice has changed in response to environmental issues related to upstream and downstream effects. Today, the City and the Department of Fisheries and Oceans (DFO) have established a detailed protocol for removing beaver dams from City waterways in a manner that minimizes effects to fish and fish habitat. This protocol is outlined in this document's Fish and Wildlife Management BMP. Key features of the protocol include:

- Timing beaver dam removal so that it does not occur during spawning periods.
- Operating machinery from the shore to avoid disturbance to the streambed and minimize disturbance of streambanks.
- Removing large beaver dams in stages. This allows water from the beaver pond to be slowly released downstream and minimizes the amount of sediment that is stirred up and carried downstream.
- Placing approved materials and sediment from the dam on the riverbank above the high water mark, and evenly distributing it over the ground to encourage revegetation. Remove extraneous material offsite.
- Using an excavator that is clean, in good repair and free of fluid leaks, and carrying out all maintenance and refueling activities away from the watercourse.
- Capturing fish stranded in isolated pools caused by the dropping water levels behind the dam and returning them to the main channel.

The protocol also includes information on removing a series of beaver dams and specific cases where DFO should be contacted for further information (see the Fish and Wildlife Maintenance BMP's in Section 5.0 of this Handbook).



The beaver, *Castor canadensis*



A large dam structure



Dam construction on drainage structures

Activity	Potential Impact	Applicable Best Management Practice
Maintenance-related Works		
<p>Outlet Maintenance</p> <p>Outlet maintenance involves the cleaning and minor repair of culvert outlet structures, headwalls, trash racks, and grating.</p>	<p>Outlet maintenance may require the clearing of debris, sediment and other accumulated materials from outlet structures. Any sediment and debris that is released by the maintenance activities into a waterway or watercourse may:</p> <ul style="list-style-type: none"> • Impact water quality to downstream areas. • Harm fish and other aquatic organisms directly. • Clog fish spawning areas with sediment. • Affect the survival of fish eggs and alevins (newly-hatched fish) by smothering them with sediment. <p>Machinery that is operated near a waterway or watercourse and used to remove debris from culvert inlets and outlets may disturb banks and vegetation; decrease bank stability; and leak/spill fuel or hydraulic fluids.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Controls ▪ Fish and Wildlife Management
<p>Retention Pond Management</p> <p>Maintenance of retention ponds requires the occasional removal of accumulated sediment and vegetation impacting flow conveyance and pond capacity.</p>	<p>Vegetated retention ponds help to filter stormwater and may also provide habitat for wildlife and bird species. Sediment generated from sediment or vegetation removal or other maintenance activities may harm to fish, other aquatic organisms, and vegetation if released into a waterway or deposited in riparian areas.</p> <p>Machinery, equipment and vehicles operated in or near a retention pond may:</p> <ul style="list-style-type: none"> • disturb or destabilize pond banks. • pose a risk of leaking fuels or lubricants to the pond and downstream watercourses. 	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Vegetation Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice
<p>Irrigation Pumping Facilities Maintenance</p> <p>The maintenance of irrigation pumping facilities involves repair and replacement of pumps, pump house structures, intake pipes, and other irrigation structures.</p>	<p>Pumps and other mechanical devices found in irrigation pumping facilities use lubricants and fuels that have the potential to harm fish and other aquatic organisms if they are allowed to enter waterways or watercourses.</p> <p>Pump intakes, if not screened with appropriately sized fish screens, can kill or injure fish and aquatic organisms by drawing them into the pump or trapping them against the intake structure.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Controls ▪ Fish and Wildlife Management
<p>Boat Launch Facilities Maintenance</p>	<p>The maintenance of any structure on a waterway or watercourse may release sediment, accumulated debris, or construction materials harmful to aquatic species and habitats. Fish and aquatic species may also be disturbed by any in-water work. Machinery used to clean and repair boat launch structures may also pose a risk of leaking fuel or lubricants into waterways.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Fish and Wildlife Management ▪ Erosion and Sediment Control
<p>Pathway and Riverwalk Cleaning</p> <p>Pathway/Riverwalk cleaning involves the removal of accumulated river-transported sediments and debris from Pathways and Riverwalk trails following flood events.</p>	<p>If sediment (sand and silt) deposited on paths and trails near waterways is released into waterways during cleaning activities, it may:</p> <ul style="list-style-type: none"> • Affect fish directly through exposure or indirectly through changes in habitat. • Reduce the number and diversity of bottom dwelling organisms (fish food) as sediment collects on the bottom of the waterbody. • Clog fish spawning areas with sediment. • Reduce the survival of eggs and fry (newly-hatched fish) by smothering them in sediment. • Sediment (gravel, sand and silt) or other contaminants released during cleaning <p>Vehicles or mechanical sweepers used to collect deposited sediment and debris may also:</p> <ul style="list-style-type: none"> • Disturb banks and vegetation. • Leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation. 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Site Restoration ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice
<p>Debris Removal</p> <p>Debris removal includes the removal of waterborne or terrestrial debris from within waterways and drainage structures (e.g., debris removal from large diameter culverts and bridges as well as the dislodging of logs collected at bridge piers during high water events) as well as from watercourse and waterway banks.</p>	<p>Some debris found in waterways, particularly large woody debris (LWD), can provide important cover for fish and other aquatic organisms, and its removal may reduce a waterway's fish habitat value. If debris removal activities release sediment (gravel, sand and silt) or other contaminants into a waterway, they may:</p> <ul style="list-style-type: none"> • Directly affect fish through exposure to contaminants or indirectly through changes in habitat. • Reduce the number and diversity of bottom dwelling organisms as sediment collects on the bottom of the waterbody. • Clog fish spawning areas with sediment. • Reduce the survival of eggs and fry (newly-hatched fish larvae) by smothering them in sediment. <p>Trees that have fallen down within the Fisheries Sensitive Zone as a result of instability due to erosion or senescence, should be left in place to function as LWD where and whenever possible. If in doubt please consult the Public Works Department.</p> <p>Machinery, equipment and vehicles used in debris removal that are operated in or near a waterway or on a waterway's banks may disturb banks, vegetation and bottom material; decrease bank stability; and leak or spill fuel or hydraulic fluids into the waterway, affecting fish, other aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Street Sweeping</p> <p>Street sweeping involves the collection of accumulated winter traction materials and other debris from the road surface.</p>	<p>De-icing compounds (i.e., road salts) applied to winter roads to control snow and ice are considered to be deleterious substances under the <i>Fisheries Act</i>. They have the potential to cause harm to fish, other aquatic organisms, and vegetation if swept into a waterway or deposited in riparian areas. Accumulated winter aggregate (gravel, sand and silt) and debris found in on roads is likely to contain contaminants which include, but are not limited to:</p> <ul style="list-style-type: none"> • De-icing compounds (road salts) • Vehicle fluids (oils and fuels) • Brake dust 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice
<p>Snow Clearing</p> <p>Snow clearing includes the removal and collection of snow from roads, paths and other structures.</p>	<p>De-icing compounds (i.e., road salts) applied to winter roads to control snow and ice are considered to be deleterious substances under the <i>Fisheries Act</i>. They have the potential to cause harm to fish, other aquatic organisms, and vegetation if swept into a waterway or deposited in riparian areas.</p> <p>De-icing materials and winter aggregate (gravels and sands) may be oversprayed directly onto waterways or riparian vegetation, or may enter waterways through snow cleared from road and bridge surfaces or meltwater off stored snow piles.</p> <p>Accumulated winter aggregate (gravel, sand and silt) and debris found in snow cleared from roads is likely to contain contaminants which include, but are not limited to:</p> <ul style="list-style-type: none"> • De-icing compounds (road salts) • Vehicle fluids (oils and fuels) • Brake dust 	<ul style="list-style-type: none"> ▪ Project Planning and Scheduling ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Graffiti Removal</p> <p>Graffiti removal involves the removal of paint from various surfaces through blasting or the application of solvents and cover paints.</p>	<p>Graffiti removal may release materials that have the potential to harm fish, other aquatic organisms and vegetation. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Materials of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • Solvents • Paints • Sandblasting debris (alkaline baking soda, paint chips) <p>Graffiti removal may also involve the use of equipment and machinery. When operated near waterways, machinery may accidentally release compounds that are harmful, including fuels and hydraulic fluids</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice
<p>Asphalt Resurfacing</p> <p>Asphalt resurfacing involves activities such as the removal of existing road surfacing materials (asphalt, waterproofing membranes, cement curbs) and replacement or repair with new surface materials on roads and bridge surfaces.</p>	<p>Materials used for asphalt resurfacing (both new and waste materials) have the potential to harm fish, other aquatic organisms and vegetation. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Materials of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • Asphalt (both new and waste) • Oils • Sealants, paints or other surface treatments • Concrete, or other cement-based products <p>Asphalt resurfacing also involves the use of machinery. When operated near waterways, equipment may accidentally release compounds that are harmful, including:</p> <ul style="list-style-type: none"> • Fuels • Hydraulic fluids <p>During the removal of existing road surfaces, sediment (gravel, sand and silt) comprising the roadbed may be washed into a waterway where it can harm fish, aquatic organisms and vegetation.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Materials Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Painting/ Metallizing Structural Steel</p> <p>The painting and metallizing of structural steel involves the mechanical removal of grease and debris (scraping/grinding, solvent application), high-pressure washing, sandblasting, and coating application.</p>	<p>Painting and metallizing structural steel may release materials that have the potential to harm fish, other aquatic organisms and vegetation. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Materials of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • Grease, debris, accumulated sediment • Solvents • Chlorine (if chlorinated water is used for pressure washing) • Sandblasting debris (paint chips, sandblast material) • Paints, sealants and other coatings <p>During painting and metallizing activities, equipment and machinery may accidentally release compounds that are harmful, including:</p> <ul style="list-style-type: none"> • Fuels and hydraulic fluids 	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

Activity	Potential Impact	Applicable Best Management Practice
<p>Epoxy Injection of Concrete/Timber Structures</p> <p>The filling of cracks in concrete and timber structures involves the drilling of cracked material, application of a surface gel and injection of epoxy</p>	<p>The drilling of concrete and timber structures required for epoxy injection can generate concrete dust and treated wood debris and can disturb any sediment that has accumulated on the structure. These materials, in addition to the surface gels and epoxies applied to concrete and timber cracks, have the potential to cause harm to fish, other aquatic organisms, and vegetation if released into a waterway or deposited in riparian areas. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>.</p> <p>Epoxy injection also involves the use of equipment and machinery. When operated near waterways, machinery may accidentally release compounds that are harmful, including fuels and hydraulic fluids.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control
<p>Painting Timber</p> <p>Timber painting includes the surface preparation of timbers and the application of paints and stains.</p>	<p>Surface preparation for timber painting may release materials that have the potential to harm fish, other aquatic organisms and vegetation. As such, they are considered to be deleterious substances under the <i>Fisheries Act</i>. Materials of concern include, but are not limited to:</p> <ul style="list-style-type: none"> • Paint debris • Treated wood debris • Sediment accumulated on timber structures <p>Paints and wood stains used to coat timbers are also deleterious substances that will cause harm should they enter a waterway. During timber painting, machinery operated over or near a waterway may accidentally release compounds that are harmful, including fuels and hydraulic fluids.</p>	<ul style="list-style-type: none"> ▪ Work Site Management ▪ Material Management ▪ Equipment Selection ▪ Erosion and Sediment Control

WOODY DEBRIS REMOVAL FOLLOWING FLOOD EVENTS

How to manage naturally deposited material

As water recedes following flood events, woody debris is often deposited on trails, pathways, and watercourse and waterway banks. While woody debris is a natural part of riparian habitats, deposited materials often interrupt public use of paths, trails and structures or pose hazards to bridges and culverts. The City of Winnipeg recognizes the value in retaining woody debris, where possible.

On banks of smaller watercourses and waterways, stable large woody debris is left in place to enhance fish and riparian habitat. On larger waterway banks, where more frequent flooding occurs, large woody debris deposited on banks by floodwaters is managed in the following way:

- Woody debris blocking public access to and use of the City's riverbank trail and riverwalk system or impacting bridges or docks and other City owned facilities is removed off site to an approved disposal site.
- If the piece is too large to remove in its entirety, crews use chainsaws with vegetable oil-based lubricants to buck it up.
- Portions of the woody debris above the ordinary high water mark and stable may be left in place if not impacting the City's infrastructure or amenities.

Small tree
deposited on a
watercourse bank



Large woody
debris



ELLICE AVENUE CULVERT INSTALLATION AT OMANDS CREEK

An example of how working as a team can improve environmental performance

In 2004, a culvert was installed under Ellice Avenue at Omands Creek. Working cooperatively, the Project engineers, the City of Winnipeg and the Department of Fisheries and Oceans (DFO) developed a strategy for minimizing negative effects to fish and fish habitat as a result of the Project.

Measures taken to ensure that construction and long-term operation of the culvert were 'fish-friendly' included:

- Collectively agreeing in advance on the areas of the creek bank to be damaged by the Project. This allowed the group to develop a plan that would minimize the extent of damage. It also meant that erosion control and revegetation measures could be planned and organized in advance of construction.
- Undertaking construction during the winter months to minimize disturbance to the creek bed and creek bank during more sensitive seasons, and to avoid the spring spawning period. (See Section 5.0 of this document: Project Planning and Scheduling BMP's for timing of work activities.)
- Implementing erosion control measures in a timely and effective fashion. An erosion control blanket was placed along the lower banks of the creek at the end of February. However, it was very quickly determined that additional erosion control measures were needed on the exposed upper slopes. At the beginning of March, straw logs were placed along the upper slopes. (See Section 5.0: this document's Erosion Control BMP's for erosion control measures.)
- Establishing new vegetation as soon as construction was complete. Beginning in April, willow whips (cuttings of native willow trees) in their dormant phase were installed along the disturbed areas of the bank. Topsoil was then distributed over the site and additional vegetation, including native species, were planted along the upper slopes. Revegetation efforts were coordinated by the City of Winnipeg Naturalist Services Branch. (See Section 5.0 of this document for Vegetation Management BMP's).

The end result is a Project that achieved its desired objectives, met regulatory requirements for fisheries protection and successfully re-established natural vegetation along this section of Omands Creek. In addition, the City also worked closely with local stewardship groups to ensure there was consistency with other rehabilitation efforts occurring elsewhere along Omands Creek.



Omands Creek at Ellice Avenue



Site Vegetation - August 2005

SLOPE PAVING MAINTENANCE - OSBORNE STREET BRIDGE

Keeping sediment from the river!

Regular flooding events result in sediment accretion on the City's riverbanks as floodwaters recede. The paved slope area below the Osborne Street Bridge and Osborne Street dock is one area where sediment routinely accumulates. To prevent this deposited material from being reintroduced to the waterway by rain and surface runoff, the City carried out cleaning activities.

Measures taken to ensure that maintenance of the paved slope would be carried out in an environmentally responsible manner included:

- **Sediment containment.** Before beginning works, a large section of floating silt curtain (also called a 'turbidity curtain') was installed below the affected section of bank. The curtain is constructed of a non-woven geotextile material designed to filter or contain sediment suspended from a float line and anchored with a weighted chain along its bottom. Rebar or angle iron stakes were used to hold the curtain in place along the bank. This minimized the potential for any disturbed sediment to impact fish and aquatic organisms.
- **Material management.** Accumulated sediment on the paved slope below the bridge deck was collected with a loader and transported off-site. Additionally, sediment laden sections of the river banks upstream and downstream of the bridge apron were also removed and the disturbed areas restored with vegetative cover

Osborne Street Dock and Bridge



Installation of Silt Curtain



Sediment Collection



RIVERBANK STABILIZATION: MAY TO ANNABELLA
An example of how riverbank stabilization can benefit riverbank habitats

In 2002, this 300m section of the Red River bank from May Street to Annabella Street failed to a point where it not only consumed the City's pathway, but threatened nearby privately owned buildings. Riverbank stabilization works implemented successfully in the winter of 2002-2003 consisted of the installation of a rock fill shear key, deposition of a limestone blanket, slope regrading and landscape restoration.

Work was planned to ensure the stabilization measures resulted in no harm to fish or fish habitat and included a continuous, vegetated buffer of native river bottom forest species.

- The works were substantially completed in the winter to minimize potential impacts to water quality, fish and fish habitat and vegetation. Shear key installation and riprap placement from the frozen river surface avoided impacts to vegetation and release of sediment.
- Following winter works, the riverbank was re-graded and temporary erosion and sediment control measures were installed.
- To ensure long-term sediment and erosion control, disturbed areas were revegetated. Graded banks were seeded with native grass seeds and covered with erosion control blankets. Native trees and shrubs were planted and the failed section of pathway was reconstructed.
- Once works were completed, the area was monitored to ensure that sediment and erosion controls were effective, the area was stable, and that vegetation was well established.

This project was completed with minimal impacts and resulted in a stabilized riverbank safe for public use and a restored portion of river bottom forest on the Red River.

Area of bank erosion, 1998-2002



Riprap placement, 2003



Vegetated riverbank and pathway, 2003



STREET SWEEPING

Keeping road sediment and debris from stormwater inlets

Sediment, debris, and other material that accumulates on road surfaces is collected through manual and mechanical sweeping, followed by rinsing of the road surface. While most of the larger material can be swept up, fine sediment is often left on road surfaces and is consequently washed into stormdrains. Catch basins can easily become clogged with sediment and become less efficient under major rain events. Sediment introduced to a waterway or watercourse through the stormwater system has been known to be deleterious to downstream fish and fish habitat. To address these concerns, the following procedures are used:

- Street surfaces and curbs are swept in early spring to pick up accumulated winter traction material, and periodically throughout the year to collect leaves and other debris. This material is collected and transported to an approved disposal site.
- Before street surfaces are washed, catch basins and stormwater inlets are blocked or filtered. Sandbags are used to prevent wash water from entering the stormwater system, and filter fabric inserts, which act to capture much of the sediment carried by the washwater, are placed inside the catch basins and secured below grating.

By taking these simple steps to capture sediment before it enters the stormwater system and discharges at outfalls along our City's watercourses and waterways, City crews are making an effort to protect our waterways and watercourses.



5.0 Best Management Practices

Best Management Practices (BMPs) are recommended techniques and guiding statements that, when followed, will allow you to undertake works in and around waterways and watercourses in a manner that will avoid, minimize or mitigate impacts to aquatic and riparian habitats, water quality and quantity, fish and wildlife species and public safety and property.

The City's primary objective in developing the following series of operational BMPs is to provide City staff and contractors with practical, economical and technically effective BMPs for routine maintenance activities. For ease of use, the BMPs included in this Handbook have been divided into two categories:

- Operational BMPs – a standard set of BMPs that apply to most operations and maintenance activities; and
- Erosion Control and Sediment Control BMPs – more specific solutions to manage erosion and sediment transport. The applicability of these BMPs will depend on the site and the activity being undertaken.

The BMPs recommended here do not represent an exhaustive list but rather a set of common BMPs that are applicable to routine City works in and around watercourses and waterways. Alternatives to and improvements on these best practices should not be overlooked when planning your proposed works. To assist in implementing these BMPs, use the Activity Table in Section 4.0 to assess the project and potential impacts, and then customize a project or site-specific set of BMPs to help you achieve compliance with environmental legislation. Qualified environmental professionals may also provide advice on the selection and application of BMPs including the use of alternative practices.

Operational BMPs

- Work Plan and Schedule** (includes timing of works)
- Work Site Management** (includes work site preparation, work site isolation, work site management and general housekeeping)
- Vegetation Management** (includes vegetation assessment, protection, restoration and vegetation and tree removal)
- Fish and Wildlife Management** (includes protecting fish and wildlife and beaver dam removal)
- Materials Management** (includes materials selection, containment, waste management and spill response)
- Equipment Selection**
- Site Monitoring**
- Site Restoration**
- Erosion Control**
- Sediment Control**

Erosion Control BMPs

Permanent

- Preservation of Existing Vegetation**
- Planting and Seeding**
- Biotechnical Stabilization**
- Gravel Blankets**
- Riprap**
- Bioengineering**
- Surface Drainage Management**
 - Cross-berms/Diversion Dikes
 - Water Bars
 - Channel Liners

Temporary

- Erosion Control Blankets and Matting**
- Mulching and Hydroseeding**
- Temporary Covers**

Sediment Control BMPs

Permanent

- Sediment Basins, Ponds and Traps**
- Engineered Wetlands**
- Vegetated Swales**

Temporary

- Silt Fence**
- Straw Logs**
- Permeable Ditch Berms/Energy Dissipaters**
- Slope Scarification/Roughening**
- Check Dams & Ditch Blocks**
- Temporary Water Diversions**
- Silt Containment Curtains**
- Stormwater Inlet/Catch Basin Filters and Dams**
- Pipe Socks and Dewatering Bags**

Project Planning and Scheduling



Description:

Project planning and scheduling includes activities such as the design of projects, creation of work plans and timing of works. Care taken in the early stages of project planning and scheduling can alleviate many of the potential environmental impacts associated with your works.

Operational Best Management Practices

Project Planning

A little planning goes a long way towards avoiding and minimizing negative environmental impacts of your work. When developing a work plan:

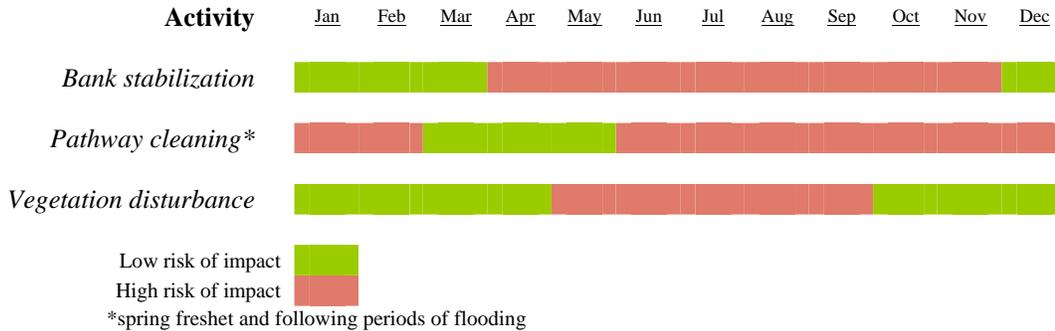
1. Begin project planning early to allow adequate time for any environmental permits/approvals/licenses to be obtained.
2. Identify any areas or activities of concern related to your operations and maintenance work. For example, if your work is on park land managed by Public Works Department, you must meet a no-net-loss policy for habitat (i.e., any habitat lost must be replaced with habitat of equal value). Consult with the Public Works Department when preparing a work plan as they can provide assistance with the assessment of habitat in your work area.
3. Plan to avoid site impacts where possible. Choose site access routes that protect native vegetation. Look for opportunities to operate outside of high impact areas (e.g., locating riverbank pathways in upland areas rather than on river slopes).

Project Scheduling

Work must be scheduled during specific periods or “windows” of time when the level of risk to fish and wildlife species from your work is reduced.



Examples of timing windows or periods of least risk



Once work is scheduled for the appropriate timing window, ensure that:

- Sediment and debris removal activities within watercourse channels occur during periods when flow is absent or minimal.
- Work is postponed during heavy rain events and construction is halted until weather improves.

Timing or Work Windows

The terms “timing window”, “work window” and “fisheries window” refer to times of reduced risk for regionally significant fish species when instream construction is permitted. This may vary depending on which species are present in a particular geographic area. A reduced risk window also exists for vegetation removal and clearing. It minimizes the risk of impacting bird eggs, nests, and young by identifying periods of the year when nesting birds or other wildlife are less likely to be impacted by your works. For work in and around Winnipeg waterways and watercourses:

- **No in-water work is to be conducted during the April 1 to June 30 spawning period.**
- **Winter construction is recommended to minimize bank and vegetation disturbances.**
- **Extra care should be taken when conducting activities that have the potential to affect migratory birds during their nesting and breeding season – typically the beginning of May to the end of July.**

Remember, reduced risk does not equal the absence of risk. Fish and wildlife may still be present during times of reduced risk so it is important that you apply BMP's diligently to avoid causing environmental harm.

Work Site Management

Description

Work site management activities, such as site preparation, work site isolation and general housekeeping, play an important role in minimizing the potential environmental impacts of operations and maintenance activities.



Operational Best Management Practices

Site Preparation

Site preparation activities often include work site access route construction, materials stockpiling, and vegetation clearing. Good site preparation activities can reduce the potential effects of erosion, slope instability and sediment discharge. BMPs for site preparation activities are presented below:

1. Minimize clearing activities. Where possible, maintain existing ground cover within riparian areas to maximize runoff filtration.
2. Clearly identify “leave” areas (areas to be protected from disturbance) with snow fencing.
3. Where possible, preserve vegetative cover for as long as possible. Schedule clearing activities immediately prior to works to minimize the length of time that soils within the disturbed area are exposed.
4. Temporarily halt clearing activities during heavy rains.
5. Grade all fill placed on watercourse banks to ensure it is compact and contoured to the natural slope of the site.
6. Avoid clearing and grading on steep slopes, where possible. If such activity is required, ensure adequate erosion and sediment control measures are in place.
7. Consider re-using small woody debris to improve soil conditions, protect roots, and improve visual aesthetics of the work site.

Some work sites will be located adjacent to watercourses that do not have obvious riparian areas to provide a buffer. In these cases, an appropriate working setback should still be established to protect the watercourse from work impacts.

Site Isolation

Proper site isolation is an important way to minimize the risk of releasing deleterious substances.

1. Isolate your work area from any flowing water that may be present, but do not stop flow to downstream portions of the watercourse. Ensure any flows are temporarily diverted around the portion of the watercourse where you are working.
2. For works using chemically active substances, such as cement-based products, paints, epoxies, or other chemicals, it is important to ensure that your isolation techniques use non-permeable barriers that will adequately contain any leachate or waste material.
3. Temporarily divert, enclose or pump the water around the work site.
4. Ensure the pump intake is screened with a fish screen and the point of discharge is located on a non-erodible surface immediately downstream of the work site to minimize disturbance to surrounding fish populations and habitats.
5. For works near or in lakes or larger water bodies, if it is not possible for you to fully isolate and divert flowing water from your work area due to water depth and volume, isolate your works with a silt curtain to keep silty water separate from clean water.
6. Contain any sediment-laden water generated during your works in an isolated work cell. Use a pump to draw sediment-laden water out of the work cell and discharge it to a level vegetated area where sediment can settle as the water infiltrates the ground.



General Housekeeping

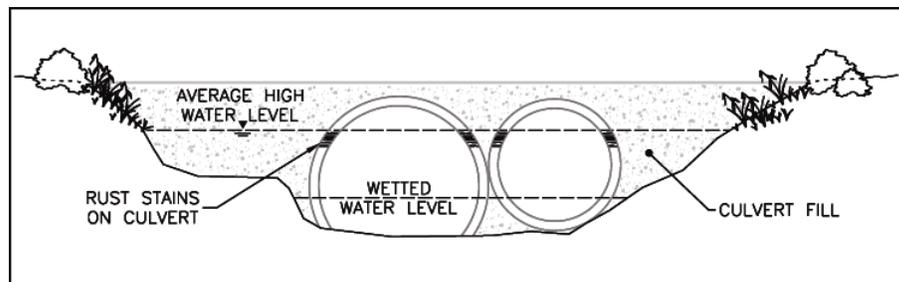
Maintaining an organized and well-kept work area can also help to protect the environmental values of your work area.

1. Keep your work area organized and materials contained appropriately.
2. If materials are to be stockpiled, ensure that they are placed on stable land well above the high water mark in a manner that prevents them from entering any watercourse (e.g., silt fence installed around pile,

- temporary cover placed over materials) and at a location beyond the influence of bank instability.
3. Ensure that all construction-related materials and debris are removed from your work area and site restoration measures are implemented as soon as possible following completion of work.

Identifying the Ordinary High Water Mark

The average high water mark can be identified at a site using the highest water stains on a culvert or bridge pier, or the top of the roots of bank vegetation.



Vegetation Management

Description

Vegetation management includes a range of activities undertaken to protect and restore vegetation (grasses, shrubs, trees and large woody debris) and control weeds within your work area. Activities such as vegetation removal, revegetation or landscaping may disturb native species and habitats, as well as expose soils that may release sediment to storm drains and adjacent waters. As natural areas in the City are managed with a 'no net loss' policy approach, approvals to affect or remove natural vegetation must be obtained.



Operational Best Management Practices

Vegetation Removal

1. Review your site prior to beginning works to identify any heritage natural habitat areas or at risk vegetation species and habitats that require protection.
2. Maximize the retention of existing vegetation, particularly trees, shrubs and ground cover in natural areas. Damage to trees and other natural area vegetation is assessed for replacement cost by the Public Works Department. Minimizing the damage will minimize your costs.
3. Review and follow the City's Urban Forestry Branch Tree Protection guidelines.
4. Ensure that your activities will not disturb nesting wildlife.
5. Schedule any vegetation management activities that require the disturbance of soils to periods of dry weather, if possible.
6. If vegetation removal activities are unavoidable, ensure you have appropriate environmental permits in place for your removal activities, particularly those within the fisheries sensitive zone.
7. To minimize streambed disturbance, any trees being removed should not be felled across a watercourse or left below the ordinary high water mark unless specified in a work design.
8. Fallen timber should be retained on the work site, where possible, for reuse as large woody debris or for redistribution above the high water mark.

Plan Winnipeg outlines measures to protect and enhance the City's urban forest, stating, *"The City shall protect and enhance its urban forest by:*

- i) increasing the stock of trees through its tree planting programs and encouraging tree planting by others;*
- ii) adopting high standards of tree maintenance, replacement, and protection during construction and requiring developers to retain existing trees in new developments wherever possible;*
- iii) replacing trees affected by disease, in particular, Dutch Elm Disease, and diversifying the variety of new trees; and*
- iv) encouraging the participation of other levels of government in programs to protect and enhance the city's urban forest."*

Vegetation Restoration

1. To maintain a continuous naturalized vegetated buffer along watercourse banks and shores, ensure that any vegetation lost or impacted as a result of operations, maintenance or construction activities is replaced with site-suitable native plant species. All areas of exposed or disturbed soils should be revegetated.
2. While restoration of vegetation should aim to establish vegetative cover as quickly as possible to provide permanent erosion control and help stabilize soils, the correct timing of planting activities is very important. For example, establishing native willow in the early spring before the plant has come out of its winter dormancy can achieve a survival rate of as high as 90%.
3. Ensure that restored vegetation is planted well, watered and otherwise maintained to a free-growing and established state.
4. Native plant species lists are available from the Public Works Department Naturalist Services Branch (visit <http://www.winnipeg.ca/publicworks/Naturalist/ns/>). Non-native species are not acceptable for planting within natural areas; this includes most sods that are non-native grass species and can serve as a wildlife attractant. In areas where the impacted vegetation was sod (e.g., in a park area), replacement sod may be used.



Landscaping

1. Protect stockpiles and landscaping materials from wind and rain by storing them under protective cover (i.e., tarps or plastic sheeting).

2. When working around curbs and gutters divert any run-off away from storm drains. Protect storm drain inlets with covers or drain blocks, filter mats or catch basin liners to filter sediment from curbside run-off before it enters the storm sewer (see Catch Basin Liners - Sediment Control BMPs).
3. Collect landscape refuse (i.e., leaves and organic material) and place or dispose of in a manner that will prevent it from entering gutters, catch basins and watercourses.

Fish and Wildlife Management

Description

Fish and wildlife management encompasses activities undertaken to protect and control fish and wildlife species. These include the salvage of fish and aquatic species and the management of beavers, birds and other wildlife species.



Operational Best Management Practices

Fish Salvage

1. If any portion of the wetted channel will be isolated and/or dewatered as part of undertaking an activity, fish should be removed from this area prior to the start of works. A certified professional should complete the salvage and ensure that the necessary permits required by the Department of Fisheries and Oceans and Manitoba Conservation and are in place.
2. Where possible, opt for less invasive salvage methods such as minnow trapping and seining, before using more stressful methods such as electrofishing.

Bird Management

Identify any bird nests that may be impacted as a result of your works, for example, nests found under bridges prior to bridge cleaning.

Bridges and Birds

Some bridges may provide nesting habitat for birds. Most active bird nests, eggs and young are protected under Section 49 of Manitoba's *Wildlife Act* and cannot be harmed or destroyed. Protected bird species include, among others:

- Raptors, including eagles, hawks, falcons and owls.
- Game birds, including ducks, geese, swans and pigeons.
- Insect-eating birds, including chickadees, catbirds, martins, robins, swallows and wrens.
- Others, including loons, ravens, Blue Jays and Grey Jays.

If your bridge maintenance activities require the removal of a nest, you will likely need to obtain a permit from Manitoba Conservation. Ensure that a permit is in place before proceeding with the work. You can access the Manitoba Wildlife Act at <http://web2.gov.mb.ca/laws/statutes/ccsm/w130e.php>

Beaver and Beaver Dam Management

The Department of Fisheries and Oceans (DFO) has provided the following guidance on beaver dam management and removal within the City of Winnipeg:

1. Remove dams within one week of ice out, otherwise dams should not be removed from one week following ice out until June 30th when spawning and hatching are largely complete.
2. Minimize the amount of sediment generated from the removal of a dam and avoid disturbance to the streambed and streambanks. Machinery should only operate from shore.
3. For large beaver dams (greater than 0.5m in height), create a small notch in the middle of the dam in order to slowly lower the water level behind the dam. Remove only the portion of the dam exposed above the water. Repeat this procedure until the dam is completely removed. Water should be drained such that sediment contained in the bottom of the pond is not released. Remove dam material slowly and deliberately in order to minimize sediment release downstream. This may require a few days, depending on the size of the dam and the amount of water that needs to be released.
4. Be vigilant for stranded fish. Capture and return fish trapped in isolated pools to the main channel of the watercourse.
5. Evenly distribute the materials and sediment removed from the beaver dam on the ground above the ordinary high water mark. Place materials in a manner that prevents them from inhibiting vegetation growth, causing erosion or re-entering the watercourse.
6. Ensure that equipment operating near the waterway is free of fluid leaks and external grease, oil and mud. Clean, refuel and service equipment in a manner that prevents the release of deleterious substances into the waterway.
7. Minimize the amount of vegetation removed from the banks (e.g., as a result of large machinery used to remove the dam). All disturbed areas should be stabilized immediately following vegetation removal by utilizing one or several BMPs, which may include hydroseeding, broadcast seeding and replanting with native vegetation. Use effective soil and erosion control measures to prevent soil-laden runoff and silt from entering the watercourse prior to the establishment of vegetation.
8. Remove a series of beaver dams from upstream to downstream in a manner that reduces the risk of flooding, habitat damage and damage to property. In addition, any sediment released will be temporarily detained behind downstream dams.

9. Contact DFO prior to removal if:
- The beaver dam is well established with maximum water depths greater than 2m and is likely to provide year-round fish habitat;
 - The removal of the beaver dam will likely impact critical or limiting fish habitat; or
 - The beaver dam is to be removed in winter.

Materials Management

Description

Materials management includes activities such as materials storage, transportation and use. Proper materials management can prevent the accidental introduction of deleterious substances to nearby waterways and ensure that work areas maintain their habitat value.



Operational Best Management Practices

1. Store chemicals, fuels and other potentially harmful materials at least 100m away from the normal high water mark of the watercourse. Ensure that secondary containment measures (e.g., drip trays) are used for any material transfer or fueling locations.
2. Have spill clean up or containment materials on the work site and easily accessible. Ensure that workers know where these materials are stored and how to use them.
3. Do not wash buckets and equipment in the watercourse. If equipment is washed on-site (using hoses or water from another source), contain runoff and prevent it from entering the watercourse.
4. Prevent construction materials, such as lumber and nails, from entering the watercourse. Remove all construction debris and waste from the work site.
5. If work involves wood timbers or materials, avoid the instream use of creosote or PCP treated materials.
6. If rock is to be used, ensure that it is appropriately sized for your use and free of silt, clay and fine sediments.
7. If concrete or cement-based materials are being used, be sure that a CO₂ tank and diffuser are kept onsite and ready for immediate deployment in case a concrete spill should occur. Maintain complete isolation from all watercourses for a minimum curing time of 72 hours.
8. If a material, fuel or chemical spill occurs:
 - Ensure public health and safety
 - Stop the flow (when possible)
 - Secure the area
 - Contain/stabilize the spill
 - Notify/report to appropriate agencies or authorities
 - Clean-up

Impacts of Cement-based Products

One liter of concrete wash water or leachate in 1000L of water will kill fish. Cement-based products including wet grout and wet concrete are lethal to fish and many other aquatic organisms. Raw product, latents or leachate entering a watercourse will alter water chemistry, making it more basic/alkaline, thus inhabitable to fish.

Mandatory reporting of environmental accidents in Manitoba is required by regulation under the *Dangerous Goods Handling and Transportation Act*. This regulation refers to essentially the same reportable quantities of regulated products as the Federal *Transportation of Dangerous Goods Act*, and the *Canadian Environmental Protection Act*.

Reportable quantities for commonly used substances		
Class 2.1	flammable compressed gas (e.g. propane):	100 L
Class 2.2	non-flammable compressed gas (e.g. carbon dioxide)	100 L
Class 3	flammable liquids	100 L
Class 8	corrosive liquid acids and caustics (e.g. mercury)	5 kg or 5 L
Class 9.1	Environmentally Hazardous, except PCB mixtures	50 kg
Class 9.1	PCB Mixtures	500 grams
Class 9.2	Aquatic Toxic	1 kg or 1 L
Class 9.3	Leachable toxic waste (i.e. used ethylene glycol)	5 L

**Should a spill occur, contact the Manitoba Conservation
 24-hour Environmental Emergencies Reporting Line at**

(204) 944-4888

You will be asked to provide:

- The location and time of the accident.
- A contact name and telephone number.
- A brief description of the accident and its status.
- The types and amount of contaminant.
- The owner of the contaminant.
- Action that has been taken or is planned with respect to the accident.

Equipment Selection and Use

Description

Equipment selection and use includes activities such as the choice of suitable equipment and proper equipment maintenance and operation. When equipment or machinery is required for your work, appropriate care and proper operation can reduce its potential impact to the environmental values of your work site.



Operational Best Management Practices

1. Keep equipment clean and in good repair to prevent leakage of fuel, oil or other liquids.
2. During spring and summer work, keep equipment fuels at least 100m from the ordinary high water mark and avoid servicing equipment within 15m of the ordinary high water mark. Even during winter work when ice acts as an additional isolating barrier, fuels should be kept away from waterways.
3. Operate equipment outside of the wetted channel. Do not allow equipment to enter any watercourse or waterbody.
4. If access to the work area requires crossing a watercourse, construct temporary watercourse crossings or temporary working platforms to keep equipment out of the watercourse. Ice bridges are considered temporary watercourse crossings.



Site Monitoring

Description

Site monitoring includes activities undertaken during work near waterways, such as the routine inspection of work areas and erosion and sediment controls, as well as the long-term monitoring of work areas following the completion of construction or restoration activities. Site monitoring is needed to ensure the work site and any associated restoration areas (i.e., revegetation) are stable and functioning as intended.



Operational Best Management Practices

1. Routinely inspect your work area for any items of environmental concern. In particular, erosion and sediment controls should be inspected during and after rain events to ensure that they remain functional.
2. Be vigilant to weather forecasts and climate conditions that may impact activities by increasing the risk of erosion and sedimentation.
3. Following the completion of your work, monitor the effectiveness of any remaining temporary sediment and erosion control measures (i.e., silt fence) and remove if no longer required.
4. If compensatory habitat was created during your work, complete any monitoring required by regulatory agencies.



Non-functioning silt fence



Site Restoration

Description

Site restoration refers to activities used to return the work area to a stable state resembling the site's original instream and riparian habitat characteristics. The site restoration set of best practices is intended to meet the standards requiring that no-net-loss or a gain in habitat be realized as a result of the works. In addition to this goal, site restoration activities will help to minimize the risk of potential post-construction impacts such as slope erosion.



Operational Best Management Practices

1. Begin site restoration activities as soon as possible following construction.
2. Grade disturbed areas to a stable angle of repose after work is completed.
3. Install erosion control blankets to protect disturbed soil areas on waterways, streambanks, and areas adjacent to watercourses from surface erosion
4. Remove any temporary stream crossings or diversions used.
5. Remove all material that was brought onto the site and retrieve any debris that may have floated downstream.
6. Dispose of all materials in an approved manner.
7. Revegetate disturbed areas with native plant species as outlined in the Vegetation Management BMP. Install vegetation that will provide a permanent erosion control cover as soon as possible.
8. Ensure that rock, boulders, and natural large woody debris existing prior to your works are retained where possible on site.



Erosion Control BMPs

The text box above is used to highlight **Erosion** and **Sediment Control BMPs**. Where possible, a distinction is made between *temporary* and *permanent* measures.

Erosion Controls

Description

Erosion Controls are installed structures or methods of work designed to prevent excessive erosion (the weathering of land surfaces by the action of moving water, wind or other geological processes).



Although erosion is a natural process, it can be accelerated by construction and maintenance activities undertaken near watercourses. The term ‘erosion control’ can refer to both engineered solutions (bank stabilization, structural walls and rock riprap) designed to address significant erosion problems and bioengineered solutions, which typically incorporate living plant materials or other organic matter in performing some engineering function (bio-revetments, livestaking, large woody debris placement). The following comments on operational BMPs for erosion control are largely directed towards controlling erosion associated with your works, rather than a discussion of erosion control designs or techniques.

Operational Best Management Practices

1. Both erosion and sediment control measures should be part of the planning and design stages of your works.
2. As the rate of erosion is influenced by factors including topography, precipitation, vegetation and soil type, consider these aspects of your work site when planning for erosion control.
3. Retain existing vegetation where possible. If vegetation must be removed, consider leaving the roots intact and/ or mulching and scattering the woody stems over the disturbed area.
4. Divert runoff away from exposed slopes. Use erosion control structures to minimize runoff velocities and to trap transported sediment.
5. Install appropriate erosion and sediment control devices (e.g., straw logs and erosion control blankets on disturbed slopes, rock check dams and temporary silt dikes in low velocity/low volume channels) to prevent the movement of sediment downstream. Ensure that any structures installed are monitored and maintained until they are no longer needed (e.g., when vegetative cover has established).

6. Minimize erosion by contouring exposed slopes to an appropriate steepness ratio and installing erosion controls promptly in order to minimize the length of time soil is left exposed.

Note:

While the following select BMPs represent some of the most commonly used and preferred practices for Erosion Control in the City of Winnipeg, it should be remembered that there are many other options, techniques and materials that can be used to prevent and minimize erosion.

**Erosion
Control
BMPs-
Permanent**

Preservation of Existing Vegetation

Description

Preservation of existing vegetation is one of the easiest and most inexpensive means to prevent erosion and control sediment.

A vegetated buffer retained between a work area and watercourse can act to filter runoff, trap sediment and maintain bank stability. Vegetation within a work area should be protected to ensure that a continuous naturalized vegetated buffer is maintained along watercourse banks and shores.



- Maximize the retention of existing vegetation, particularly trees, shrubs and ground cover near waterways and watercourses, when planning your works. Refer to the “no mow zone” policy adopted by the Public Works Department.
- Identify areas of existing vegetation that are to be retained. Snow fence should be used to surround “leave” areas.
- Select access routes to your work site that minimize impacts to native vegetation.
- Retain wetland plants (e.g., sedges, rushes, grasses) where possible as they provide additional filtration of sediment.
- Ensure that any vegetation lost or impacted as a result of operations and maintenance or construction activities is replaced with native plant species. The Public Works Department has information on the selection of native plant species.



Erosion Control BMPs- Permanent

Planting and Seeding

Description

Planting and seeding are permanent erosion control practices that reduce rain drop impact, minimize runoff, and stabilize soils by means of extensive root systems.



Planting

- Planting can be used on a variety of slope grades. On steep slopes, additional measures (i.e., hydroseed, grass seed or ring berms) may be required to stabilize the soil around the base of newly planted vegetation.
- Select native plant species suitable for site light, soil nutrient and moisture conditions. Native plant species lists are available from the Public Works Department.
- Time planting activities with the species' growing seasons. Potted plant stock may be best installed in early spring or late winter while native willow should be planted in the fall or early spring before winter dormancy has been broken.
- To help ensure the survival of planted vegetation, topsoil is to be used to dress planting holes and make certain that adequate coverage is provided to the root ball. Following installation of planted stock a maintenance schedule should be established which includes including watering and invasive weed control. Maintenance should continue until the plants have reached a free-growing and established state (2-3 growing seasons).



Seeding

- Seeding should be used on flat areas or low slopes (less than 3:1). For steeper slopes, use hydroseeding with a tackifier or cover the seeded slopes with erosion control matting.

- Spread seed mix immediately after the final site grading and ensure that other sediment controls are in place while the initial vegetation cover establishes.
- If possible, seed in early spring or early fall to take advantage of the optimal growing conditions. Avoid seeding immediately prior to forecast of a heavy rainfall.
- Select native seed mixes appropriate to your specific site conditions, soil characteristics and time of year.
- Loosen the soil surface through raking or scarification; apply any needed soil amendments (topsoil, organic matter); and seed with selected method and mixture. If broadcast seeding, cover the seeded area with a mulch material.
- Maintenance of the seeded area will include weed control, watering throughout the growing season and reseeding any areas of poor growth.

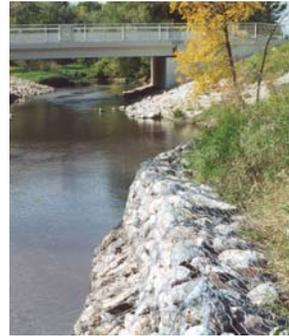
Note:

The placement of sod is another vegetation technique that may be useful in some circumstances (e.g., to replace impacted vegetation on lawn areas). Commercial sods are most commonly formed of non-native grass species and can be a considerable attractant to some problematic wildlife species (e.g., Canada Geese), so their use should be limited.

Biotechnical Stabilization

Description

Biotechnical stabilization integrates both biological (“soft”) and traditional structural (“hard”) engineering elements. Living or senescent plant material and inert structural components can be combined to stabilize eroding banks and slopes.



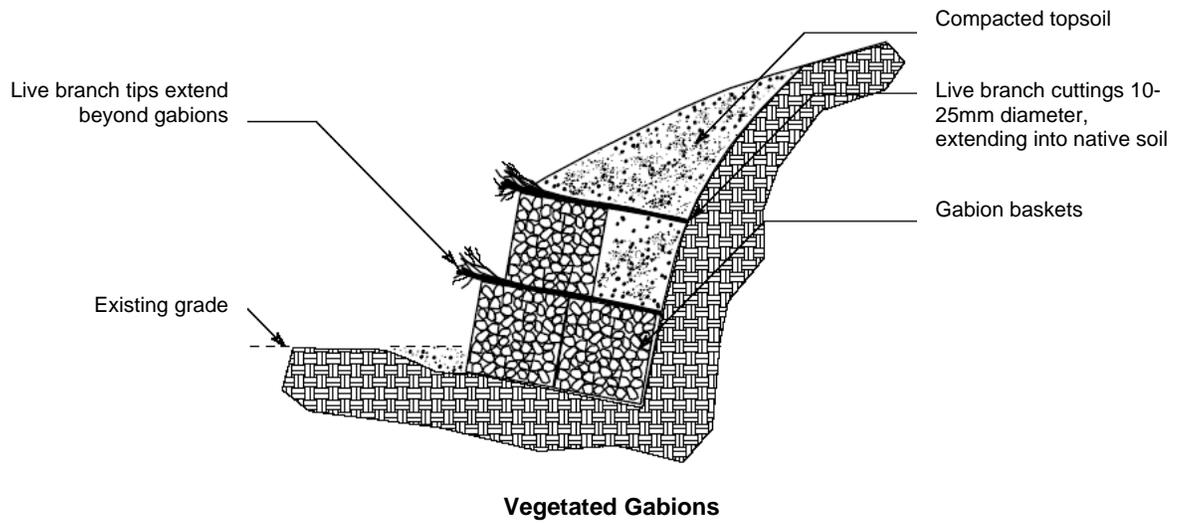
**Erosion
Control
BMPs -
Permanent**

Many techniques are used in biotechnical stabilization. Specific site conditions—for example, the causes of bank instability, type of soils, slope gradient, drainage conditions, location, and levels of public use—and your stabilization objectives will help to determine your choices.

While inert structures may achieve the primary stabilization of an eroding or failing bank slope, plant material used in biotechnical stabilization is complementary to reduce surficial erosion by slowing surface runoff, intercepting transported sediment, and promoting infiltration of surface flow. Woody vegetation can also lend to stabilization of shallow failures through root reinforcement, hydraulic wicking, and buttressing.

- Contact the Planning Property and Development Department for engineering advice and the Public Works Department for vegetation advice.
- Technical assessment of the area of bank instability is required to determine how bank performance is controlled - by surficial erosion, deep-seated movement/failure, or by both conditions.
- Select and design appropriate site-specific biotechnical stabilization measures. Biotechnical stabilization may include the use of live stakes, live fascines, brush layers, root wads, pole drain systems, live crib walls, and vegetated rock gabions, to name a few of the many techniques available.
- Follow procedures for the harvesting, handling, storage, and installation of live plant material carefully. Use dormant live cuttings of easy-rooting native plant species (willows, dogwoods).
- Store and transport live-stake material in water. Install live, cut material in the ground as soon as possible after harvesting. Ensure good contact is created between live stems and soils. Work soils between live stems to promote root growth.

See also the
Vegetation
Management
BMP in this
document



Erosion
 Control
 BMPs -
 Permanent

Soil Bioengineering

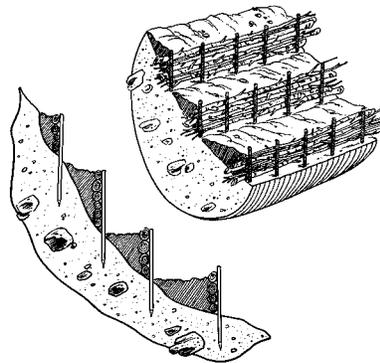
Description

Soil bioengineering is the use of vegetative structures alone to stabilize and protect soils, provide vegetative cover and reduce erosion. The term incorporates a range of techniques used to prevent erosion and control sediment; these include many of the techniques used in biotechnical stabilization such as live stakes, live fascines, and live pole drains, but without the “hard engineering component.”



Bioengineering can be used to provide vegetative cover in areas where planting and seeding is not possible. It is a technique that will require initial erosion control measures such as seeding and mulching vegetation grows.

- When constructing soil bioengineering structures, use native vegetation and consider salvaging materials on-site.
- Use cuttings from fast rooting plant species like willow, cottonwood, and red-osier dogwood.
- Use dormant plant material. Install structures in late fall/early spring to maximize plant survival.
- Use bioengineering in combination with other stabilization techniques such as grading or terracing on steep slopes to protect against surface erosion and mass wasting and to protect earth embankments, eroding stream banks and gullies.
- Information is available through the **Public Works Department** that may help you plan appropriate bioengineering applications for your work site.



Erosion Control BMPs- Permanent

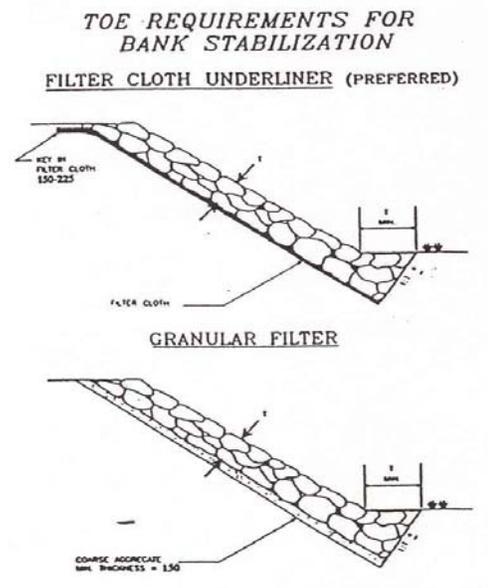
Gravel Blankets

Description

A gravel blanket or aggregate cover refers to the placement of crushed stone or gravel on highly erodible exposed soils to protect the slope from raindrop impact and surface flow. This stabilizes soil surfaces, particularly those where groundwater emerges, and reduces erosion with a cover that is stable in all weather conditions. A gravel blanket may also be used at unpaved construction site entrances to reduce erosion by vehicle traffic and prevent the transport of sediment.



- Use a gravel blanket on highly erodible slopes (silty and fine sandy soils) that cannot be stabilized by vegetative methods.
- Deposit a 3 to 5cm thick layer of clean granular aggregate on low gradient slopes of erosive material.
- Aggregate should be placed on the slope evenly and securely.
- On construction entrances, the area should be cleared of debris and a 15 to 20cm blanket of crushed aggregates placed evenly to follow the natural contours of the ground.
- Maintenance of this practice involves inspection for continued stability. Any erosion problems noted should be addressed immediately. For construction entrance blankets, additional gravels may be added to ensure sediments deposited on gravels are capped.



**Erosion
 Control
 BMPs-
 Permanent**

Riprap

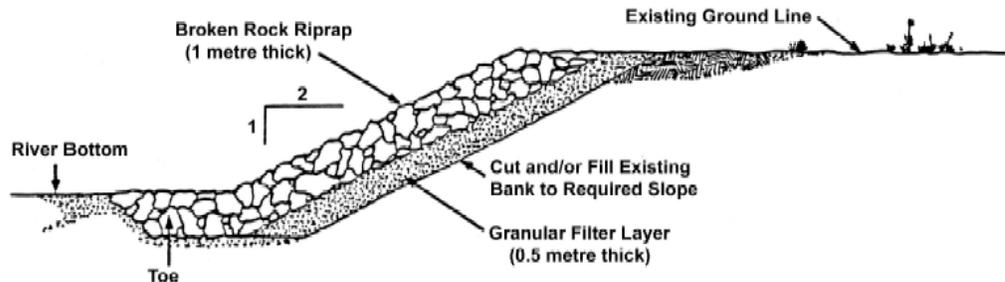
Description

Riprap is a protective layer of rock used to armor areas of bank erosion and scour. Riprap comes in a variety of sizes, from small stones to large boulders. Its angular and irregular shape helps to hold rock in place and resist the force of moving water.



Note: riprap should be used only in locations where bioengineering and biotechnical solutions are not feasible.

- Use larger angular rock to accommodate high channel velocities and shear stress conditions. Lay a non-woven geotextile as per engineer's advice on the slope surface prior to placement of rock.
- Select durable, well-graded materials such as dolomitic crushed limestone or granite field stone sized to withstand river hydraulics.
- Choose material that is clean and free of silt and fine sediment.
- Place riprap uniformly and carefully to eliminate weak areas where erosion may occur.
- Recess riprap flush with the natural grades where possible.
- Transition riprap into adjacent untreated lands.



TYPICAL SECTION

Surface Drainage Management

Description

Surface drainage management structures are used to reduce erosion by directing and containing surface flow. They include runoff control structures, like cross berms or diversion dikes, water bars, and channel liners.



Cross Berms/Diversion Dikes

Cross berms are temporary diversion dikes made of a ridge of compacted earth and constructed across the top or base of a disturbed slope. Upslope berms divert runoff from unprotected slopes and prevent erosion of the slope by lessening flow over the disturbed soils. Downslope berms divert sediment-laden waters coming off the disturbed slope to onsite sediment control structures thereby preventing soil movement off-site.

- Use cross berms or diversion dikes to divert stormwater runoff from exposed slopes and to retain sediment on site while permanent cover is established.
- Direct flows carried by the cross berms to constructed sediment traps or stabilized outlets.
- Use local materials to construct the berms. Grade the berm or dike to ensure flow velocity will not cause it to destabilize and erode.
- If the berm is to remain in use for more than 30 days, vegetate it to ensure stability and extend its functional life.
- Inspect berms periodically and after storm events to identify any needed repairs. Check that berms remain compacted and stable.

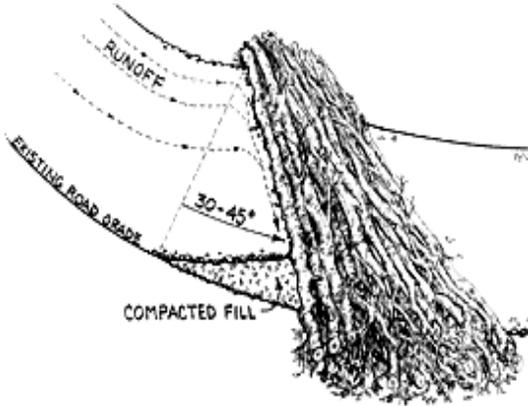
Water Bars

A water bar is a specific type of runoff diversion that is constructed diagonally at intervals across roads or rights-of-way subject to erosion. Water bars interrupt the flow of water on a long sloping right-of-way and divert portions of that flow to adjacent undisturbed areas for dissipation.



Very little maintenance is required when water-bars are properly constructed and placed in the right locations. Water bars can be constructed of compacted soil, gravel, rocks, or logs partially buried into the road or trail bed, placed at a 30° angle across the right-of-way. The material chosen should be durable enough to withstand expected traffic.

- Limit the drainage area to less than 0.4 hectares.
- Install the diversion as soon as the right-of-way has been cleared or graded.
- Space water bars closer on steep slopes to allow the dissipation of flow energy.
- Select stable discharge areas that provide sufficient retention or sedimentation capacity before water reaches a watercourse.
- Inspect water bars after every rainfall, or at a minimum of once per week to check for required repairs. Earth fill water bars damaged by vehicular traffic should be reshaped every day.



Channel Liners

Channel liners are materials used to reduce erosion within areas receiving stormwater runoff such as drainage channels, ditches and swales. Natural channel liners are usually rock or soils, but channel liners may be composed of a range of materials. Hard channel liners are erosion-resistant linings of riprap, paving or other structural materials that are used to convey water when flow velocity is too great for grassed swales. Soft or “green” channel liners are linings of grass, vegetation or geosynthetic products that handle lower velocity flow and act as effective filters, reducing runoff velocity and increasing infiltration.



- Use grass channel liners whenever possible. Vegetated channel liners are attractive and act to filter stormwater runoff, reducing erosion and sediment release.
- Use geotextile soft linings in channels where flow velocity is too great for grass or vegetated linings. These materials are flexible, easy to install and maintain, and aesthetically pleasing, but can be damaged by heavy traffic and extremes in temperature and flow.
- Use riprap as a flexible channel liner that will reduce outlet flow velocity, while preventing erosion and scouring of the channel.

- Use paved or concrete channel liners on very steep slopes, when other channel liners are not practical. Ensure the channel liner is constructed with stable materials and that the discharge location is protected from the high outlet flow velocities.
- Ensure channel liners are sized, installed and maintained properly as failure will likely result in severe erosion of the slope.

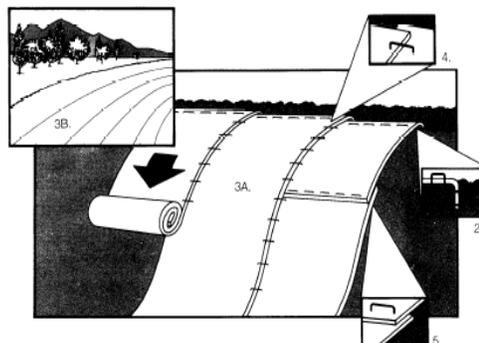
Erosion Control Blankets and Matting

Description

Erosion control blankets and matting are permeable blankets or matting made from synthetic or natural fiber used to temporarily protect a slope from raindrop impact and surface runoff. Matting may be synthetic and used for turf reinforcement, or made of jute, straw, paper or coconut fiber and used as a mulch netting to protect seeded areas during the establishment of permanent vegetation.



- Erosion control blankets and matting can be used on slopes and in swales and channels to protect newly established vegetation.
- Use fiber matting when seeding alone or hydroseeding/mulching is not adequate, on steeper slopes, in the winter season, or when site conditions are extreme.
- Several varieties of erosion control products and matting products are available. Check individual products for installation guidelines.
- To ensure a firm and continuous contact between the matting and slope, grade and shape the slope to remove any rocks and debris.
- Prepare the seed bed by loosening soils and applying any required soil amendments. Seed the area and apply the blanket immediately.
- Install the fiber matting loosely along the slope from top to bottom, overlapping edges and securing with staples.
- Bury the uphill end of the matting in a trench to secure in place.



- Inspect the matting periodically and after heavy rainfall events for erosion and undermining of the slope. Repair any failures immediately.
- Ensure that a berm is constructed along the top of slope to prevent water from running down the slope. Flows should be piped or otherwise conveyed along or down the slope to a safe discharge location.

Mulching & Hydroseeding

Description

Mulching is a temporary erosion control practice used to stabilize recently cleared or newly planted soils. A layer of organic material, straw, grass, woodchips or bark is placed over the exposed area and acts to protect soils from rainfall impact and reduce runoff velocity.



Hydroseeding is a process used to provide a temporary cover and aid revegetation through the spray application of a blended mix of seed, water, fertilizer and mulch.

**Erosion
Control
BMPs –
Temporary**

In some select areas (e.g., low gradient slopes or exposed soils in planting beds) the use of erosion control matting or blankets to cover exposed soils may not be warranted and mulching may be adequate. In other areas, slope conditions (e.g. steep and inaccessible areas or large slopes of relatively stable but unvegetated material) may permit the use of hydroseeding. Often hydroseeding mixtures use non-native grasses; requesting native seed mixes should be considered when selecting this technique.

- Use hydroseeding or mulching in combination with seeding or planting to stabilize soils, retain moisture and protect seedlings from extreme temperatures.
- Mulch alone, depending on the size and weight of the mulch material chosen, can be used on slopes with a less than 2:1 grade. On steeper slopes, use hydroseeding, mulch matting with netting or anchor mulch in place.
- If mulch is to be used, place mulch to cover the slope adequately with a 2 to 3 inch thick layer. Secure lighter mulches (e.g., straw) in place by applying a tackifier or mulch netting, or crimping into the soil.
- To maintain hydroseeded and mulched areas, inspect after storm events. Repair, reseed and remulch areas where washout or erosion has occurred.



Temporary Covers

Description

Temporary covers provide non-permanent protection of exposed surfaces from wind, rainfall and overland flow. Temporary covers may be vegetative (e.g., seeding, mulching, hydroseeding or sodding) or non-vegetative (e.g., gravel blankets, geotextiles, or plastic covers), but both types are designed to provide interim protection of exposed soils.



- Cover bare soils exposed during construction or maintenance activities and denuded areas like soil stockpiles, dikes, earthen dams, sides of sediment basins and temporary road banks with temporary covers.
- Choose a cover material appropriate to the site and the length of time the temporary cover is needed. A section of excavated bank or exposed soil on an active construction site can be easily protected from snow- or rainfall by the placement of a plastic cover. If a stockpile will remain in place for more than a few months during the growing season, consider the use of a temporary vegetative cover.
- Use temporary covers with other erosion and sediment control measures. They can help to reduce sediment runoff to downstream or off-site areas while permanent vegetation or other erosion control measures are establishing.



Sediment Controls

Description

Sediment Controls are designed to prevent the movement of erodible soils and transportation of sediment particles. While sedimentation is a natural process, it can be accelerated by construction and maintenance activities near watercourses.



**Sediment
Control
BMPs**

The following comments on operational BMPs for sediment control are largely directed towards controlling sediment associated with your works.

1. Both erosion and sediment control measures should be part of the planning and design stages of your works.
2. Develop a sediment control plan for your work area before beginning operations and maintenance activities to ensure that your works will not result in the release of any substance that could be deleterious (toxic) to fish or fish habitat.
3. Remove all excavated material to an approved disposal location above the ordinary high water level where it can be stabilized and prevented from entering a watercourse (e.g., use temporary covers, grade soils away from the watercourse, install silt fences around spoil piles, revegetate).
4. Use clean materials (those that are free of fine soils that may contribute sediment to the watercourse) when installing riprap or other bank erosion protection measures.

While the following select BMPs represent some of the most commonly used and preferred practices for Sediment Control, there are many other options, techniques and materials that can be used to prevent and limit erosion and sediment transport.

Sediment
Control
BMPs -
Permanent

Sediment Basins, Ponds and Traps

Description

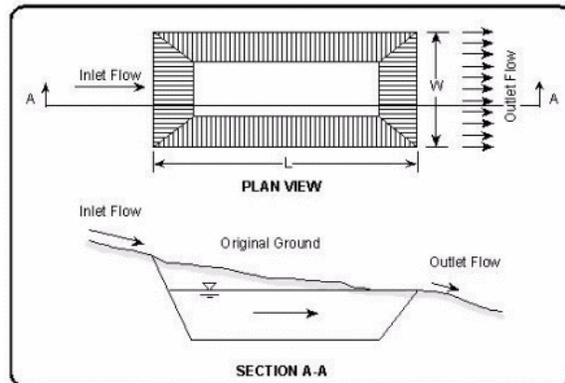
Sediment basins, ponds and traps are used to store sediment-laden runoff and allow sediment to settle out of the water column.

They are used when it is anticipated that other erosion controls may not be sufficient to prevent sediment from being carried off the site. Sediment traps are usually small temporary collection areas installed at site drainage discharge points, which work to slow runoff velocity and allow the larger particles of sediment to drop out prior to runoff reaching receiving watercourses. Unlike sediment traps, sediment ponds or sediment basins are usually larger temporary or permanent excavated structures or natural depressions that hold shallow pools of stormwater runoff.



When using sediment **traps**:

- Install sediment traps early in the construction process.
- Use sediment traps for drainage areas less than 2 hectares.
- Utilize natural drainage patterns in selecting a sediment trap location.
- Locate sediment traps in areas where potential overflow from stormwater will not cause further erosion of the slope and where maintenance crews can easily access them.
- Maximize the surface area of the trap to increase trap effectiveness. The longer the runoff is detained within the trap, the more effective the trap becomes at removing smaller particles like suspended silts and clays.
- Surround the trap with a compacted embankment, create shallow side slopes and line the inlet(s) and outlet with well-graded stone.

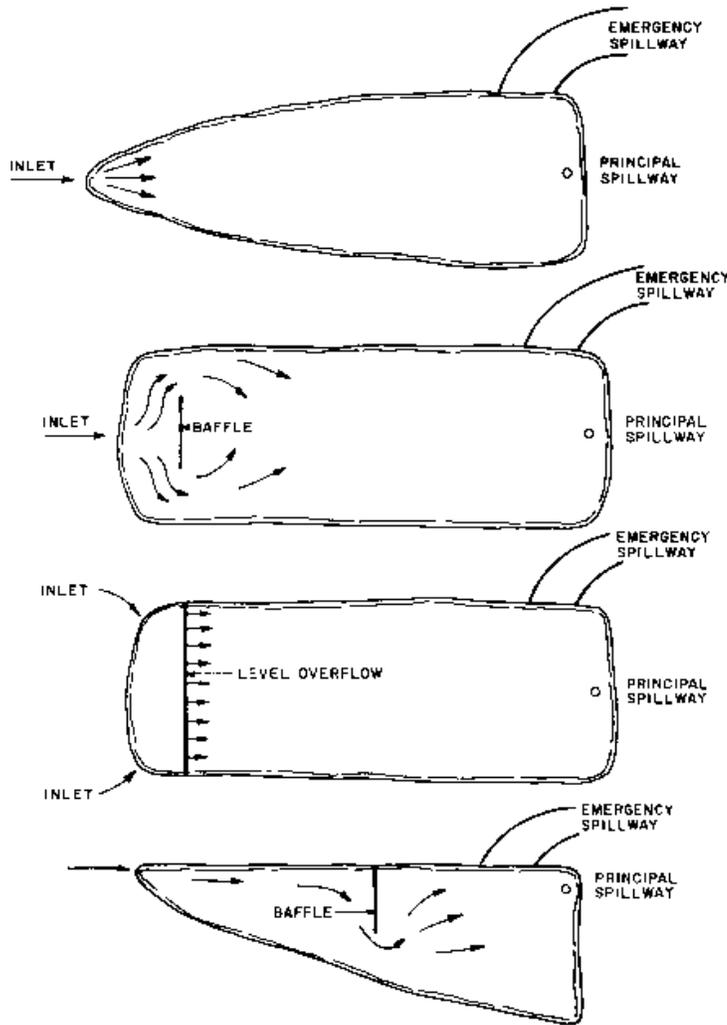


- Maintain the sediment trap by removing accumulated sediment when 30 to 50% of trap capacity is reached.
- Inspect the traps after each rainfall event.

When using sediment **ponds or basins**:

- Have an engineer design permanent sediment pond structures. Construct sediment ponds sized to meet drainage requirements.
- Design ponds specifically to prolong residence times and in order to settling out of suspension the finer particle sizes such as silts and clays.
- Consider the use of baffles constructed out of clear crush rock berms

IMPOUNDMENT CONFIGURATION



and/or non-woven filter fabric to promote a longer residence time. Baffles should extend the full width of the pond, rather than being staggered, to prevent increased velocity and subsequent re-suspension.

- Design the outflow structure to facilitate a top water decant, as typically the top several inches of the water column (surface) is the cleanest. This may be accomplished through the use of a non-perforated vertical riser pipe.
- Select sites and construct ponds prior to grading within the drainage area. Do not use sediment ponds in -line with continuously running water (live streams).
- Use ponds with large surface area-to-volume ratios for most effective sediment control.
- Use earthen dams for larger drainage areas and rock dams for smaller sites or where the dam is to be used as an overflow outlet.
- Inspect the basin or pond after every storm event to ensure proper drainage. Repair erosion of the dam or embankment immediately.
- Remove accumulated sediment from the pond when storage capacity reaches 50%.

Engineered Wetlands

Description

Engineered or constructed wetlands are designed to remove contaminants (e.g., oils, pesticides, nutrients, fertilizers, animal wastes) from stormwater runoff. They can be on-line or off-line, with on-line wetlands also providing storage for flood control and stream bank erosion protection. Constructed wetlands also create or restore valuable wildlife pond and marsh habitat and may be used for recreation. In most cases, engineered wetlands require site investigations and analysis to ensure they perform to required standards and flow dynamics.



**Sediment
Control
BMPs -
Permanent**

- Engineered wetlands can be constructed at varying scales to produce small local facilities or larger regional ones.
- Space requirements for this practice may limit its use in already developed areas, as wetland construction would require retrofitting existing green space.
- Use created wetlands and planted biofilters to provide pollution treatment of stormwater runoff while creating habitat for wildlife.
- Designs utilizing marsh-pond complexes and those with a 5-8 day detention period appear to be most effective at contaminant removal.
- Locate wetlands on areas of impermeable soils. If this is not possible, a liner will be required to help prevent the wetland from drying.
- Stabilize the outlet and inlet structures and ensure that some type of structure is placed that will act to dissipate the energy of the flow. This may include round rock or riprap or some type of weir structure.
- Create portions of the wetland with varying depths and plant with wetland and emergent type vegetation. In order to enhance wildlife habitat values, retain a forested buffer around the wetland.

Sediment Control BMPs - Temporary

Vegetated Swales

Description

Vegetated swales are grass-lined or planted shallow channels used to carry stormwater runoff. Vegetation lining the channel provides roughness, thereby reducing the flow velocity of runoff and acts to filter pollutants and sediments from stormwater. Vegetated swales are used in combination with other sediment and erosion control BMPs.



- Use vegetated swales in areas needing erosion-resistant channels (i.e., highly erodible soils, moderately steep slopes), but where flow velocity is not expected to exceed 1.5m/sec.
- Construct swales to follow natural drainage patterns.
- Swales should not receive direct sedimentation from disturbed areas, but rather should carry stormwater runoff around site perimeter.
- Only install if there is space available for the wide cross-section required for vegetative swales.
- Construct swales prior to site grading. Seed and cover bare soils with sod, mulch, netting or geotextiles.
- If vegetated swales are designed well they can be very effective at preventing erosion and reducing sediment carried in runoff. If they are designed poorly they can alter natural flow, may be destroyed in storm events or may become clogged with sediment.
- To maintain vegetated swales, grass should be cut and cleaning activities planned to retain vegetation while still ensuring adequate flow within the channel.



Silt Fence

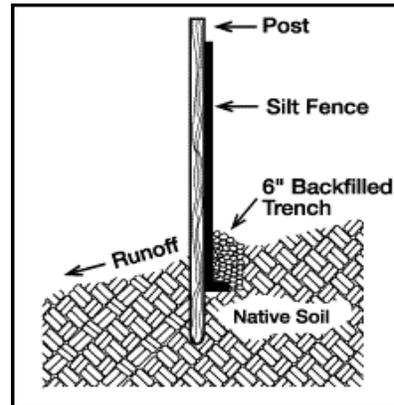
Description

A sediment or silt fence is a vertical woven geotextile barrier supported by posts and embedded at the lower edge. It is a temporary measure used to prevent silt from entering water bodies by surrounding a disturbed site and intercepting and retaining sediment from site runoff. Silt fences should not be placed perpendicular to flow, as they are essentially impermeable and any flow will likely end run.

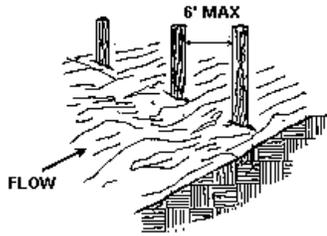


**Sediment
Control
BMPs -
Temporary**

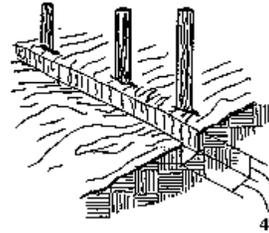
- Silt fences should be placed to follow slope contours along the base of exposed slopes.
- They are best used in long sections to minimize joints. At joints, sections should be overlaid for reinforcement.
- Posts should be spaced 2m apart. If 3m spacing is used, a wire fence on the downslope side should support the fence.
- Drive posts securely into the ground, ensuring posts are on the downslope side of the filter fabric, and turn the ends of the fence uphill to prevent flow from shortcutting the fence.
- Excavate a minimum 10cm by 10cm trench along the upslope side of the fence and place the lower portion of the filter fabric in the trench. Backfill and compact the trench.
- Inspect sediment fences after rainfall events. Remove sediment build-up around the silt fence when it reaches one-third to one-half of the silt fence capacity.
- Sediment fences should be removed once the upslope area has been permanently stabilized and sediment build-up on the upslope side of the fence has been removed.



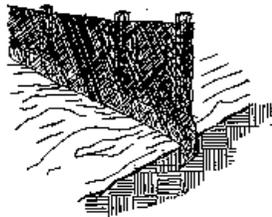
1. Set The Stakes



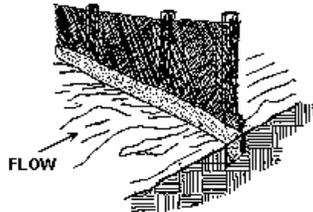
2. Excavate a Trench Upslope Along The Line of The Stakes



3. Staple Filter Material To The Stakes and Extend It Into the Trench



4. Backfill and Compact The Excavated Soil



SHEET FLOW INSTALLATION



Sediment fence used below exposed soil at a culvert outfall.



Sediment fence, while intercepting sediment from surface runoff, does little to address larger erosion problems.

Sediment
 Control
 BMPs -
 Temporary

Straw Logs

Description

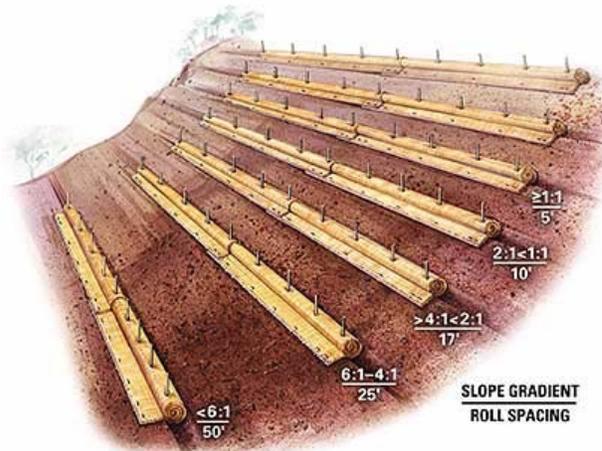
Straw logs are low maintenance, biodegradable and easily contoured sediment control structures. They are installed along slopes below areas of disturbance and around a site perimeter to slow and filter runoff and intercept sediment.



- Straw logs are easily constructed of rolled straw matting. Straw matting or straw and coconut fabric material specially prepared for use in constructing straw logs is also available.
- When installing straw logs, as with other sediment control structures, consider the slope gradient and expected surface flow when spacing the structures across the slope. Install the initial structure at the top of the slope or just below it and the final structure at or just beyond the toe of the slope.



- Excavate a shallow trench along the contour of the slope at the location where each straw log is to be installed. Place the unrolled straw matting material on the slope and roll into place in the trench. If larger diameter 'logs' are desired, filler materials such as loose straw or leaves may be rolled into the log. Use staples and stakes to hold the structure in place.
- Inspect after storm events, repair promptly, and clear accumulated sediment from the upslope side of each structure.
- Straw logs should be used in concert with other erosion controls, such as the placement of erosion control matting and planting or seeding.



Graphic: North American Green

**Sediment
Control
BMPs –
Temporary**

Permeable Ditch Berms/Energy Dissipaters

Description

Permeable ditch berms or energy dissipaters are reusable temporary structures used to provide erosion and sediment control by reducing runoff flow velocities and trapping sediment. Constructed of overlapping panels of shaped, durable and lightweight plastic, they are easily transported and installed.



- Consider the use of permeable ditch berms as an alternative to the use of hay bales. Permeable ditch berms are durable, flexible and can be easily anchored securely into place.
- Place permeable ditch berms on seeded slopes or runoff channels to assist revegetation. The energy dissipation of runoff flows will aid the establishment of seeded vegetation.
- Install permeable ditch berms in conjunction with erosion control blankets or matting to prevent undercutting and surface erosion.
- Inspect the berms regularly after storm events. To maintain the structures, remove any accumulated sediment.



Slope Scarification/ Roughening

Description

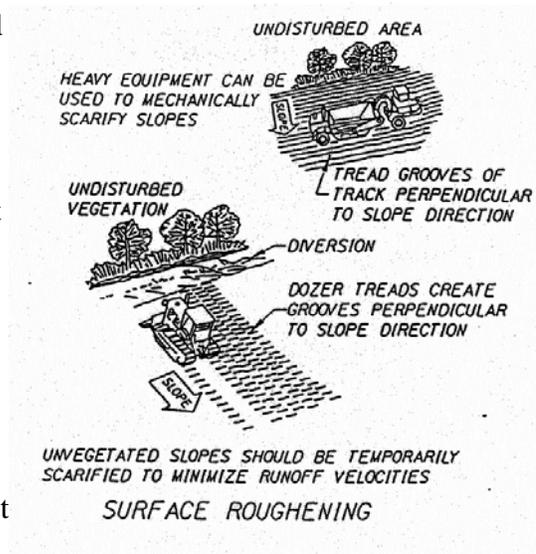
Slope scarification and roughening are temporary erosion control practices involving the surface roughening of an exposed slope. Roughening creates furrows or horizontal grooves while scarification textures the slope through the cutting and loosening of compacted soils. These practices prepare the slope for seeding and the establishment of vegetation increase infiltration of runoff and help to trap sediment in grooves and tracks.



Scarification can be a useful initial sediment control technique when it is used as part of a set of practices. On winter slopes during the construction phase, for example, slope scarification is an easy way to help reduce the risk of sediment moving during short melt periods that may occur while construction is underway.



- These practices are useful on most slopes, including those steeper than 3:1, on piles of excavated soils and on highly erodible materials.
- They can be used on frequently moved or disturbed soils and on areas that will not be immediately vegetated. In combination with seeding, planting and temporary mulching they further reduce erosion and sediment release.
- Complete this practice soon after the slope is exposed.
- To minimize compaction, limit use of tracked machinery to soils that do not compact easily (i.e. sands) and avoid tracking heavy clays.



- Maintain roughened slopes through regular inspection after rainfall events. Heavy rains will erode soil surfaces and limit the effectiveness of slope texturing techniques. If grooves or tracks are washed away, re-roughen. If rills appear on the slope, fill, grade and reseed immediately.

Check Dams and Ditch Blocks

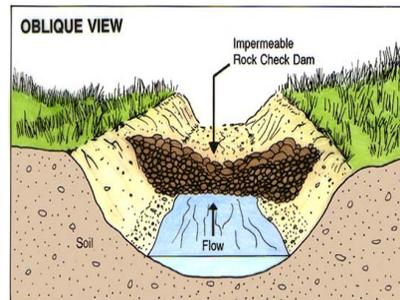
Description

Check dams and ditch blocks are small, temporary dams constructed across a swale, drainage channel, curb or gutter. They are typically gravel, rock, sandbag, log or straw bale structures used to slow the velocity of concentrated water flow, reduce erosion and catch sediment.



Check Dams

Check dams may also be used in curbs and gutters to reduce water velocities and capture sediments before they enter the storm sewer system. As their primary function is to slow runoff, they are most effective at sediment control when used in combination with other storm water and erosion and sediment control measures.



- Use check dams in swales, temporary channels or roadside ditches, but not in natural watercourses.
- Place check dams in channels draining stormwater off of disturbed areas or sites where temporary seeding has been done but is not yet established.
- In a long channel use check dams in a series to create multiple barriers to sediment runoff.
- Place materials carefully within the channel so the centre of the dam is lower than the edges touching the banks and the edges extend above the expected high water mark..
- Maintain the dam by ensuring it remains clear of leaves and debris and checking stability after storm events.



A specialized dam for blocking sediment from storm drains and catch basins.

- Remove the check dam only after the area being drained is completely stabilized. All sediment accumulated on the upstream side of the dam should be excavated prior to dam removal.

Ditch Blocks

Ditch blocks can be used in temporary ditches or permanent ditches not stabilized by vegetation to prevent the off-site transportation of sediments.

- Use ditch blocks in drainages constructed in erodible soils such as sands and silts and on steeper gradient channels.
- Earthen ditch blocks can be used to temporarily block flow from portions of ditch channels, to isolate disturbed areas from flow. Temporary diversion of water is required, through piping or pumping.
- Check dams are used as ditch blocks to reduce flow velocity, minimize erosion, and trap sediment from runoff in ditch channels. They can be used in any ditch requiring erosion protection.
- Rock check dams are generally used in higher flow velocities and slope gradients.



Temporary Water Diversions



Description

Temporary water diversions are techniques and structures used to isolate a work area from flowing water while ensuring that flow is conveyed to downstream watercourses. Diversion techniques should be selected with consideration of site-specific conditions, such as the volume of flow to be conveyed around the work area, the duration of the diversion and the scale of the work and channel.

Note:

Works that require temporary water diversions should be planned in consultation with DFO. Temporary water diversions for projects that may impact navigation on waterways and watercourses, such as larger scale construction projects, may also be regulated under the federal *Navigable Waters Protection Act*.

Common temporary water diversion techniques include:

1. Dam and Pump

- easily installed with minimal disturbance to the watercourse.
- provides temporary isolation for a short duration.
- upstream and downstream dams are installed and water is pumped around the work site.
- the number and size of pumps is determined by the volume of flow to be moved downstream.

2. Dam and Flume

- easily installed with minimal disturbance to the watercourse.
- provides temporary isolation for a longer period of time (more than one day).
- water is carried through the work site using a section pipe sized to adequately convey the channel flows.

3. Flow Diversion Channel

- used for larger instream works of longer duration.
- can involve the physical construction of a temporary diversion channel.

- more expensive and time-consuming to construct, but may be required to ensure environmental protection requirements are met.

General considerations include the following:

- Have all equipment and materials required for diversion (e.g., dam materials, flume, pump) on-site prior to initiating your instream work.
- Be sure that you have adequate hose or pipe length to carry the flow around or through your work site.
- Screen pump intakes with adequately sized fish-screens as outlined in the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO, 1995) to prevent fish mortality.
- Ensure that scour protection (a non-erodible surface) is placed at the outlet of pumps and flumes to protect channel banks and bottoms from eroding.
- If a flow diversion channel is to be used, excavate it “in the dry” and ensure its banks are stable before connecting it to the watercourse. Sediment controls may be needed to prevent the release of sediment-laden waters from the new channel.
- Ensure a fish salvage has been conducted within any portion of a fish-bearing watercourse that will be dewatered or isolated from flows for an extended period of time.
- When removing temporary water diversions, consider the use of temporary sediment control devices (e.g., gravel non-woven filter fabric check dams or floating silt curtain) downstream of disturbed work areas to prevent the release of sediment.
- When dewatering isolated work cells, discharge all sediment-laden water to a nearby vegetated area where it can settle and infiltrate.
- Re-establish flow through the channel by slowly breaching the top dam to allow water to enter the work area. Allow sediment to settle out of the water column before removing lower dam and temporary diversion structures.

Silt Containment Curtains/Turbidity Barriers

Description

Silt containment curtains, also known as turbidity barriers, are permeable barriers used to contain sediment-laden water within a work cell. Silt curtains can be placed across or within channels where wetted depth or width prevents the use of other isolation techniques. As the curtains are constructed of filter fabric suspended from a float line and held to the bottom by a heavy anchor line, they are typically used on low-flow sites where the work may be conducted “in the wet”.



Sediment Control BMPs – Temporary

- Consider the use of silt curtains if your works require short-term isolation within deep waters, along foreshores of large channels, or in areas where the placement of other isolation structures (sheet piles, sandbag coffer dams) is difficult.
- Ensure that your silt curtain is adequately sized to the length and depth of your work area.
- Install the silt curtain prior to the excavation of materials or the disturbance of soils and sediment. Secure one end in place and extend the curtain panel through the water, ensuring that the anchor line rests on the channel bottom and the float line remains on the water surface. Secure the other end of the curtain to create an isolated work cell along the affected portion of bank.
- Anchor both ends securely to the bank to ensure sediment-laden water will be contained. Additional support of the curtain may be required (e.g., support posts, rebar).
- Leave the silt curtain in place until sediment has settled out of water held within the work cell.



Sediment
 Control
 BMPs –
 Temporary

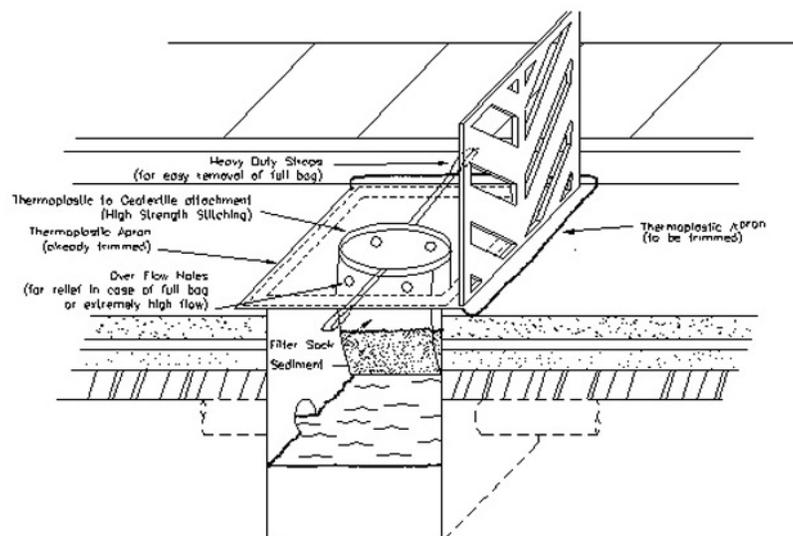
Stormwater Inlet/Catch Basin Filters and Dams



Description

Stormwater inlet/catch basin filters and dams are sediment control structures used to prevent the discharge of sediment-laden waters and debris to storm sewers and receiving watercourses. They act to filter or block debris and runoff entering stormwater drains and catch basins and are effective means of controlling transported sediment.

- Choose filters that fit. Filter sacks that hang below the storm drain grate may hold a greater volume of sediment, but can become stuck in inlets and may be difficult to remove without the use of heavy equipment. Filters that remain on the surface of the grate can be easily cleaned, but may require more routine maintenance.
- Inspect filters and dams regularly to ensure that they are functioning as desired, particularly after storm events.
- Maintain filters regularly. The removal and cleaning of filters should be done in a manner that prevents the release of the captured sediment to nearby storm drains and watercourses.
- While filter materials may adequately trap sediment, other chemically active substances such as concrete leachate are not effectively contained. Runoff containing concrete or cement compounds, paints, epoxies or other deleterious substances must be blocked from entering storm drains and catch basins through the use of dam structures.



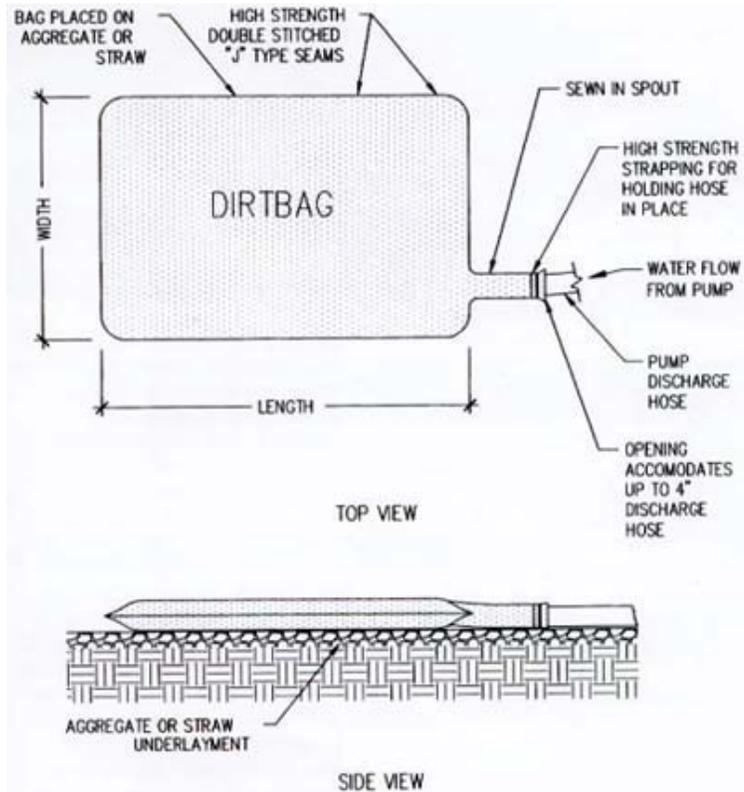
Pipe Socks and Dewatering Bags

Description

Pipe socks and dewatering bags are designed to control sediment flow entering or exiting pipes or pumps. They are typically used in dewatering applications at a pipe or pump outlet to collect sediment and debris from the conveyed water prior to its discharge to a waterbody.



- Select pipe socks and dewatering bags to adequately filter the volume of water expected to pass through the pipe or pump. Pipe socks and dewatering bags are typically constructed of non-woven geotextile materials and these materials may be specifically selected for the expected sediment particle size.
- Securely fasten pipe socks to pipes with clamps.
- Use the tie-down straps provided with a dewatering bag to secure the bag to the pump discharge hose.
- Place the dewatering bags on a level stabilized surface over dense vegetation/straw or gravel.
- Replace a pipe sock or dewatering bag when it is half full of sediment or when the sediment within the structure is blocking the conveyance of flow.
- Dispose of sediment and debris collected from the sock or bag in a manner that will prevent its introduction to any watercourse or waterbody. It may be acceptable in some cases to bury filled dewatering bags on site, providing visible fabric is removed and the area is seeded.



6.0 Important Contacts and Resources

Effective communication is key to achieving compliance for project work completed in and around water. Primary City of Winnipeg contacts were provided on the Call Card provided in Section 1.4 (page 5) of this Handbook.

6.1 Additional Contacts List

In addition to City of Winnipeg contacts provided on the Call Card in Section 1.4 of this Handbook, the following contact information for federal and provincial environmental agencies may be helpful.

Department of Fisheries and Oceans (Central and Arctic Region)	
Regional Headquarters Freshwater Institute 501 University Crescent Winnipeg, MB R3T 2N6	Telephone: (204) 983-5000
Habitat Management Manitoba - Winnipeg District	Telephone: (204) 983-5220
Manitoba Conservation	
Headquarters Operations 200 Saulteaux Crescent Winnipeg MB R3J 3W3	Telephone: (204) 945-6647 Fax: (204) 945-7782
Red River Region 123 Main Street, Suite 160 Winnipeg MB R3C 1A5	Telephone: (204) 945-7081 Fax: (204) 948-2338

6.2 Additional Information Sources

The following Internet links provide additional information on fish and fish habitat and associated best management practices. These links are provided for information purposes only.

To access the full text of applicable federal, provincial and City of Winnipeg legislation, try the following links:

Canadian Department of Justice – provides alphabetized links to federal statutes and regulations, including the *Fisheries Act*, *Migratory Birds Convention Act*, and *Navigable Waters Protection Act*.

<http://laws.justice.gc.ca/en/>

Laws of Manitoba – provides links to all provincial legislation and regulations.

<http://web2.gov.mb.ca/laws/statutes/index.php>

Bylaws of The City of Winnipeg- provides links to all consolidated Bylaws.

<http://www.winnipeg.ca/interhom/>

The federal Department of Fisheries and Oceans Web sites contain information on responsibilities pertaining to the *Fisheries Act*:

The Canada Fisheries Act.

<http://laws.justice.gc.ca/en/F-14/>

DFO Habitat Conservation and Protection Guidelines (1998).

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/fhmguide/index_e.asp

DFO Policy for Management of Fish Habitat.

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/legislation-lois/policies/fhm-policy/index_e.asp

DFO Guidelines for Attaining No Net Loss.

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/fhmcons/index_e.asp

DFO Freshwater Intake End-of-Pipe Fish Screen Guideline

<http://www.dfo-mpo.gc.ca/Library/223669.pdf>

“What the Law Requires” information.

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/guides/law-lois/index_e.asp

“Working In or Around Water?” Fact Sheet Series.

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/water-eau/index_e.asp

“What You Should Know About Fish Habitat” Manitoba Fact Sheet 1.

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/factsheets-feuillets/manitoba/fact1_e.asp

“What You Should Know About Fish Habitat and the Effects of Sediment” Manitoba Fact Sheet 6.

http://www.dfo-mpo.gc.ca/canwaters-eauxcan/infocentre/guidelines-conseils/factsheets-feuillets/manitoba/fact6_e.asp

For further standards and best practices documents, refer to the following Web sites:

Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat, prepared by DFO and Manitoba Conservation.

<http://www.gov.mb.ca/conservation/fish/images/stream.pdf>

Standards and Best Practices for Instream Works, BC Ministry of Water, Land and Air.

<http://wlapwww.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

Fish Habitat Manual, Alberta Transportation.

<http://www.trans.ab.ca/Content/doctype123/production/fishhabitatmanual.htm>

Washington State Integrated Streambank Protection Guidelines.

<http://wdfw.wa.gov/hab/ahg/ispgdoc.htm>

For information on Manitoba's fish and wildlife species, including species at risk, refer to the following Web sites:

Flora and Fauna, City of Winnipeg, Naturalist Services – provides detailed lists of plant and animal species within the City of Winnipeg.

<http://www.winnipeg.ca/publicworks/naturalist/ns/ff/default.asp>

Managing Animals, Plants and Habitats, Manitoba Conservation – provides an overview of species at risk in Manitoba, biodiversity conservation and habitat management.

<http://www.gov.mb.ca/conservation/wildlife/managing/index.html>

Manitoba Fish Key, Manitoba Conservation – a guide to fish frequently caught by sport fishermen.

<http://www.gov.mb.ca/conservation/fish/images/fishkey1.pdf>

For maps, atlases, and habitat inventories relating to your project area, try the following links:

City of Winnipeg Maps – a series of searchable Winnipeg maps.

<http://www.winnipeg.ca/interhom/maps/>

City of Winnipeg, Naturalist Services, Winnipeg Natural Habitat Maps – an interactive map that provides species lists and habitat descriptions for parks and open spaces throughout Winnipeg.

http://www.winnipeg.ca/publicworks/naturalist/ns/natural_areas/default.asp

Urban Habitat Stewardship Resource Network – provides maps and descriptions of different habitat types within the City of the Winnipeg.

<http://www.gatewest.net/~cwhp/>

For information on obtaining a Waterway Permit for construction along the City's Waterways, try the following link:

<http://www.winnipeg.ca/ppd/riverbank.stm>

7.0 Next Steps

This Handbook is a “living document”. It will be updated as new information on best practices becomes available, as changes occur in the regulatory requirements for work activities near waterways and watercourses, and as feedback is received from City staff and users of the Handbook. Updates will be posted on the City of Winnipeg website and an email notification will be sent to Handbook users.

Several initiatives are currently underway to develop accepted protocols for maintenance activities regularly undertaken by City of Winnipeg staff. Cooperative agreements, for example, are being developed between the City, The Forks and Parks Canada to facilitate maintenance activities in and around the multiple jurisdictions found at the confluence of the Red and Assiniboine Rivers. It is hoped that a series of protocols, acceptable to local environmental regulators, can be developed to streamline the implementation of common maintenance activities completed in and around the City's waterways and watercourses and protect the environmental attributes and values that they sustain.

Finally, the City wants to make this document as useful and as user-friendly as possible. If you have any suggestions to improve this Handbook, please feel free to fill out the Feedback Form found on the following page.

Feedback Form

Please feel free to share your comments on any aspect of this document in the space provided below. Your input will be used to guide future development of this document.

What do you like about the Best Practices Handbook?

What do you dislike about it?

What would you like to see changed in the next version of this document?

How can this document be made more useful to you?

Other comments?

Please detach or copy and submit completed forms to:

Don Kingerski, P.Eng.
Riverbank Management Engineer
Planning, Property & Development Department

8.0 Glossary

Alevin: for the first free-swimming stage of a juvenile fish which have recently hatched from the egg and during which the fish feeds off an attached yolk sac, which they eventually absorb.

Anadromous: Fish species that spawn in fresh water but spend a significant portion of their lives in the ocean (*e.g.*, coho, chinook, chum, pink and steelhead salmon).

Aquatic Habitat: Areas associated with water that provide food, cover and other elements critical to the completion of an organism's life cycle (*e.g.*, bogs, swamps, riparian areas and streams).

Avoidance: Minimizing the effects of an undertaking on fish habitat through the identification and bypassing of areas of concern to fisheries.

Bedload: Coarse granular material transported along the channel bottom in the lower layers of stream flow by rolling and bouncing, typically during elevated flow conditions.

Benthic Invertebrates: Animals lacking backbones that live in the substrates of aquatic systems.

Benthos: The bottom of a stream or lake and the organisms which inhabit them.

Berm: A ridge or small dike that breaks the continuity of a slope.

Best Management Practices (BMPs): A practice or combination of practices that are determined to be the most technologically and economically feasible means of preventing or managing potential impacts.

Biodiversity: The diversity of plants, animals and other living organisms in all their forms and levels of organization and the evolutionary and functional processes that link them.

Bioengineering: The use of living plant materials to perform some engineering function (*e.g.*, enhanced soil stability).

Biotechnical- The use of mechanical engineering elements along with complementary living plant material to stabilize banks and slopes.

Buffer: The portion of the management zone that is directly adjacent to the leave area.

Check Dam: A small dam constructed in a ditch or similar place to decrease water velocity and promote the accumulation of sediment. Similar definition as a silt trap.

Coffer Dam: A watertight enclosure built in a shallow river or creek, which is pumped dry to allow construction activities in the isolation of flowing water.

Compensation: “The placement of natural habitat, increase in the productivity of existing habitat or maintenance of fish production by artificial means in circumstances dictated by social and economic conditions, where mitigation techniques and other measures are not adequate to maintain habitats for Canada’s fisheries resources” (DFO, 1986).

Deleterious Substance: “Substance harmful to fish or fish habitat” (Canadian Fisheries Act, Section 36.3).

DFO: Department of Fisheries and Oceans (federal).

Diversion Dam: A barrier built within the active channel of a watercourse in order to divert water along a different flow path.

Diversion Ditch: A ditch that directs water and silt into stabilized areas away from a watercourse.

Due Diligence: A legal term that requires individuals on the job to maintain a reasonable standard of care. This term applies to environmental precautions but also to other areas such as safety, for example.

Dike: An impervious elongated mound of earth constructed to confine water or another liquid from entering or leaving an area of land.

Environmentally Sensitive Areas (ESA’s): Areas requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, and other natural systems or processes.

Environmentally-sensitive Lands: Areas so designated include wetlands, steep slopes, waterways, underground water recharge areas, riverbanks, natural plant and animal habitats, flood plains, and other landforms that are easily disturbed by development.

Erosion: The wearing away of soil and/or rock by water and/or wind action.

Fish Habitat: The *Fisheries Act* defines fish habitat as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes”. Fish habitat comprises physical, chemical and biological attributes of the freshwater, estuarine, marine and terrestrial (riparian) environment that directly or indirectly support fish populations.

Fisheries: Includes “fish” populations, as well as the “habitat” that supports fish. The term “fish” includes “shellfish, crustaceans, marine animals, and the eggs, spawn, sperm, spat and juvenile stages of fish, shellfish, crustaceans and marine animals” (*Fisheries Act*).

Fisheries Sensitive Zone (FSZ): An area, which encompasses the watercourse as well as associated riparian areas. Includes in-stream aquatic habitats, as well as the out-of-stream habitat features such as side channels and wetlands.

Fisheries Window: A time of reduced risk for important commercial, sport and resident fish species when instream construction is permitted. In Maple Ridge, typically from Aug 1st to Sept 15th annually.

Fry: The young stage of fishes (*i.e.*, less than one year old), particularly after the yolk sac has been absorbed.

Geotextile Filter Fabric: A synthetic material placed under erosion control material (*i.e.*, riprap), with the primary functions of layer separation, aggregate confinement and distribution of load.

Grade: The slope of road, channel, or natural ground.

Habitat: The place where an organism lives and/or the conditions of that environment including the soil, vegetation, water and food.

Habitat Enhancement: Any manipulation of habitat that improves its value and ability to meet the specified requirements of one or more species.

Large Organic Debris (LOD): A large tree part, conventionally a piece greater than 10 cm in diameter and 1 m in length that contributes to stream channel stability, creates fish habitat diversity, and provides cover for fish and their predators.

Harmful Alteration, Disruption or Destruction of Fish Habitat (HADD): The DFO define HADD of fish habitat as “any change in fish habitat that reduces its capacity to support one or more life processes of fish”.

Leave Area: The area of land and vegetation adjacent to an aquatic area that is to remain in an undisturbed state, throughout and after the development process.

Low Ground Pressure Machines: Machines that exert a total ground pressure of less than 43.4KPa (6.3lbs per square inch.).

Migration: Fish movements between two or more separate habitats (*e.g.*, from over-wintering habitat to spawning habitat).

Mitigation: Actions taken during the planning, design, construction, and operation of a project to alleviate or reduce potential adverse effects on fish habitat, such as culvert design modifications to allow fish passage, timing constraints for instream work, and erosion control measures.

No Net Loss: A working principle of the Federal DFO which strives to balance unavoidable habitat losses through avoidance, mitigation, and habitat replacement on a project-by-project basis. (DFO, 1986).

Nursery Habitat: Habitat where juvenile fish feed or take refuge (*e.g.*, backwater areas, shallow creek margins).

Revegetation: The re-establishment of vegetation in disturbed areas.

Riparian Vegetation: Vegetation adjacent to a watercourse, lake, swamp, or spring, that is generally critical for wildlife cover, fish food organisms, stream nutrients and large organic debris, and for stream bank stability.

Riparian Zone: Riparian zones typically consist of vegetated corridors adjacent to streams and lakes. Riparian zones are areas of transition between aquatic and upland ecosystems and provide a vital source of nutrients, cover and temperature regulation.

Riprap: Rock or stone placed on earth surfaces for protection of the soil against the erosive action of flowing water or precipitation.

Salmonid: A general term that collectively refers to salmon species, trout and char.

Sediment: Particulate matter that is entrained within, or settled out from, water.

Silt: The fine particulate fraction of sediment.

Silt Fence: A synthetic barrier erected to restrict the movement of unconsolidated material from a disturbed area to any sensitive areas.

Spawning Habitat: Fish habitat associated with the breeding of fish.

Stream: A watercourse, having an alluvial sediment bed, formed when water flows on a perennial or intermittent basis between continuous definable banks.

Streambank: The area resulting from downward cutting “erosion”, or scour of the channel substrate by hydraulic forces . Depending on bank materials and erosive forces, streambanks can take a vertical, sloping or undercut form.

Substrate: The bottom or bed materials of a water body or watercourse in which plants and organisms live and grow.

Suspended Solids: Particulate matter, such as silt or clay, that is entrained within a water column (*i.e.*, has not settled to the substrate)

Water Body: Areas inundated by water either permanently, or intermittently for a period of time exceeding 2 weeks of the year.

Watercourse: Means a drain, ditch, drainage ditch, culvert, water channel, retention pond or waterway, whether natural, constructed or altered.

Waterway: A river, stream, creek or canal, whether natural, constructed or altered and includes the frozen surface and bed of a waterway.

Woody Debris: Sound and rotting logs and stumps that provide cover for small animals and their predators (both fish and wildlife).

9.0 References

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PART III: Protocols for Activities In and Around the City's Waterways and Watercourses



Approved Protocols

For Activities In and Around
the City's Waterways and Watercourses
(DFO Operational Statements -
Valid until March 31, 2006)

These documents may be accessed on the world-wide web at

www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/mb/index_e.htm

This Operational Statement applies only to small-scale removal of aquatic vegetation for purposes of recreation (e.g., swimming) and navigation. Freshwater aquatic vegetation plays an important role as habitat for fish and other aquatic species. However, in some freshwater lakes and rivers, aquatic vegetation can be dense enough to interfere with recreation and navigation. This occurs in water bodies with high nutrient levels that create favourable conditions for aquatic vegetation growth. In many water bodies, even small amounts of vegetation removal can be harmful to fish and other aquatic life. However, in some water bodies, limited removal of aquatic vegetation using proper techniques can be done while protecting fish and fish habitat.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which small quantities of aquatic vegetation (i.e. no greater than a 4 metre wide band) may be removed and the measures to be incorporated into your Aquatic Vegetation Removal project in order to avoid negative impacts to fish habitat. **You may proceed with your Aquatic Vegetation Removal project without a DFO review when you meet the following conditions:**

- ▶ you are not working within West Hawk Lake, which is subject to provincial management consideration,
- ▶ you are not working within the following areas/water bodies where aquatic vegetation is limited:
 - ▶ Water bodies in Northern Manitoba as described by the *Manitoba In-Water Construction Timing Windows* (attached),
 - ▶ Water bodies in Southern Manitoba (as described by the attached *Manitoba In-Water Construction Timing Windows*) that contain lake trout,
- ▶ removal does not involve dredging the bottom of the water body, and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat During Small-Scale Aquatic Vegetation Removal* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat During Small-Scale Aquatic Vegetation Removal

1. Time aquatic vegetation removal to protect spawning fish, their incubating eggs, and larval life stages. Adhere to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*).
2. The removal of aquatic vegetation for navigation and recreation purposes will not exceed a 4 metre wide band. This 4 metre wide band extends out perpendicular from the shoreline into the water body until you reach the navigable channel and includes any existing plant-free areas.
 - 2.1. Removal techniques should avoid disturbing the bottom substrates of the lake or river. This means you should try not to create large clouds of suspended silt and muck when removing the aquatic vegetation.
 - 2.2. Leave all rocks and woody material in the area that is being cleared of aquatic vegetation. If necessary for safe navigation, rocks and woody material can be moved to similar depth areas adjacent to the cleared channel.
3. Hand removal of aquatic vegetation is the most preferred method. If hand removal is not possible, use only floating machinery to prevent disturbance to the bottom substrates of the lake or river.
 - 3.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 3.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 3.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
4. Place all vegetation removed in an appropriate landfill or composting location well above the ordinary high water mark (see definition below).



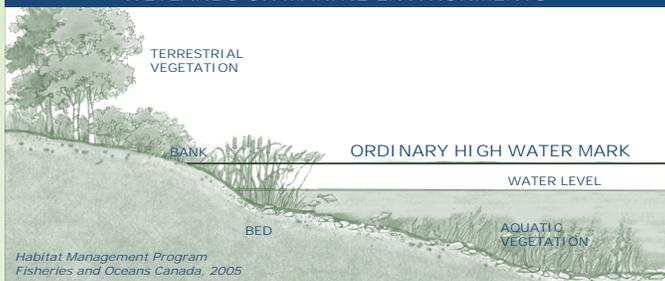
AQUATIC VEGETATION REMOVAL

VERSION 1.0
Valid until March 31, 2006

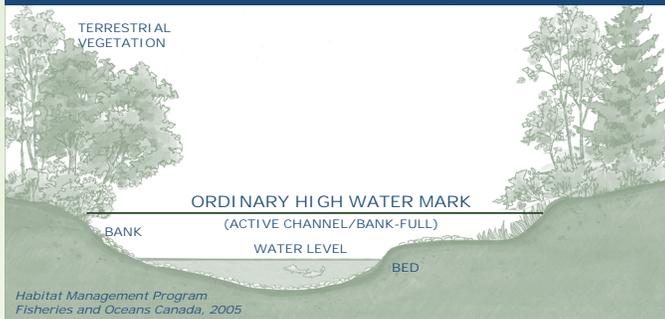
Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).

CROSS-SECTION OF INLAND LAKES, WETLANDS OR MARINE ENVIRONMENTS



CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)



FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

Aussi disponible en français.



This Operational Statement addresses beach creation projects that involve a small waterfront recreation area, located entirely above the ordinary high water mark (see definition below). Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to this type of beach development. Riparian vegetation occurs adjacent to the water body and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas, so should remain undisturbed to the greatest extent possible. It is important to design your beach to meet your needs while also protecting riparian areas.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into the design, construction and maintenance of your Beach Creation project in order to avoid negative impacts to fish habitat. **You may proceed with your Beach Creation project adjacent to freshwater lakes, rivers and streams without a DFO review when you meet the following conditions:**

- ▶ the proposed beach, associated structures and materials are placed above the ordinary high water mark (see definition below).
- ▶ the combined width for all existing and proposed shoreline improvements (docks, boathouses, beaches) is less than 25% of the property's riparian area width (shoreline frontage width), and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Creating a Beach* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Creating a Beach

1. It is preferable to build the beach where sand, pebble or small gravel substrates already exist and in a flat, gently sloping area to prevent the beach material from drifting into the water.
2. Do not take materials (i.e., rocks, logs) from the shoreline, from below the ordinary high water mark or from the lake or river bottom to build the beach.
3. Install effective sediment and erosion control measures before starting work to prevent sediment from entering the water body. Inspect them regularly during the course of construction to ensure that they are functioning properly. Make all necessary repairs if any damage is discovered.
4. Leave a vegetated strip or construct a small berm or edging out of rocks or wood between the beach and the shoreline, lined appropriately with filter cloth to prevent beach sand from entering into the water. Locate this berm or edging above the ordinary high water mark.
5. Use naturally rot-resistant untreated materials (e.g. cedar, hemlock, rocks, plastic) to build beach structures where possible. Treated lumber may contain compounds that can be released into the water and become toxic to the aquatic environment.
 - 5.1. If treated lumber is used for beach structures it should be environmentally-friendly (see definition below).
 - 5.2. Cut, seal and stain all lumber away from the water using only environmentally-friendly stains (see definition below). All sealed and stained lumber should be completely dry before use near water.
6. Operate machinery on land above the ordinary high water mark and in a manner that minimizes disturbance to the banks of the water body.
 - 6.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
7. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the beach. This removal should be kept to a minimum.
8. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
9. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to



prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.

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

Definitions:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).

Environmentally-friendly lumber and stains:

Chemical wood preservatives used in Canada are regulated by the Pest Management Regulatory Agency, Health Canada. Approved preservatives used most commonly in lumber are Alkaline Copper Quaternary (ACQ) and Copper Azole (CA). Creosote treated wood should not be used in or near water. Ask your local building supply outlet for further information on available products.

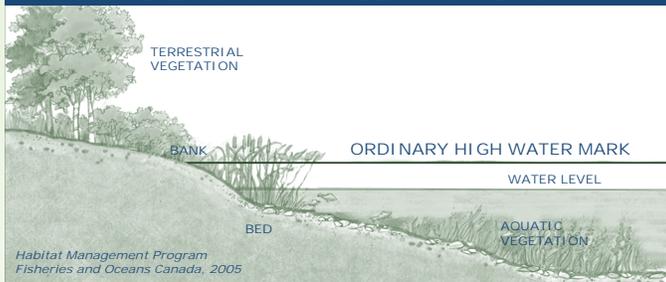
FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

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R3T 2N6
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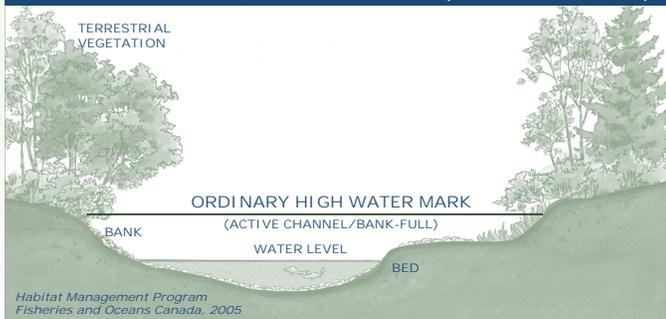
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Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
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Aussi disponible en français.

CROSS-SECTION OF INLAND LAKES, WETLANDS OR MARINE ENVIRONMENTS



CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)



Beaver dams may need to be removed or breached periodically to protect, maintain or construct infrastructure or to avoid the flooding of private and public land. Although beaver dams may provide fish habitat by creating upstream ponds, stabilizing flows and adding woody debris for cover, they may also present a barrier to fish movement, alter sediment transport regimes and increase water temperatures. Removal of beaver dams can negatively affect fish and fish habitat by de-watering the upstream pond, stranding fish and releasing sediment and large volumes of water (that can be devoid of oxygen, particularly in winter) downstream. The breaching or removal of a beaver dam may not prevent future beaver activity in the area. Persistent breaching or removal of a beaver dam can increase the risk of negative impacts to fish habitat. In these instances, other beaver management techniques should be considered.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into your Beaver Dam Removal project in order to avoid negative impacts to fish habitat. **You may proceed with your Beaver Dam Removal Project without a DFO review when you meet the following conditions:**

- ▶ removal of the dam will not adversely affect a fishery, or recreational or property uses that depend on the dam's existence, both upstream and downstream,
- ▶ removal activities are limited to removing or breaching the beaver dam itself and do not involve channel modification (e.g., widening, straightening, ditching, etc.),
- ▶ individual detonations of more than one kilogram of explosives will not be used to remove the dam (diesel fuel and fertilizer is not to be used as a type of explosive),
- ▶ the removal does not involve a beaver dam that is directly connected with a culvert or bridge (removal in these situations is addressed in Operational Statements for Culvert Maintenance and Bridge Maintenance), and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Removing Beaver Dams* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Removing Beaver Dams

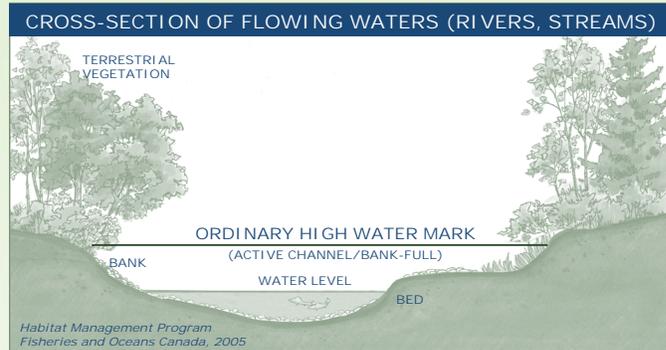
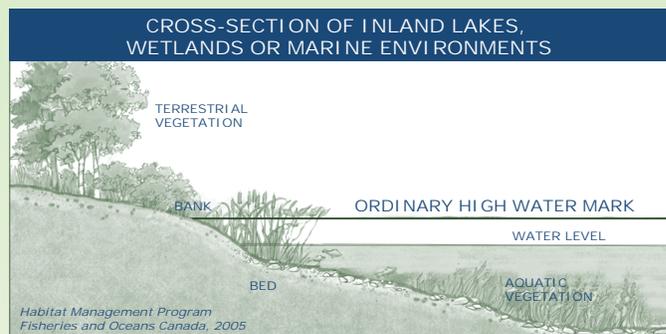
1. For non-emergency beaver dam and debris removals (e.g., removal with hand tools, machinery, explosives), time the activity to protect spawning fish, their incubating eggs and larval life stages by adhering to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*). Any proposal to conduct such work under ice-covered conditions requires prior review by DFO.
2. Emergency beaver dam removal can be carried out at any time during the 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. Your local DFO office is to be notified immediately. **You should follow all other measures to the greatest extent possible.**
3. 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 to ensure they are functioning properly. Make all necessary repairs if any damage is discovered.
4. Operate machinery from outside of the water and in a manner that minimizes disturbance to the banks or bed of the watercourse.
 - 4.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 4.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 4.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
5. Remove the dam gradually to allow the water to release slowly and prevent sediment at the bottom of the pond from being released downstream. As the water levels drop in the upstream pond, increase the size of the opening to drain the pond to the desired level. Dam removal activities should not result in any alteration to the natural shoreline. The width of the breach opening of the beaver dam should not exceed the width of the original stream channel to prevent bank erosion and flooding of adjacent properties. Any removal of a beaver dam should avoid severe flooding, downstream habitat damage and damage to property of downstream landowners (e.g., when a series of beaver dams is to be removed, this should be done from downstream to upstream, etc.).



6. If blasting is required, individual detonations should be minimized (no more than one kilogram and preferably smaller). If larger charges are required, contact DFO prior to commencing the work.
7. Safely return any fish that become trapped in isolated pools, or that are stranded in newly flooded areas, back to the main channel of the watercourse.
8. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
9. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access and remove the beaver dam. This removal should be kept to a minimum.
10. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.
11. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

Aussi disponible en français.



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 covered by this Operational Statement include only: 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, removal of debris to protect piers and abutments and structural repairs, as described below.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into your Bridge Maintenance project in order to avoid negative impacts to fish habitat. **You may proceed with your Bridge Maintenance project without a DFO review when you meet the following conditions:**

- ▶ the work does not include realigning the watercourse or replacing the existing bridge,
- ▶ the work does not involve any dredging, placing fill, or excavating the bed below the ordinary high water mark (see definition below),
- ▶ the withdrawal of any water will not result in a reduction in the wetted width of the stream, and will not exceed 10% of the instantaneous flow, in order to maintain existing fish habitat, and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Maintaining a Bridge* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (for example, the *Navigable Waters Protection Act*) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Maintaining a Bridge

1. Deck Sweeping
 - 1.1. Seal drains and open joints before sweeping to prevent loose material from falling into the watercourse.
 - 1.2. Clean and remove debris and sediment from drainage devices and dispose of the material in a way that will prevent it from entering any watercourse
2. Deck Washing
 - 2.1. Seal drains and open joints before washing to prevent sediment-laden wash-water from entering the watercourse. If a bridge deck has no curbs, install temporary ones (e.g., a water-filled hose line) prior to washing to help direct the water towards the ends of the bridge.
 - 2.2. Sweep decks, including curbs, sidewalks, medians and drainage devices to remove as much material as practical before washing.
 - 2.3. Direct wash-water past the ends of the bridge deck to a collection basin or a vegetated area that effectively removes suspended solids, dissipates velocity and prevents 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. For open-decked structures, take whatever means are practical to prevent accumulated materials from entering the watercourse, such as sweeping and disposing of accumulated material.
 - 2.4. The intakes of pumping hoses should be equipped with an appropriately sized screen to avoid entrainment and impingement of fish. Guidelines to determine the appropriate mesh size for intake screens may be obtained from DFO (*Freshwater Intake End-of-Pipe Fish Screen Guidelines*, 1995, available at www.dfo-mpo.gc.ca/Library/223669.pdf).
3. Removal and Application of Protective Coatings
 - 3.1. 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.
 - 3.2. Use measures such as barges or shrouding to trap and prevent blasting abrasives, protective coatings, rust and grease from entering the watercourse.
 - 3.3. Contain paint flakes, abrasives and other waste materials for safe disposal.
 - 3.4. Store, mix and transfer paints and solvents at a suitable location on land away from the watercourse and not on the bridge to prevent these materials from entering any watercourse in the event of a spill.
 - 3.5. Do not clean equipment in the watercourse or where the wash-water can enter any watercourse.
4. Removal of Debris (including woody debris, garbage and ice build-up)
 - 4.1. Unless the debris accumulation is an immediate threat to the integrity of the piers and abutments or wing walls (see Measure 4.4), time debris removal to protect spawning fish, their incubating eggs and larval life stages by adhering to fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*), with the exception of removal of ice build-up.



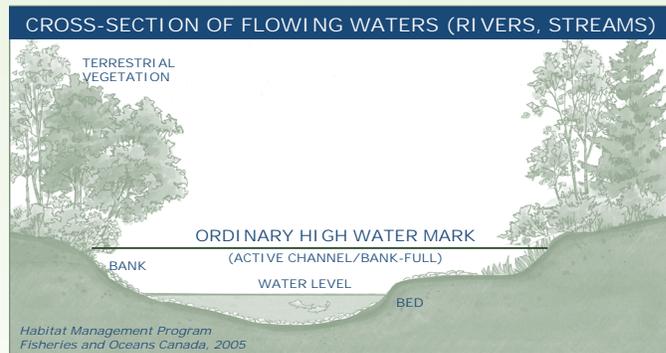
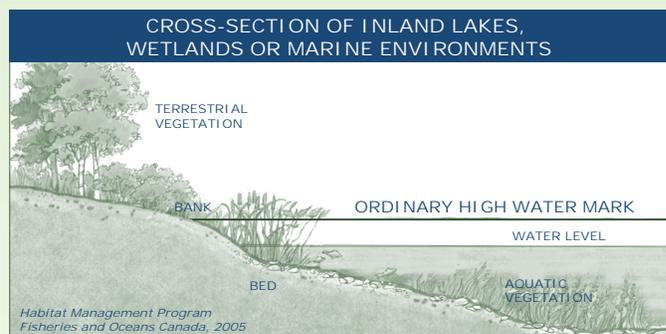
- 4.2. Limit the removal of debris to the material located within the stream crossing right-of-way, which is necessary to protect piers and abutments or wing walls (i.e., debris built-up against piers, abutments or wing walls).
- 4.3. Remove debris by hand or with machinery operating from shore or a floating barge. Explosives are not to be used to remove debris.
- 4.4. 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.**
- 4.5. 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.
5. Structural Repairs and Reinforcements
 - 5.1. Use measures such as barges or shrouding to trap and prevent concrete and/or other bridge materials from entering the watercourse.
 - 5.2. If replacement rock reinforcement/armouring is required to protect the abutments and/or wing walls by stabilizing eroding areas around them, the following measures are to be incorporated:
 - 5.2.1. Place appropriately-sized, clean rocks into the eroding area by hand, or utilize machinery operating from shore.
 - 5.2.2. Do not obtain rocks from below the ordinary high water mark (see definition below) of any water body.
 - 5.2.3. The use of acid-containing rocks such as sulphide-producing materials commonly obtained from metal mines, or poor quality limestone rocks such as those that fracture and break down quickly when exposed to the elements, should be avoided.
 - 5.2.4. Install rock at a stable slope to maintain a uniform stream bank and natural stream alignment.
 - 5.2.5. Ensure rock does not interfere with fish passage or constrict the channel.
 - 5.2.6. If any in-water work is involved, adhere to fisheries timing windows, as outlined in Measure 4.1 above.
6. Operate machinery from outside of the water, or on the water in a manner that minimizes disturbance to the banks or bed of the watercourse.
 - 6.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
7. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be required. This removal should be kept to a minimum and should be limited to within the right-of-way of the bridge.
8. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them

from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.

9. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.
10. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



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Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
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This Operational Statement applies to the construction of only those small-scale bridge structures that completely span a watercourse without altering the stream bed or bank, and that are a maximum of two lanes wide. A clear-span bridge is often more preferred than a culvert as no structures are placed on the stream bed or banks.

Clear-span bridge construction has the potential to negatively affect riparian habitat. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas. Only the vegetation required to be removed to meet operational and safety concerns for the crossing structure and the approaches should be removed.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into the design and construction of small-scale, clear-span roadway or railway bridges in order to avoid negative impacts to fish habitat. **You may proceed with your Clear-Span Bridge project without a DFO review when you meet the following conditions:**

- ▶ the bridge is no greater than two lanes in width and does not encroach on the natural channel width by the placement of abutments, footings or armouring (e.g., rock and concrete) below the ordinary high water mark (see definition below) so that there is no restriction to natural channel processes,
- ▶ the work does not include realigning the watercourse,
- ▶ disturbance to riparian vegetation is minimized,
- ▶ the work does not involve dredging, infilling or excavating the bed or bank of the watercourse, and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing Clear-Span Bridges* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., the *Navigable Waters Protection Act*) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This

information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Constructing Clear-Span Bridges

1. Avoid building on meander bends, braided streams, alluvial fans or any other area that is inherently unstable and may result in the erosion and scouring of the bridge structure.
2. Construct the bridge structure (including any approaches, abutments, armouring (rock and concrete) or footings) entirely above the ordinary high water mark (see definition below) and away from areas with eroding or unstable banks.
3. Construct the bridge structure with sufficient freeboard to pass floating objects at high flows.
4. Design the bridge so that stormwater runoff from the bridge deck, side slopes and approaches is directed into a collection basin or a vegetated area having suitable features to remove suspended solids, dissipate velocity and prevent sediment and other deleterious substances from entering the watercourse.
5. Generally, there are no restrictions on timing for the construction of clear-span structures as they do not involve in-water work. However, if there are any activities with the potential to disrupt spawning fish, their incubating eggs and larval life stages (e.g., in-water crossing of watercourse by machinery), these should adhere to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*).
6. Machinery fording the watercourse to bring equipment required for construction to the opposite side of the watercourse should be limited to a one-time event (over and back) and occur only if an existing crossing at another location cannot be used. If the stream bed and banks are highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment crossing, then a temporary crossing structure or other practices should be used to protect these areas. For information consult the *Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat* (Manitoba Natural Resources and DFO, 1996). The fording should also adhere to the timing windows specified in Measure 5.
7. Install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. Pay particular attention to the ditches of road approaches. Inspect measures regularly during the course of construction and until any required re-vegetation has established to ensure they are functioning properly. Make all necessary repairs if any damage is discovered or if these measures are not effective at controlling erosion and sedimentation.
8. Operate machinery from outside of the water and in a manner that minimizes disturbance to the banks of the watercourse.
 - 8.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 8.2. Wash, refuel and service machinery and store fuel and other

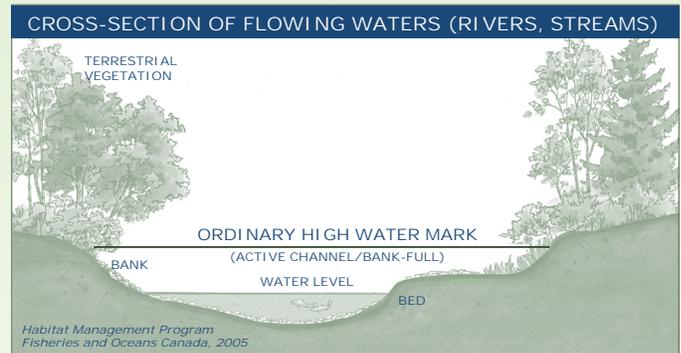
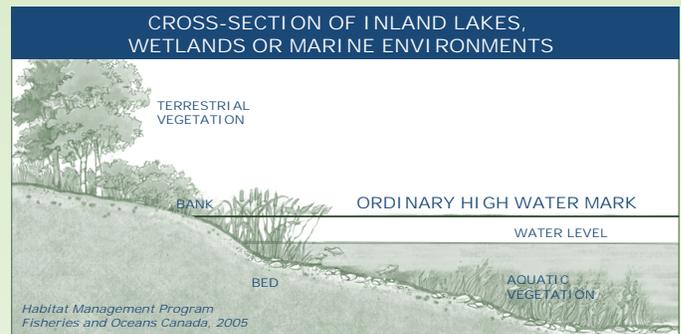


materials for the machinery away from the water to prevent deleterious substances from entering the water.

- 8.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
9. Use measures to prevent deleterious substances, such as new concrete (i.e., it is pre-cast, cured and dried before use near the watercourse), grout, paint, ditch sediment and preservatives from entering the watercourse.
10. While this Operational Statement does not apply to the clearing of riparian vegetation, the removal of select plants may be required to meet operational and/or safety concerns for the crossing structure and the approaches. This removal should be kept to a minimum and will not occur outside of the road right-of-way.
11. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
12. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.
13. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



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Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

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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 replacing damaged or destroyed culvert bevel ends. Culverts requiring regular maintenance should be considered for future remediation via redesign or reinstallation.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into your Culvert Maintenance project in order to avoid negative impacts to fish habitat. **You may proceed with your Culvert Maintenance project without a DFO review when you meet the following conditions:**

- ▶ it does not include realigning the watercourse, installing a culvert liner, or extending/replacing the existing culvert,
- ▶ it does not include any dredging, infilling (e.g., filling scour pools) or excavation of the bed or bank of the watercourse, and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Maintaining Culverts* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., the *Navigable Waters Protection Act*) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Maintaining Culverts

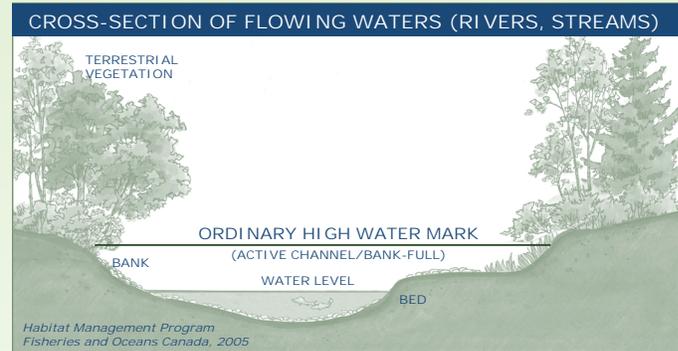
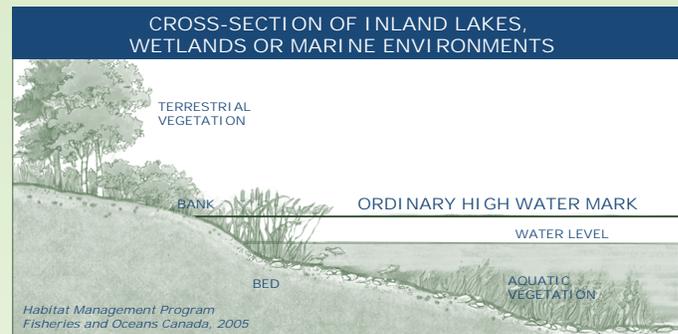
1. Removal of Debris (including woody debris, garbage and ice build-up):
 - 1.1. Non-emergency debris removal should only be done by hand or with machinery (e.g., backhoe). Time your material and debris removal activities to protect spawning fish, their incubating eggs and larval life stages by adhering to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*), with the exception of removal of ice build-up. Any proposal to conduct such work under ice-covered conditions (except for removal of ice build-up) requires prior review by DFO.
 - 1.2. 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. The local DFO office is to be notified immediately. **You should follow all other measures to the greatest extent possible.**
 - 1.3. Limit the removal of accumulated debris (i.e., branches, stumps, other woody materials, garbage, ice build-up, 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.
 - 1.4. Explosives are not to be used to remove debris.
 - 1.5. Remove accumulated debris gradually to prevent downstream erosion, flooding and the mobilization of sediment from the upstream ponded area. Gradual dewatering will also reduce the potential for stranding fish in upstream areas. Any removal of debris (including a beaver dam) should avoid severe flooding, habitat damage and damage to property of downstream landowners (e.g., when a series of debris dams is to be removed, this should be done from downstream to upstream, etc.).
 - 1.6. 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 culvert structure.
2. Install effective sediment and erosion control measures before starting work in order to prevent the entry of sediment into the watercourse. Pay particular attention to the ditches of road approaches. Inspect them regularly during the course of the work and until any required re-vegetation is established to ensure they are functioning properly. Make all necessary repairs and adjustments if any damage is discovered or if these measures are not effective in controlling erosion and sedimentation.
3. Operate machinery from outside of the water and in a manner that minimizes disturbance to the banks of the watercourse.
 - 3.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 3.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 3.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.



4. If replacement rock is required to stabilize eroding inlets and outlets, the following measures should be incorporated:
 - 4.1. Place appropriately-sized, clean, rocks into the eroding bank area only by hand or using machinery operating outside of the water.
 - 4.2. Do not obtain rocks from below the ordinary high water mark of any water body (see definition below).
 - 4.3. The use of acid-containing rocks, such as sulphide-producing materials commonly obtained from metal mines or poor quality limestone rocks, such as those that fracture and break down quickly when exposed to the elements, should be avoided.
 - 4.4. 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 that it is stable.
 - 4.5. Ensure rock does not interfere with fish passage or constrict the channel width.
 - 4.6. If any in-water work is involved, adhere to fisheries timing windows, as outlined in Measure 1.1 above.
5. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
6. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.
7. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



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R3T 2N6
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R7N 1G8
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Docks and boathouses are common features on the shorelines of lakes and rivers in Canada and are an important part of the recreational use of our waterways. The shoreline area in front of your cottage or waterfront property is also important habitat for a variety of aquatic organisms, including fish. Fish lay their eggs, feed and hide from predators in these shoreline areas. Building a dock or boathouse along your waterfront can impact this important habitat.

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The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into the design, construction, rebuild and repair of your dock or boathouse, in order to avoid negative impacts to fish habitat. **You may proceed with your Dock or Boathouse project without DFO review when you meet the following conditions:**

- ▶ you are not working within West Hawk Lake, which is subject to provincial management consideration,
- ▶ it is a new repair or rebuild of a floating, cantilever or post dock or boathouse,
- ▶ it is a new, repair or rebuild of an open-faced crib dock built entirely on natural bedrock or sand bottom with a total combined footprint (for both existing and proposed cribs) of 15m² or less,
- ▶ the total surface area for the entire dock and boathouse, located below the ordinary high water mark, including both existing and proposed structures combined, does not exceed 50m²,
- ▶ it is not made of concrete or steel sheeting or any other skirting that isolates the area under the dock from the rest of the water,
- ▶ it does not require any dredging, blasting or infilling in the water body,
- ▶ the combined width for all existing and proposed shoreline improvements (docks, boathouses, beaches) is less than 25% of the property's riparian area width (shoreline frontage width), and
- ▶ you incorporate the *Measures to Protect Fish Habitat when Building your Dock or Boathouse* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., the *Navigable Waters Protection Act*) that apply to the work being

carried out in relation to this Operational Statement. Please note that permanent structures (docks or boathouses) are not allowed on waters regulated by Manitoba Hydro along the Winnipeg River. Docks must be removable types and boathouses must be built on shore above the ordinary high water mark (see definition below). Contact the Manitoba Hydro Shore Lands Permit Program for more information.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish Habitat when Building your Dock or Boathouse

1. Floating, cantilever and post docks, and marine railways (on posts) for boathouse access can be installed at any time.
2. Time the installation of crib docks with a total combined footprint (total area of cribbing in contact with the bottom) of up to 15m² to prevent disruption of spawning fish, their incubating eggs and larval life stages by adhering to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*).
3. Construct cribs in an open faced manner and fill with large rocks that provide crevices for fish and other small organisms to use. Leave enough space between cribs (two metres or more) and locate them at least two metres from the ordinary high water mark (see definition below) to allow near shore water to circulate. The construction of boathouses above the ordinary high water mark is strongly encouraged in order to minimize impacts to fish habitat.
4. Materials (e.g., rock, logs) to build the dock should not be taken from the shoreline, from below the ordinary high water mark or from the lake or river bottom. Use clean materials that are free of dirt.
5. If rocks, stumps or logs need to be moved on the lake or river bottom or shoreline to build the dock, they are relocated to an area of similar depth adjacent to the dock and not removed altogether from the bottom or shoreline.
6. The entry of sediments from the construction site into the water body can harm fish and fish habitat. Ensure that the appropriate sediment and erosion control measures (i.e. silt fences) are in place before you start dock construction, particularly on sites with erodible soils such as sand and clay.
 - 6.1. You and/or your contractor should inspect sediment and erosion control measures regularly during the course of construction and make all necessary repairs if any damage is discovered (e.g., you see silt or sediment entering the water).
 - 6.2. Avoid doing work during wet and rainy periods.
7. Use naturally rot-resistant, untreated materials (e.g. cedar, hemlock, rocks, plastic) as supports for dock structures that will be submerged in water and preferably for structures above water. Treated lumber may contain compounds that can be released into the water and become toxic to the aquatic environment.



- 7.1. If treated lumber is to be used for dock structures above water, it should be environmentally-friendly (see definition below).
 - 7.2. Cut, seal and stain all lumber away from the water using only environmentally-friendly stains (see definition below). All sealed and stained lumber should be completely dry before used near water.
 - 7.3. Ensure plastic barrel floats are free of chemicals inside and outside of the barrel before they are placed in water.
8. Whenever possible, construct the dock either from a barge or float on the water or through the ice instead of using machinery from the bank of the water body.
9. Operate machinery from outside of the water and in a manner that minimizes disturbance to the banks of the water body.
 - 9.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 9.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 9.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
10. If a concrete abutment is needed to secure your dock to land, install it entirely on land, above the ordinary high water mark. The concrete is to be pre-cast and cured away from the water before use to prevent seepage of potentially toxic substances into the water body.
11. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum.
12. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetate the following spring.
13. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

If you would like more detailed information on fish-friendly dock construction and maintenance practices to help you plan your project, please refer to the following document:

The Dock Primer - A Cottager's Guide to Waterfront-Friendly Docks
http://www.dfo-mpo.gc.ca/regions/central/pub/dock-quais/index_e.htm
(Prairies Edition)

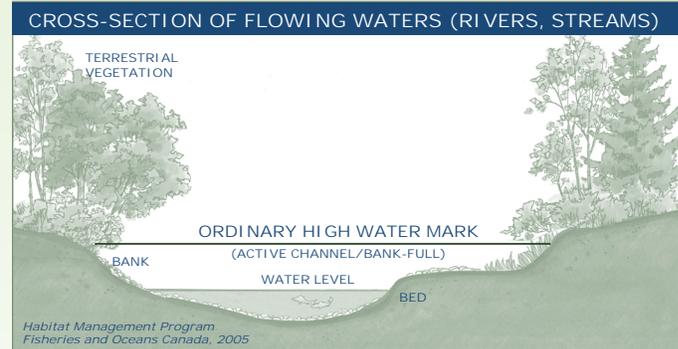
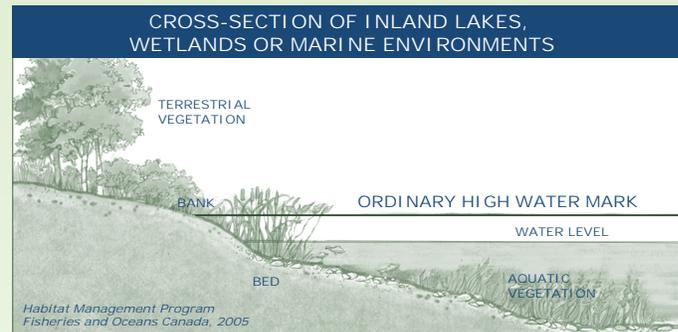
The "Dock Primer" contains additional helpful information. It also states that all docks must be reviewed. Please note however, that projects following this Operational Statement will not need DFO review.

Definitions:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).

Environmentally-friendly lumber and stains:

Chemical wood preservatives used in Canada are regulated by the Pest Management Regulatory Agency, Health Canada. Approved preservatives used most commonly in lumber are Alkaline Copper Quaternary (ACQ) and Copper Azole (CA). Creosote treated wood should not be used in or near water. Ask your local building supply outlet for further information on available products.



FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

Aussi disponible en français.



For the purpose of this Operational Statement, the term High-Pressure Directional Drilling (HPDD) means trenchless methods of crossing a watercourse, using pressurized mud systems. HPDD is used to install cables and pipelines for gas, water, telecommunications, fibre optics, power, sewer, oil and water lines underneath watercourses. This method is preferable to open cut and isolated crossings because the cable or pipeline is drilled underneath the watercourse with very little disturbance to its bed or banks. HPDD involves drilling a pilot bore-hole underneath the watercourse towards a surface target on the opposite side and back reaming the bore-hole to the drill rig while pulling the pipe or cable along through the hole. This process typically uses the freshwater gel mud system to transport drilled spoil, reduce friction and stabilize the bore-hole. The gel mud system is typically composed of a mixture of clean, fresh water as the base, bentonite (clay-based drilling lubricant) or an alternative drilling lubricant as the viscosifier, and synthetic polymers.

Successful HPDD is more favourable than an open-cut water crossing because it minimizes the potential to impact fish and fish habitat. This Operational Statement does not apply to any wet open-cut water crossing under any circumstance, nor does it apply when there is a high risk of a frac-out.

One of the risks associated with HPDD is the escape of drilling mud into the environment as a result of a spill, tunnel collapse or the rupture of mud to the surface, commonly known as a "frac-out". A frac-out is caused when excessive drilling pressure results in drilling mud propagating vertically toward the surface. The risk of a frac-out can be reduced through good geotechnical assessment practices and good drill planning and execution. The extent of a frac-out can be limited by careful monitoring and having appropriate equipment and response plans ready in the event that one occurs.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into your High-Pressure Directional Drilling project in order to avoid negative impacts to fish habitat. **You may proceed with your HPDD project without a DFO review when you meet the following conditions:**

- ▶ a geo-technical assessment prepared by a qualified professional determines that this drilling technique will be successful; if there is a high risk of a frac-out, this Operational Statement does not apply,
- ▶ you have a professionally-prepared emergency frac-out response plan and contingency crossing plan in place (on-site and well-understood and readily available to all workers) that outlines the protocol to monitor the construction, to stop work in the event of a frac-out or spill, and to contain and clean-up drilling fluids and other deleterious substances, and

- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling* listed below.

This Operational Statement also describes contingency crossing measures for an isolated trenched crossing in the event of a frac-out. You may proceed with your contingency crossing plan without a DFO review when your project meets the following conditions:

- ▶ the channel width of the watercourse is less than 5 meters from ordinary high water mark to ordinary high water mark (see definition below), and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat for Isolated Trenched Crossings in the Event of a Frac-out* listed below.

Plans for contingency crossings of watercourses greater than 5 metres wide from ordinary high water mark to ordinary high water mark, and contingency crossings during fisheries restricted activity periods will require prior DFO review. Because of the time requirements for DFO review, it is recommended that contingency plans for HPDD in these circumstances be referred to DFO well in advance of HPDD project commencement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., the *Navigable Waters Protection Act*) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling

1. Design the drill path to an appropriate depth below the watercourse to minimize the risk of a frac-out, as determined by a qualified professional, and to prevent the pipeline or cable from becoming exposed due to natural scouring of the stream bed. Ensure the drill entry and exit points are far enough from shorelines and stream banks to minimize disturbance to riparian areas, reduce the risk of frac-outs into the water body, and enable the containment of drilling fluids and other deleterious substances outside of the active stream channel.
2. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a



minimum and within the utility right-of-way.

3. Machinery fording the watercourse to bring equipment required for construction to the opposite side of the watercourse is limited to a one-time event (over and back) and is to occur only if an existing crossing at another location cannot be used. If the stream bed and banks are highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas. For information consult the *Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat* (Manitoba Natural Resources and DFO, 1996). Any fording should adhere to provincial fisheries timing windows in order to prevent disruption to spawning fish, their incubating eggs and larval life stages (see the attached *Manitoba In-Water Construction Timing Windows*).
4. Operate machinery on land and in a manner that minimizes disturbance to the banks of the watercourse.
 - 4.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 4.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 4.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
5. Ensure the drilling mud, sediment-laden water and any other deleterious substances are contained above the ordinary high water mark and do not enter any watercourse.
6. Monitor the watercourse to observe signs of surface migration of drilling mud (frac-out) during all phases of the work.
7. For the duration of the work, keep on-site and readily accessible in the event of a frac-out, all material and equipment needed to contain and clean-up releases of drilling mud, cuttings and other waste materials.
8. Implement your frac-out response plan immediately upon the detection of a frac-out, a sediment release or spill of a deleterious substance. This plan is to include measures to, a) stop work; contain the drilling mud, cuttings and other waste materials and prevent their further migration into the watercourse; b) notify all applicable authorities, including the closest DFO office; c) promptly clean-up and appropriately dispose of the drilling mud, cuttings and other waste material in a location where it cannot re-enter any watercourse; and d) ensure clean-up measures are suitably applied so as not to result in further alteration of the bed and/or banks of the watercourse.
9. In the event of a frac-out, invoke the contingency crossing plan to re-drill at a more appropriate location and target depth (as determined by a geotechnical assessment done by a qualified professional) or if necessary, refer to the *Measures to Protect Fish and Fish Habitat for Isolated Trenched Crossings in the Event of a Frac-out* (see below) to isolate the watercourse to complete the crossing in the dry at the current location.

Measures to Protect Fish and Fish Habitat for Isolated Trenched Crossings in the Event of a Frac-out

10. The contingency crossing plan is to be followed to complete an isolated trenched crossing in the event of a frac-out when relocating and re-drilling is not feasible. An isolated crossing (i.e., dam and pump, flume) involves isolating the work area and diverting the flow around the construction site while completing the crossing in-the-dry. This Operational Statement does not provide for a wet open-cut trenched crossing under any circumstances.
11. Time the isolated crossing to protect spawning fish, their incubating eggs and larval life stages. Adhere to provincial fisheries timing windows, as identified in Measure 3 above. In the event of a frac-out, you may proceed with the isolated crossing as already approved by DFO (identified in the conditions above), if operating within acceptable activity periods. If a frac-out occurs outside of these acceptable periods, you must contact the local DFO office prior to proceeding with an isolated crossing in accordance with your contingency crossing plan.
12. **Temporary Isolation**
Temporary isolation is used to allow work "in the dry" while maintaining downstream flows. The following general measures should be used when isolating the trenched crossing construction.
 - 12.1. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction to ensure they are functioning properly. Immediately make all necessary repairs if any damage is discovered.
 - 12.2. Use coffer dams such as aqua-dams, pea gravel or sand bags, concrete blocks, steel or wood wall, clean rock, sheet pile or other appropriate designs to separate the dewatered work site from flowing water.
 - 12.3. Use clean, washed material to build any granular coffer dams and face them with clean, washed granular material that is adequately sized (i.e., moderate sized rock and not sand or gravel) to hold the coffer dams in place during the work. If necessary, the outside face of the coffer dams is to be lined with heavy poly-plastic to make them impermeable to water. Material to build these dams should not be taken from below the ordinary high water mark (see definition below).
 - 12.4. Design coffer dams to accommodate any expected high flows of the watercourse during the construction period.
 - 12.5. Minimize flow constriction to maintain unobstructed fish passage, or only a very brief fish passage delay, and restore original flow as soon as work is completed.
 - 12.6. Before starting trench construction, salvage any fish from within the isolated area and return them safely to the downstream portion of the watercourse.
 - 12.7. Remove accumulated sediment and excess spoil from the isolated area and restore the bed and banks of the watercourse to pre-construction condition before coffer dams are removed. Restore the original channel bottom gradient and substrate and cover the disturbed stream bed with a layer of clean granular material. Ensure banks are stabilized, adequately protected from erosion and re-vegetated, preferably with native species.



- 12.8. Treat water from dewatered areas or divert into a vegetated area or settling basin to remove suspended solids and prevent sediment and other deleterious substances from entering the watercourse.
- 12.9. Gradually remove the coffer dam to equalize the water levels inside and outside the isolated areas and to reduce the amount of suspended sediment that is carried downstream.

13. Pumped Diversions

Pumped diversions are used to maintain downstream flows and prevent upstream ponding, while isolating a portion of a channel to allow work in the dry.

- 13.1. Do not use pumped diversions where there are fish passage concerns.
- 13.2. Before pumping water from the work area, salvage fish within the isolated area and return them safely to the downstream portion of the watercourse.
- 13.3. Ensure intakes are sized and adequately screened to prevent debris blockage and fish mortality (refer to DFO's *Freshwater Intake End-of-Pipe Fish Screen Guidelines*, available at www.dfo-mpo.gc.ca/Library/223669.pdf).
- 13.4. Ensure the pumping system is sized to accommodate any expected high flows of the watercourse during the construction period. Back-up pumps should be kept on-site in case of pump failure.
- 13.5. Line the area where the pump discharges with clean rock to prevent erosion and the release of suspended sediments downstream, and remove this material when the works have been completed.

14. Machinery

In addition to the other measures identified in this Operational Statement, these measures are to be followed when doing an isolated crossing:

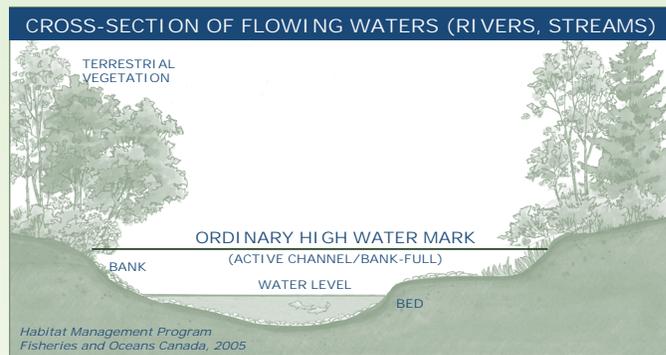
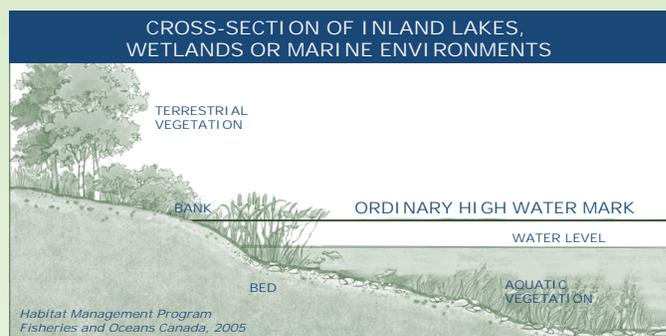
- 14.1. Install stabilized entrances at machinery access points and establish single site entry and exit.
- 14.2. Minimize distance between machinery access points from the stream banks to the work site to minimize disturbance to fish habitat.

Measures that Apply to all Work Conducted under this Operational Statement

15. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
16. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.
17. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

Aussi disponible en français.



Ice bridges and snowfills are two methods used for temporary winter access in remote areas. Ice bridges are constructed on larger watercourses that have sufficient stream flow and water depth to prevent the ice bridge from coming into contact with the stream bed or restricting water movement beneath the ice. Snowfills, however, are temporary stream crossings constructed by filling a stream channel that is dry or frozen to the bottom with clean compacted snow.

This Operational Statement applies only to ice bridges, and only those constructed of clean (ambient) water, ice and snow, which will not restrict water-flow at any time. This Operational Statement is not intended to cover ice roads that run along the length of a water body.

Ice bridge crossings provide cost-effective access to remote areas when watercourses are frozen. Because the ground is frozen, the ice bridge can be built with minimal disturbance to the bed and banks of the watercourse. Ice bridges can still have negative effects on fish and fish habitat. Clearing shoreline and bank vegetation increases the erosion potential and instability of the banks and can lead to deposition of sediment into fish habitat. There is also potential for a blockage of fish passage during spring break-up.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into the design, construction, and decommissioning of your Ice Bridge project in order to avoid negative impacts to fish habitat. **You may proceed with your Ice Bridge project without a DFO review when you meet the following conditions:**

- ▶ the ice bridge is constructed only of clean (ambient) water, ice and snow,
- ▶ the work does not include realigning the watercourse, dredging, placing fill, or excavating the bed or bank of the watercourse,
- ▶ materials such as gravel, rock, soil, and loose woody material are not used,
- ▶ where logs are required for use in stabilizing shoreline approaches, they are clean and securely bound together, and they are removed either before or immediately following spring ice-out,
- ▶ the withdrawal of any water will not exceed 10% of the instantaneous flow, in order to maintain existing fish habitat,
- ▶ natural, under ice water flow is maintained where it occurs, and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing an Ice Bridge* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Constructing an Ice Bridge

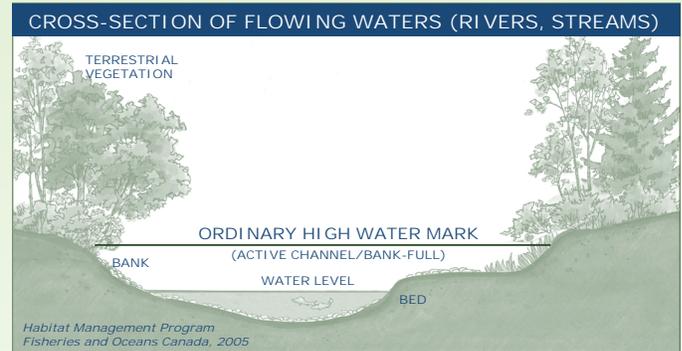
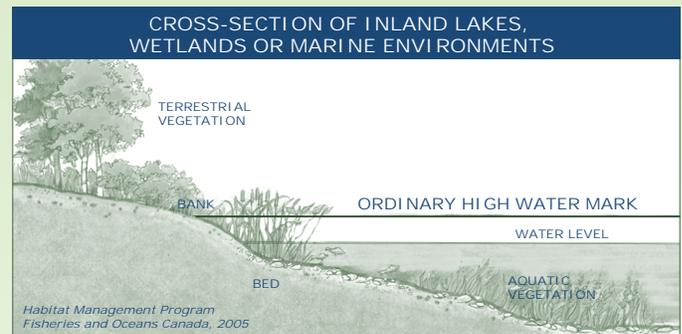
1. Use existing trails, winter roads or cut lines wherever possible as access routes to limit unnecessary clearing of additional vegetation and to prevent soil compaction.
2. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the access. This vegetation removal should be kept to a minimum and should not be wider than the road surface.
3. Construct approaches using clean (ambient), compacted snow and ice to a sufficient depth to protect the stream banks or shoreline. Clean logs may be used where necessary to stabilize approaches.
4. Where logs are used to stabilize the approaches of an ice bridge:
 - 4.1. The logs are to be clean and securely cabled together so they can be easily removed.
 - 4.2. No logs or woody debris are to be left within the water body or on the banks or shoreline where they can wash back into the water body.
5. Operate machinery from on land or on ice and in a manner that minimizes disturbance to the banks of the water body.
 - 5.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 5.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water or spreading onto the ice surface.
 - 5.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.



6. The intakes of pumping hoses should be equipped with an appropriately sized screen to avoid entrainment and impingement of fish. Guidelines to determine the appropriate mesh size for intake screens may be obtained from DFO (*Freshwater Intake End-of-Pipe Fish Screen Guidelines*, 1995, available at www.dfo-mpo.gc.ca/Library/223669.pdf).
7. Appropriate measures should be taken to prevent the ice bridge from blocking fish passage, or from causing channel erosion and flooding in the spring. For example, on a flowing watercourse, prior to spring break-up, breach the ice bridge using physical means or create one or more v-notches, of adequate size to accommodate spring runoff, in the middle of the ice bridge to allow it to melt from the centre.
8. At the end of the crossing season and prior to snow-melt, install appropriate sediment and erosion control measures on all disturbed areas and approaches to prevent sediment from entering the watercourse. Inspect and maintain sediment and erosion control measures until complete re-vegetation is achieved.
9. As soon as possible following snow-melt, plant and seed preferably native trees, shrubs or grasses on disturbed areas. Cover seeded/planted areas with appropriate cover (e.g., mulch, matting) to prevent soil erosion and to help seeds germinate.

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



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Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

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In this Operational Statement, isolated ponds include only those ponds that are constructed to capture and store runoff water from snow-melt and heavy rainfall events for irrigation, livestock watering, golf courses or aesthetic purposes. This Operational Statement does not apply to aggregate extraction pits or quarries. Isolated ponds are completely separate from any watercourse and typically have little to no impact on fish or fish habitat. They do, however, present a risk of spreading invasive aquatic species and/or diseases if they are located within a floodplain and new species are introduced into them; and they can potentially alter groundwater flow and warm the groundwater temperature. Groundwater flow and temperature changes are of particular concern in relation to coldwater streams.

Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to isolated pond construction. Riparian vegetation occurs adjacent to the water body and directly contributes to fish habitat by providing shade, cover and spawning and food production areas. It is important to design your isolated pond to meet your needs while also protecting riparian areas.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into the design, construction, and maintenance of your Isolated Pond project in order to avoid negative impacts to fish habitat. **You may proceed with the construction of an Isolated Pond without a DFO review when you meet the following conditions:**

- ▶ there is no inlet and/or outlet channel connecting the isolated pond to the main channel of a watercourse,
- ▶ the pond is located at least 30 metres away from the ordinary high water mark of a watercourse (see definition below),
- ▶ if located adjacent to a coldwater stream, the pond will not alter ordinary groundwater flow patterns (in either quantity or temperature), and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing an Isolated Pond* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., with respect to activities in a floodplain, water-taking or capture, and the introduction of new species to the pond) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Constructing an Isolated Pond

1. You may proceed with isolated pond construction at any time of the year.
2. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the pond. This removal should be kept to a minimum.
3. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 3.1. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the watercourse to prevent deleterious substances from entering the water.
 - 3.2. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
4. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
5. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.
6. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.



Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).

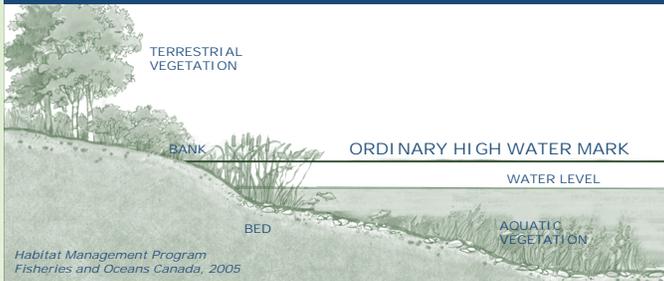
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Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

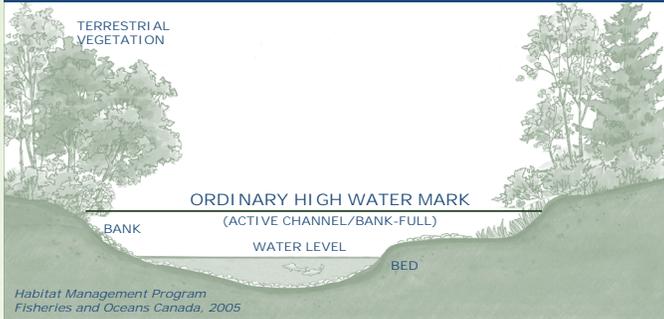
Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

Aussi disponible en français.

CROSS-SECTION OF INLAND LAKES,
WETLANDS OR MARINE ENVIRONMENTS



CROSS-SECTION OF FLOWING WATERS (RIVERS, STREAMS)



Overhead lines are constructed for electrical or telecommunication transmission across many watercourses that range in size from small streams and ponds to large rivers, lakes and reservoirs.

Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to overhead line construction. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas. It is important to design and build your overhead line project to meet your needs while also protecting riparian areas.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into the design and construction of your Overhead Line project in order to avoid negative impacts to fish habitat. **You may proceed with your Overhead Line project without a DFO review when you meet the following conditions:**

- ▶ construction and/or placement of any temporary or permanent structures are not required (e.g. islands, poles, crib works, etc.) below the ordinary high water mark (see definition below), and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., the *Navigable Waters Protection Act*) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines

1. Installing overhead lines under frozen conditions is preferable in all situations in order to minimize impacts to substrate, riparian vegetation and aquatic habitat. On wet terrain (e.g., bogs), lines should be installed under frozen conditions, where possible, or using aerial methods (i.e., helicopter).
2. Machinery fording the watercourse to bring equipment required for construction to the opposite side of the watercourse should be limited to a one-time event (over and back). If the stream bed and banks are highly erodible (e.g., dominated by organic materials and silts) and significant erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practices are to be used to protect these areas. For information, consult the *Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat* (Manitoba Natural Resources and DFO, 1996).
 - 2.1. Time the machinery crossing to prevent disruption to spawning fish, their incubating eggs and larval life stages. Adhere to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*).
3. Operate machinery from outside of the water and in a manner that minimizes disturbance to the banks of the watercourse.
 - 3.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 3.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 3.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
4. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and until re-vegetation of disturbed areas is complete, and make all necessary repairs.
 - 4.1. Avoid work during wet, rainy conditions, or use aerial methods (i.e., helicopter) to install overhead lines.
5. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the overhead line. This removal should be kept to a minimum and should not be wider than the right-of-way.
6. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
7. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to



germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.

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

Definition:

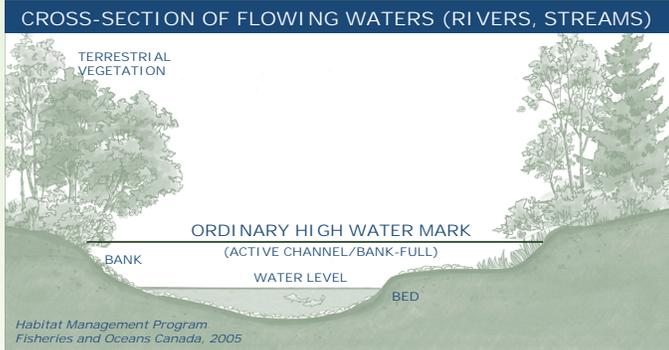
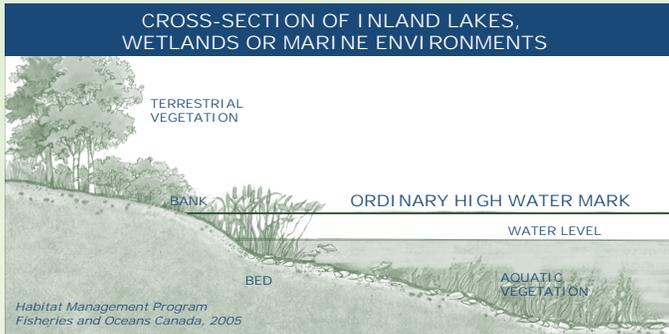
Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).

FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

Aussi disponible en français.



This Operational Statement deals with routine maintenance dredging associated with the removal of accumulated sediment from channel beds to maintain the design depths of existing public use facilities such as navigation channels, harbours, marinas, boat launches and port facilities. It does not include clean-out of channels for other purposes, such as agricultural drains or water intake installation and/or maintenance. Routine maintenance dredging is defined as dredging that has been conducted regularly (at least once within the previous 5 years) and does not include any expansion of the previously dredged area. Dredging is typically conducted by mechanical methods such as clam buckets, draglines or backhoes. The largest threat to fish and fish habitat is from the increased amount of suspended sediment introduced to the water column during the dredging process.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into your Routine Maintenance Dredging project in order to avoid negative impacts to fish habitat. **You may proceed with your Routine Maintenance Dredging project without a DFO review when you meet the following conditions:**

- ▶ the site has been routinely dredged (at least once within the previous 5 years), is in accordance with the results of a previous government review and no expansion of the dredged area occurs,
- ▶ dredging of contaminated sediment does not occur,
- ▶ hydraulic methods such as propeller washing are not used (suction dredging is acceptable),
- ▶ the dredged material will not be used to infill the shoreline or adjacent wetlands, and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when doing Routine Maintenance Dredging* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., the *Navigable Waters Protection Act*) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This

information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when doing Routine Maintenance Dredging

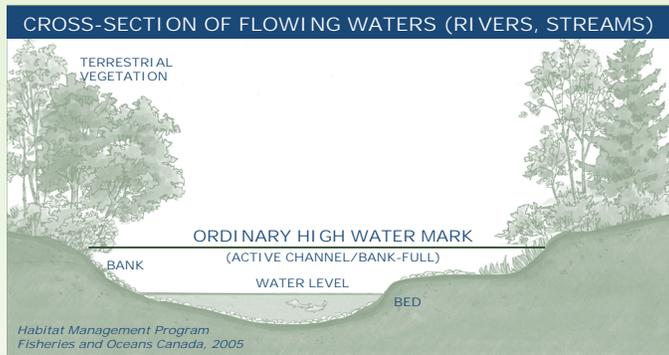
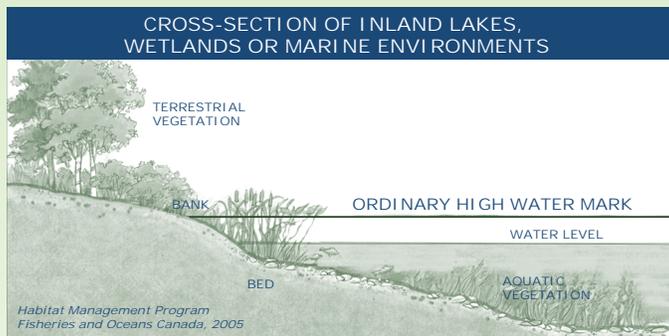
1. Time routine maintenance dredging to protect spawning fish, their incubating eggs and larval life stages. Adhere to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*). Where possible, dredging should occur under winter conditions when the area to be dredged is frozen to the bottom or when the area to be dredged is dry.
2. Isolate the work area using appropriate measures (e.g., silt curtains, etc.) to prevent re-suspended sediment from spreading to adjacent areas. Inspect isolation measures regularly and make all necessary repairs. Once dredging is completed, allow sufficient time to permit sediment to settle out and the water to be as clear inside the isolated area as outside the isolated area before removing sediment control measures.
3. Dredge on calm days to minimize the suspension of fine sediment particles into the water column and to ensure the sediment control measures are not disturbed by wave action.
4. Minimize the amount of dredged material removed by only dredging the area and depth required for navigation.
5. Remove all dredged material to a location outside of the ordinary high water mark (see definition below) of any water body.
6. Operate machinery in a manner that minimizes disturbance to the banks or bed of the water body.
 - 6.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 6.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 6.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
7. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the dredged area. This removal should be kept to a minimum.
8. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
9. Vegetate any disturbed areas by planting and seeding preferably native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.



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

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

Winnipeg District Office
Fisheries and Oceans Canada
Freshwater Institute
501 University Crescent
Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
Fax: (204) 622-4066

Aussi disponible en français.



The placement of cables on the beds of freshwater lakes and rivers is a common practice used to deliver utility services (i.e., electricity and telephone) across water bodies when overhead lines are not feasible. The placement of underwater cables is more favourable than using unconfined open trench methods, which bury the cables within the substrate of the lake or river. Placing cables on the beds of freshwater lakes or rivers typically generates less sediment and avoids the need to use machinery in the water. In some instances, however, cables may need to be buried near to the shoreline for operational safety reasons.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under Section 35 of the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with Subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to be incorporated into your Underwater Cable project in order to avoid negative impacts to fish habitat. **You may proceed with your Underwater Cable project without a DFO review when you meet the following conditions:**

- ▶ unconfined open trench methods, including ploughing and water-jetting, to bury cables are not used,
- ▶ underwater cables are not installed on or within known fish spawning habitat,
- ▶ cable trenching is limited to near shore areas and is to be no greater in width than that required to accommodate the cable,
- ▶ any near shore excavation to bury the cable extends a maximum total of 10 meters below the ordinary high water mark (see definition below), but in no case will involve more than 10% of a stream channel width (in total),
- ▶ explosives are not used to install the cable, and
- ▶ you incorporate the *Measures to Protect Fish and Fish Habitat when Placing Underwater Cables* listed below.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

This Operational Statement does not release you from the responsibility of obtaining any other permits or approvals that may be required under municipal, provincial and federal legislation (e.g., the *Navigable Waters Protection Act*) that apply to the work being carried out in relation to this Operational Statement.

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, the Manitoba notification form to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Habitat when Placing Underwater Cables

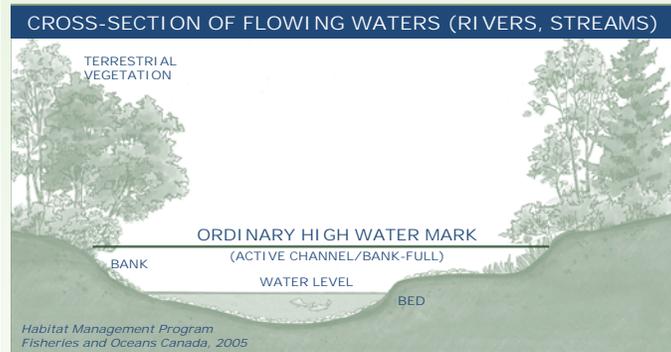
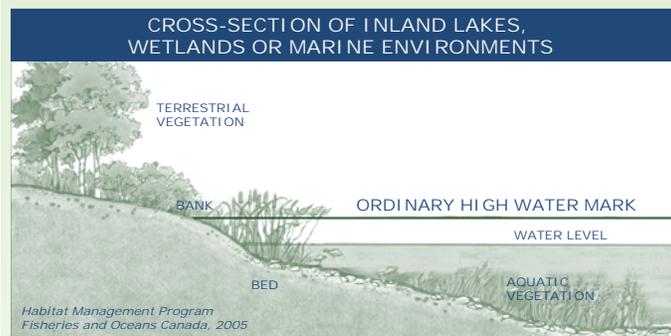
1. Subject to the conditions noted above, if necessary for safety and to protect cables against ice scour, underwater cables may be buried near shore. Whether the area is dry or wetted at the time of construction, these measures are to be followed:
 - 1.1. Time near shore isolated trench construction to protect spawning fish, their incubating eggs and larval life stages. Adhere to provincial fisheries timing windows (see the attached *Manitoba In-Water Construction Timing Windows*).
 - 1.2. Install and maintain effective sediment control measures (e.g., silt curtain) around the area to be trenched before, during and after trenching to prevent re-suspended sediment from spreading to adjacent areas. Inspect sediment control measures regularly and make all necessary repairs if any damage or leakage is discovered. Once trenching and cable installation is complete, allow sufficient time to permit sediment to settle out and the water to be as clear inside the isolated area as outside the isolated area before removing sediment control measures.
 - 1.3. Any fish trapped within an enclosed area are to be safely relocated outside of the enclosed area to the main water body.
 - 1.4. Any rock, cobble or gravel on the bed that is moved to facilitate placement of the cable on the bottom of the water body is to be kept as close as possible to its original location.
 - 1.5. Any covering of cables with rock should be carried out using hand tools,
 - 1.6. Any material that is temporarily removed from the bank of the water body (below the ordinary high water mark) during the dry land trenching is to be stockpiled separately and returned to its original location after the cable has been installed.
 - 1.7. After excavation, restore the original contour, gradient and substrate of the water body bank, shore and bed prior to removing isolation measures.
2. Operate machinery from outside of the water in a manner that minimizes disturbance to the banks or bed of the water body.
 - 2.1. Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
 - 2.2. Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent deleterious substances from entering the water.
 - 2.3. Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
3. Stabilize any waste materials removed from the work site, above the ordinary high water mark (see definition below), to prevent them from entering any watercourse. Spoil piles could be contained with silt fence, flattened, covered with biodegradable mats or tarps, and/or planted with preferably native grass or shrubs.
4. While this Operational Statement does not cover the extensive clearing of shoreline vegetation, the removal of select plants may be necessary to accommodate the cable. This removal should be kept to a minimum.



5. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent soil erosion and to help seeds germinate. If there is insufficient time in the growing season remaining for the seeds to germinate, stabilize the site (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and then vegetate the following spring.
6. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark - The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In **flowing waters (rivers, streams)** this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In **inland lakes, wetlands or marine environments** it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For **reservoirs** this refers to normal high operating levels (Full Supply Level).



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Freshwater Institute
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Winnipeg, Manitoba
R3T 2N6
Tel: (204) 983-5163
Fax: (204) 984-2402

Dauphin District Office
Fisheries and Oceans Canada
101-1st Avenue N.W.
Dauphin, Manitoba
R7N 1G8
Tel: (204) 622-4060
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MANITOBA IN-WATER CONSTRUCTION TIMING WINDOWS FOR THE PROTECTION OF FISH AND FISH HABITAT

Restricted activity timing windows have been identified for Manitoba lakes and streams to protect fish during spawning and incubation periods when spawning fish, eggs and fry are vulnerable to disturbance or sediment. During these spawning periods, no in-water or shoreline work is allowed except under site- or project-specific review and with the implementation of protective measures. Restricted activity periods are determined on a case by case basis according to the species of fish in the water body, whether those fish spawn in the spring, summer or fall, and whether the water body is located in Northern or Southern Manitoba.

Timing windows are just one of many measures used to protect fish and fish habitat when carrying out a work or undertaking in or around water. Be sure to follow all of the measures outlined in the Operational Statements to avoid negative impacts to fish habitat.

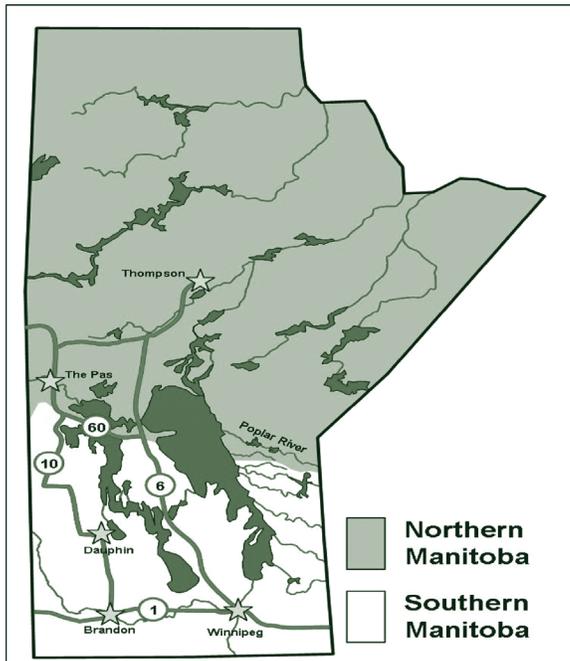


Figure 1: Southern and Northern Manitoba boundaries for spawning timing windows.

How To Determine Timing Windows

1. Determine the fish species living in the water body where you wish to do work. Consult the Province of Manitoba Angling Map (available from the Government of Manitoba map sales) which details the fish present in most Manitoba lakes and streams, or contact your local Fisheries and Oceans Canada (DFO) office. Pictures of most of these fish species can be found in the Manitoba Angler's Guide (sport fishing regulations).
2. Determine if the fish living in the water body spawn in the spring, summer, or fall according to Table 1. You can have one, two or all three fish spawning types in one water body. In Manitoba, essentially all lakes and streams contain one or more of the spring spawning fish listed, however far fewer contain summer or fall spawning fish.
3. Determine if the water body is located in Northern or Southern Manitoba according to Figure 1.
4. Use Table 2 to determine the in-water work timing restrictions according to the location of a water body (North or South) and the type of fish found within (spring, summer or fall spawners). During these periods no in-water work (below the ordinary high water mark) is to occur without site- or project-specific review by DFO.

Table 1: Common spring, summer and fall spawning fish

Spring Spawning Fish	Summer Spawning Fish	Fall Spawning Fish
<ul style="list-style-type: none"> ▶ Northern Pike ▶ Walleye, Sauger ▶ Yellow Perch ▶ Suckers ▶ Smallmouth Bass ▶ Arctic Grayling 	<ul style="list-style-type: none"> ▶ Channel Catfish ▶ Lake Sturgeon ▶ Goldeye, Mooneye ▶ White Bass ▶ Freshwater Drum ▶ Carmine Shiner* 	<ul style="list-style-type: none"> ▶ Brook Trout ▶ Lake Trout ▶ Arctic Char ▶ Lake Whitefish

Table 2: Timing Windows when no in-water work is to occur in order to protect spawning fish and developing eggs and fry

	Spring Spawning Fish	Summer Spawning Fish	Fall Spawning Fish
Northern Manitoba	April 15 - June 30	May 15 - July 15	September 1 - May 15
Southern Manitoba	April 1 - June 15	May 1 - June 30*	September 15 - April 30

* Carmine Shiner - This is a Species At Risk found only in Southern Manitoba in the Whitemouth River and its tributaries, the Bird River and its tributaries and the Pinawa Channel. This fish spawns from May 15 to July 15 and this extended summer spawning timing window should be applied to those water bodies where it is found.



MANITOBA IN-WATER CONSTRUCTION TIMING WINDOWS FOR THE PROTECTION OF FISH AND FISH HABITAT

Restricted activity timing windows have been identified for Manitoba lakes and streams to protect fish during spawning and incubation periods when spawning fish, eggs and fry are vulnerable to disturbance or sediment. During these spawning periods, no in-water or shoreline work is allowed except under site- or project-specific review and with the implementation of protective measures. Restricted activity periods are determined on a case by case basis according to the species of fish in the water body, whether those fish spawn in the spring, summer or fall, and whether the water body is located in Northern or Southern Manitoba.

Timing windows are just one of many measures used to protect fish and fish habitat when carrying out a work or undertaking in or around water. Be sure to follow all of the measures outlined in the Operational Statements to avoid negative impacts to fish habitat.

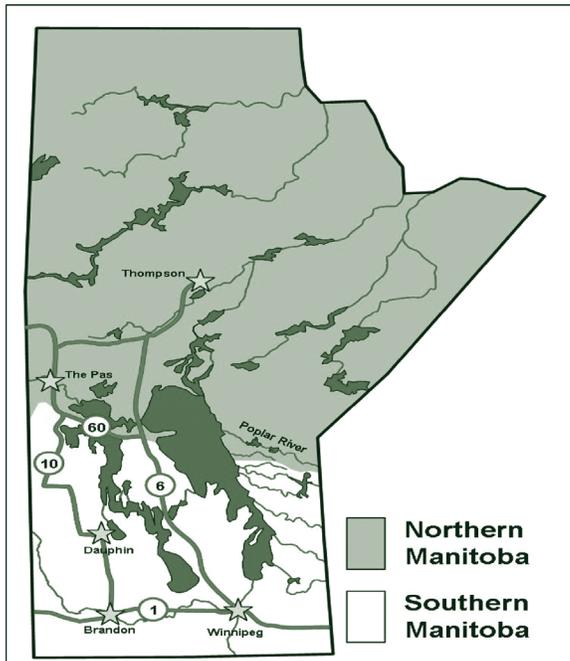


Figure 1: Southern and Northern Manitoba boundaries for spawning timing windows.

How To Determine Timing Windows

1. Determine the fish species living in the water body where you wish to do work. Consult the Province of Manitoba Angling Map (available from the Government of Manitoba map sales) which details the fish present in most Manitoba lakes and streams, or contact your local Fisheries and Oceans Canada (DFO) office. Pictures of most of these fish species can be found in the Manitoba Angler's Guide (sport fishing regulations).
2. Determine if the fish living in the water body spawn in the spring, summer, or fall according to Table 1. You can have one, two or all three fish spawning types in one water body. In Manitoba, essentially all lakes and streams contain one or more of the spring spawning fish listed, however far fewer contain summer or fall spawning fish.
3. Determine if the water body is located in Northern or Southern Manitoba according to Figure 1.
4. Use Table 2 to determine the in-water work timing restrictions according to the location of a water body (North or South) and the type of fish found within (spring, summer or fall spawners). During these periods no in-water work (below the ordinary high water mark) is to occur without site- or project-specific review by DFO.

Table 1: Common spring, summer and fall spawning fish

Spring Spawning Fish	Summer Spawning Fish	Fall Spawning Fish
<ul style="list-style-type: none"> ▶ Northern Pike ▶ Walleye, Sauger ▶ Yellow Perch ▶ Suckers ▶ Smallmouth Bass ▶ Arctic Grayling 	<ul style="list-style-type: none"> ▶ Channel Catfish ▶ Lake Sturgeon ▶ Goldeye, Mooneye ▶ White Bass ▶ Freshwater Drum ▶ Carmine Shiner* 	<ul style="list-style-type: none"> ▶ Brook Trout ▶ Lake Trout ▶ Arctic Char ▶ Lake Whitefish

Table 2: Timing Windows when no in-water work is to occur in order to protect spawning fish and developing eggs and fry

	Spring Spawning Fish	Summer Spawning Fish	Fall Spawning Fish
Northern Manitoba	April 15 - June 30	May 15 - July 15	September 1 - May 15
Southern Manitoba	April 1 - June 15	May 1 - June 30*	September 15 - April 30

* Carmine Shiner - This is a Species At Risk found only in Southern Manitoba in the Whitemouth River and its tributaries, the Bird River and its tributaries and the Pinawa Channel. This fish spawns from May 15 to July 15 and this extended summer spawning timing window should be applied to those water bodies where it is found.



NOTIFICATION FORM

Manitoba Operational Statement Habitat Management Program

VERSION 1.0
Valid until March 31, 2006

PROPONENT INFORMATION

NAME:		
STREET ADDRESS:		
CITY/TOWN:	PROVINCE/TERRITORY:	POSTAL CODE:
TEL. NO. (RESIDENCE):	TEL. NO. (WORK):	
FAX NO:	EMAIL ADDRESS:	

CONTRACTOR INFORMATION (provide this information if a Contractor is working on behalf of the Proponent)

NAME:		
STREET ADDRESS:		
CITY/TOWN:	PROVINCE/TERRITORY:	POSTAL CODE:
TEL. NO. (RESIDENCE):	TEL. NO. (WORK):	
FAX NO:	EMAIL ADDRESS:	

PROJECT INFORMATION

Select Operational Statements that are being used (check all applicable boxes):

<input type="checkbox"/> Aquatic Vegetation Removal	<input type="checkbox"/> Clear-Span Bridges	<input type="checkbox"/> Overhead Line Construction
<input type="checkbox"/> Beach Creation	<input type="checkbox"/> Culvert Maintenance	<input type="checkbox"/> Isolated Ponds
<input type="checkbox"/> Beaver Dam Removal	<input type="checkbox"/> High-Pressure Directional Drilling	<input type="checkbox"/> Routine Maintenance Dredging
<input type="checkbox"/> Bridge Maintenance	<input type="checkbox"/> Dock and Boathouse Construction	<input type="checkbox"/> Underwater Cables
	<input type="checkbox"/> Ice Bridges	<input type="checkbox"/> Other (specify):

Select the type of water body at or near your project:

<input type="checkbox"/> River, Stream, Creek	<input type="checkbox"/> Pond or wetland (pond is less than 8 hectares)	<input type="checkbox"/> Marine (Ocean or Sea)
<input type="checkbox"/> Lake (8 hectares or greater)	<input type="checkbox"/> Estuary	

LOCATION OF THE PROJECT(S) (fill out this section if the project location is different from Proponent Information; append multiple project locations on an additional sheet if necessary)

Name of Water body	Coordinates of the Project (UTM co-ordinate or Degrees, Minutes, Seconds), if available
	Easting: _____ Northing: _____ Latitude: _____ Longitude: _____
Legal Description (Plan, Block, Lot, Concession, Township, Section, Range)	Directions to Access the Project Site (i.e., Route or highway number, etc.)
Proposed Start Date (YYYY/MM/DD):	Proposed Completion Date (YYYY/MM/DD):

We ask that you notify DFO, preferably 10 working days before starting your work, by filling out and sending in, by mail or by fax, this notification form to the DFO office in your area (see Manitoba DFO office list below). This information is requested in order to evaluate the effectiveness of the work carried out in relation to the Operational Statement.

I, _____ (print name)
certify that the information given on this form is, to the best of my knowledge, correct and complete.

Signature

Date

Note: If you cannot meet all of the conditions and cannot incorporate all of the measures in the Operational Statement then your project may result in a violation of Subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact the DFO office in your area (see Manitoba DFO office list) if you wish to obtain DFO's opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fish habitat protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-CSI-605. Under the *Privacy Act*, individuals have a right to, and on request shall be given access to, any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provisions of the *Access to Information Act*.

FISHERIES AND OCEANS CANADA OFFICES IN MANITOBA

Winnipeg District Office Fisheries and Oceans Canada
Freshwater Institute 501 University Crescent Winnipeg, MB R3T 2N6
Tel.: (204) 983-5163 Fax: (204) 984-2402

Dauphin District Office Fisheries and Oceans Canada
101 1st Avenue N.W. Dauphin, MB R7N 1G8
Tel.: (204) 622-4060 Fax: (204) 622-4066

Aussi disponible en français.



Protocols Under Development

**For Activities In and Around
the City's Waterways and Watercourses**

**Draft
Protocol –
For Work in
and Around
the City’s
Waterways &
Watercourses**



**PROTOCOL FOR BOAT LAUNCH AND DOCK
MAINTENANCE**

Purpose: To remove accumulated silt, sediment and debris from around existing boat launches and dock structures to facilitate their intended use by water borne vessels

Functional boat launches and docks along the navigable waterways of Winnipeg play an important role in providing safe boating opportunities within the City’s municipal boundaries. Ensuring that these facilities are properly maintained (e.g., free of accumulated sediment and debris, dredged to the appropriate depth) is key to their value to, and safe use by, City residents. Spring flooding typically occurs on the City’s major waterways resulting in the deposition of sediment and debris along waterway banks and on facilities and structures located within the floodplain. This sediment and debris can pose a hazard to boat launch and dock users and is aesthetically unpleasing. A component of past boat launch and dock cleaning operations, pumped water has been used to hose down these facilities and surrounding areas. Channel dredging has also been completed at some locations. Without the application of appropriate environmental controls during boat launch and dock maintenance activities, a significant risk exists for mobilizing and transporting sediment-laden water to fish habitat.

All Winnipeg waterways are considered fish habitat. As such, all fish habitat in the City, and indeed across Canada, is regulated by the federal Fisheries Act, which is administered by Fisheries and Oceans Canada (DFO). It is DFO’s mandated responsibility to provide advice on how to undertake activities when a potential impact to fish and fish habitat exists. Any project determined by DFO to cause the harmful alteration, disruption or destruction (HADD) of fish habitat must be authorized by DFO before the project can proceed pursuant to Section 35(2) of the Fisheries Act. In addition, Section 36(3) of the Fisheries Act prohibits the discharge of any deleterious substance to fish habitat. DFO has determined that the silt and sediment being washed back into a waterway as a result of boat launch and dock maintenance activities or from channel dredging is a deleterious substance. Therefore, if undue care and attention is given to the maintenance of

these facilities there is a strong possibility that silt and sediment could be discharged to fish habitat in contravention of the Act.

This protocol provides the necessary BMPs and mitigation measures to avoid the HADD of fish habitat and to minimize the release of sediment-laden water to fish habitat during activities related to boat launch and dock cleaning and maintenance. The protocol will also be useful when notifying DFO of proposed instream works.

Standard Operating Procedures for Boat Launch and Dock Maintenance:

1. The DFO must be notified prior to the commencement of boat launch and dock cleaning activities.
2. No silt, sediment or other deleterious substances may be deposited into waterways at any time. All sediment, debris and other accumulated material should be collected and removed to an approved disposal facility.
3. Appropriate precautions must be taken to ensure mechanical equipment is in good working order, properly maintained and that fuels, lubricants and/or other petroleum products are not deposited within 30 metres of the ordinary high water mark of the waterway.
4. All reasonable efforts must be made to first mechanically remove accumulated silt, sediment and debris from the boat launch or dock. After all reasonable efforts to mechanically remove these materials, power washing with river water is permitted. All pumps drawing water from a waterway must have an approved fish screen on the suction end of the pump hose (see DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline*, 1995).
5. All existing rock, cobble, boulders and woody debris found within the wetted channel and along the river margins must not be removed from the site as they are considered fish habitat features and must be preserved. An exception to this procedure will be granted when the safety of boat launch and dock users and/or navigation on the waterway is compromised.
6. When dredging of an area of waterway is required, floating silt curtain or other appropriate sediment control device should be installed around the proposed dredge site to contain the downstream movement of suspended sediment. The silt curtain/sediment control device should only be removed when water contained within is deemed to be of acceptable quality for release.

**Draft
Protocol –
For Work in
and Around
the City’s
Waterways &
Watercourses**



**PROTOCOL FOR RIVER WALKWAY
MAINTENANCE**

Purpose: To remove accumulated silt, sediment and debris from the City of Winnipeg river walkway system

Winnipeg's river walkways, paralleling the City's major waterways, are a popular community attraction and recreational destination for Winnipeg residents and visitors during low water conditions. Spring flooding typically occurs on the City's major waterways resulting in the deposition of sediment and debris along waterway banks and, due to their close proximity, on the river walkways themselves. This sediment and debris can pose a hazard to walkway users, is aesthetically unpleasing and may easily be transported to the waterway during ensuing rains. A component of past river walkway cleaning operations, pumped water has been used to hose down the walkway and surrounding areas. Without the application of appropriate environmental controls during walkway maintenance, a significant risk exists for mobilizing and transporting sediment-laden water to fish habitat.

All Winnipeg waterways are considered fish habitat. As such, all fish habitat in the City, and indeed across Canada, is regulated by the federal *Fisheries Act*, which is administered by Fisheries and Oceans Canada (DFO). It is DFO's mandated responsibility to provide advice on how to undertake activities when a potential to impact fish and fish habitat exists. Any project determined by DFO to cause the harmful alteration, disruption or destruction (HADD) of fish habitat must be authorized by DFO before the project can proceed pursuant to Section 35(2) of the *Fisheries Act*. In addition, Section 36(3) of the *Fisheries Act* prohibits the discharge of any deleterious substance to fish habitat. DFO has determined that the silt and sediment being washed back into a waterway as a result of the river walkway cleaning is a deleterious substance. Therefore, if undue care and attention is given to river walkway maintenance, there is a strong possibility that silt and sediment could be discharged to fish habitat in contravention of the *Act*.

This protocol provides the necessary BMP's and mitigation measures to avoid the HADD of fish habitat and to minimize the release of sediment-laden water to fish habitat during activities related to river

walkway cleaning and maintenance. The protocol will also be useful when notifying DFO of proposed instream works.

Standard Operating Procedures for River Walkway Maintenance:

1. A *River Walk Cleanup Record of Activities* sheet must be filled out detailing the events of each day of cleaning as they occur (see attached).
2. The DFO must be notified prior to the commencement of walkway maintenance activities.
3. No silt, sediment or other deleterious substances may be deposited into waterways at any time. All debris and accumulated material on and along the walkway should be collected and removed to an approved disposal facility.
4. Before washing off a walkway or structure, a containment system must be set up downslope of the work area to collect any sediment-laden water generated by this activity. Sediment-laden water collected by the containment system must be filtered, retained or otherwise treated prior to discharge to a waterway.
5. Appropriate precautions must be taken to ensure mechanical equipment is in good working order, properly maintained and that fuels, lubricants and/or other petroleum products are not deposited within 30 metres of the ordinary high water mark of the waterway.
6. All pumps drawing water from a waterway must have an approved fish screen on the suction end of the pump hose (see DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline*, 1995).
7. Potable water used for walkway washing purposes should not be allowed to directly enter a waterway without the appropriate application of a chlorine-neutralizing compound (*e.g.*, sodium thiosulphate) or technique.
8. All existing rock, cobble, boulders and woody debris found along the river margins must not be removed from the site as they are considered fish habitat features and must be preserved.

**Draft
Protocol –
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Watercourses**



**PROTOCOL FOR FROZEN WATERWAYS
MAINTENANCE ACTIVITIES AND PROGRAMS**

Purpose: To construct and maintain frozen waterway access ramps, trails and ice skating facilities

Winnipeg's frozen waterway trails, access ramps and ice-skating facilities are a popular community attraction for City residents and visitors during the winter months. While the Red River and other major waterways supporting winter trails and facilities may be frozen, it is still imperative that associated maintenance activities and programs take place in an environmentally responsible manner, utilizing appropriate best management practices (BMP's) and mitigation measures in an effort to minimize impact to fish and fish habitat.

All Winnipeg waterways are considered fish habitat. As such, all fish habitat in the City, and indeed across Canada, is regulated by the federal *Fisheries Act* which is administered by Fisheries and Oceans Canada (DFO). It is DFO's mandated responsibility to provide advice on how to undertake activities when a potential impact to fish and fish habitat exists. Any project determined by DFO to cause the harmful alteration, disruption or destruction (HADD) of fish habitat must be authorized by DFO before the project can proceed pursuant to Section 35(2) of the *Fisheries Act*. In addition, Section 36(3) of the *Fisheries Act* prohibits the discharge of any deleterious substance to fish habitat.

Constructing and maintaining a frozen waterway trail, access ramp and/or ice skating facility may appear relatively benign in light of the frozen nature of the waterway and surrounding environment. However pollutants, debris and materials deposited on or around a frozen waterway can find their way to the aquatic environment during spring melt. Because spring melt typically occurs over a relatively short time period, a "pulse" of accumulated deleterious and other substances (e.g., fuels, lubricants, sediment, paint) is released and can significantly deteriorate water quality and impact fish and fish habitat. Therefore, if undue care and attention is given to the maintenance of winter access ramps, trails and ice skating facilities,

there is a strong possibility that various deleterious substances could be discharged to fish habitat in contravention of the *Act*.

This protocol provides the necessary BMPs and mitigation measures to avoid the HADD of fish habitat and to minimize the release of deleterious substances to fish habitat during construction and maintenance activities for frozen waterway access ramps, trails and ice skating facilities.

Standard Operating Procedures for Frozen Waterways Maintenance Activities and Programs:

1. The DFO must be notified prior to the commencement of construction and/or maintenance activities and/or programs on frozen waterways.
2. No silt, gravel, limestone or other deleterious substances may be deposited onto frozen waterways or riverbanks without notification to, and receipt of a Letter of Advice from, the DFO and authorization from a Waterway Engineer.
3. An application must be prepared and submitted to support the acquisition of a Frozen Waterway Bylaw Permit from the City of Winnipeg, Chief of Police. The application must be submitted at least 14 days prior to the proposed commencement of construction/maintenance activities. Construction/ maintenance activities must fully adhere to the terms and conditions stated on the permit.
4. A meeting with the City of Winnipeg, River Patrol Unit staff must be convened to determine when safe ice conditions exist to safely support desired maintenance equipment and public access.
5. Frozen waterways must not be accessed until written authority is granted by the Chief of Police in accordance with City of Winnipeg By-law #6581/95.
6. Equipment weights accessing frozen waterways must not exceed amounts stated on the Frozen Waterways By-law Permit.
7. Appropriate precautions must be taken to ensure mechanical equipment is in good working order, properly maintained and that fuels, lubricants and/or other petroleum products are not deposited within 30 metres of the normal high water mark of the waterway.
8. All fixtures and materials (rock, straw mulch and wood chips etc.) associated with the Frozen Waterways programs must be removed

when the River Patrol Unit advises that public access is no longer authorized due to deteriorating ice conditions.

9. All pumps drawing water from a waterway must have an approved fish screen on the suction end of the pump hose (see DFO's *Freshwater Intake End-of-Pipe Fish Screen Guideline*, 1995).
10. Rock material used on access pads and other locations along the waterway must be clean and free of soil, silt, sand or other transportable substance.
11. All existing rock, boulders and woody debris are not to be removed from the site, but worked around where possible and relocated nearby, if necessary.