

# Environmental Management Manual

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# Environmental Protection Plan

For the

**ASHBURN ROAD DEVELOPMENT  
SAINT JOHN, NEW BRUNSWICK**

By

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# **Horizon Management Ltd. Environmental Management Manual**

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## **1.0 Introduction**

As part of the Environmental Impact Assessment Review for the Ashburn Road Development, Saint John, New Brunswick, the Technical Review Committee has required that Horizon Management Ltd. prepare and submit an Environmental Protection Plan (EPP) to the Project Manager, Environmental Assessment Section, Department of Environment and Local Government for review and approval.

In the preparation of this plan, Horizon Management Ltd. reviewed a number of existing EPP's and concluded that the Environmental Management Manual (EMM) prepared by the New Brunswick Department of Transportation was a comprehensive document that embodied the approaches and protection measures required for the Ashburn Road Development.

Horizon Management Ltd. has therefore taken the environmental protection approaches employed by NBDOT and incorporated them into their own EMM/EPP for this project.

## **2.0 Environmental Legislations, Policies, Procedures and Guidelines**

The environmental approvals process begins at the earliest stage of a project, and continues throughout the planning, design, construction, operation, maintenance and rehabilitation (OMR) of the project. To successfully navigate the environmental approvals process in an efficient manner while ensuring a high level of environmental protection, it is necessary to have a sound understanding of the environmental legislation and policies that guide the process.

The following section outlines the component of federal and provincial environmental legislation, policies, procedures and guidelines which could apply to the construction, design and OMR of the Ashburn Road project. This section provides an indication of which activities affecting the environment may be regulated.

Environmental requirements such as mitigation measures, monitoring, etc are identified during the environmental impact assessment process, which is conducted as per the NB Clean Environmental Act and/or the Canadian Environmental Assessment Act during the planning and the design phase of the project. The environmental requirements are then implemented during the construction and OMR phase.

### **2.1 Environmental Legislation and Policies**

#### **2.1.1 Federal Acts and Regulations**

Environmental management and protection in New Brunswick is primarily the responsibility of the provincial government, however federal legislation applies when a federal authority has a specified decision-making responsibility in relation to a project. The “triggers” for an environmental assessment are when a federal authority:

- Proposes a project;
- Provides financial assistance to enable a project to be carried out;
- Sells, leases, or otherwise transfers control or administration of federal land to enable a project to be carried out;
- Provides a license, permit or an approval that is listed in the Law List Regulations that enables a project to be carried out.

Federal funding and permits are the most common triggers for highway construction projects in New Brunswick.

The applicable federal acts and regulations are summarized in Table 2.1.

**Table 2.1 – Federal Acts, Regulations, Policies and Guidelines**

<b>Federal Acts, Regulations, Policies and Guidelines</b>		<b>Administered By</b>
<b>Canadian Environmental Assessment Act</b>		Canadian Environmental Assessment Agency
Website	<a href="http://laws.justice.gc.ca/en/C-15.2/">http://laws.justice.gc.ca/en/C-15.2/</a>	
<b>Canadian Environmental Protection Act</b>		Environment Canada
Website	<a href="http://www.ec.gc.ca/CEPARRegistry/the_act/">http://www.ec.gc.ca/CEPARRegistry/the_act/</a>	
<b>Canadian Wildlife Act</b>		Environment Canada
Website	<a href="http://laws.justice.gc.ca/en/W-9/">http://laws.justice.gc.ca/en/W-9/</a>	
<b>Code of Practice for the Environmental Management of Road Salts</b>		Environment Canada
Website	<a href="http://www.ec.gc.ca/nopp/roadsalt/cop/en/rs_main.htm">http://www.ec.gc.ca/nopp/roadsalt/cop/en/rs_main.htm</a>	
<b>Federal Policy on Wetlands Conservation</b>		Environment Canada
Website	<a href="http://www.qc.ec.gc.ca/faune/atlasterreshumides/html/programmes_politique_e.html">http://www.qc.ec.gc.ca/faune/atlasterreshumides/html/programmes_politique_e.html</a>	
<b>Fisheries Act</b>		DFO/Environment Canada
Website	<a href="http://laws.justice.gc.ca/en/F-14/">http://laws.justice.gc.ca/en/F-14/</a>	
<b>Indian Act</b>		Indian Affairs and Northern Development
Website	<a href="http://laws.justice.gc.ca/en/I-5/">http://laws.justice.gc.ca/en/I-5/</a>	
<b>Migratory Birds Convention Act</b>		Environment Canada
Website	<a href="http://laws.justice.gc.ca/en/M-7.01/">http://laws.justice.gc.ca/en/M-7.01/</a>	
<b>Navigable Waters Protection Act</b>		Transport Canada
Website	<a href="http://laws.justice.gc.ca/en/N-22/">http://laws.justice.gc.ca/en/N-22/</a>	
<b>Species At Risk Act</b>		DFO/Env Canada/Parks Canada
Website	<a href="http://www.sararegistry.gc.ca/the_act/default_e.cfm">http://www.sararegistry.gc.ca/the_act/default_e.cfm</a>	

## Canadian Environmental Assessment Act

CEAA is administered by the Canadian Environmental Assessment Agency (CEAA Agency). CEAA was developed to balance environmental considerations with economic and social considerations in project decision-making. The key objectives of CEAA are:

- To minimize or avoid environmental effects before they occur;
- To incorporate environmental factors into decision making;
- To provide an opportunity for public participation; and
- To promote sustainable development.

## Canadian Environmental Protection Act

The Canadian Environmental Protection Act (CEPA) is administered by Environment Canada and Health Canada, and is an important part of Canada's federal environmental legislation. CEPA is aimed at preventing pollution and protecting the environment and human health and at promoting sustainable development. CEPA includes regulations that control the release of toxic emissions and effluents into the environment (including petroleum products and road salt); and the transportation, storage, use and disposal of toxic substances.

CEPA also includes the Disposal at Sea Regulation which is administered by Environment Canada.

### **Canadian Wildlife Act**

The Canada Wildlife Act provides the federal Minister of the Environment with the authority to acquire lands for wildlife research, conservation and interpretation and to take any action deemed necessary to protect any species of wildlife in danger of extinction. The act applies to all federal lands, any waters on or flowing through the lands, the natural resources on the land, and the internal waters of Canada, and includes provisions for the protection of endangered species. Lands protected by the Canada Wildlife Act have Wildlife Area Regulations (special protective prohibitions) that may limit or preclude road development. These lands should be avoided where possible.

### **Federal Policy on Wetlands Conservation**

The Federal Policy on Wetland Conservation (Environment Canada 1991) does not constitute specific legislation, but sets forth goals, principles, and strategies which are integrated into the existing federal mandates. This policy is administered by the Canadian Wildlife Service, which is part of Environment Canada. The objective of this policy is to "promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future". This objective is achieved through more specific goals such as the use of wetlands in a manner that enhances prospects for their productive and sustainable use by future generations, and no net loss of wetland functions on all federal lands, on all waters, or on any other lands where an environmental assessment under CEAA is required. In practice, all projects requiring a provincial EIA registration or a provincial WAWA permit for work in or near wetlands should also be in compliance with the Federal Policy on Wetland Conservation.

"Wetland function" is defined per the Federal Policy on Wetland Conservation (Environment Canada 1991) as:

"...the natural processes and derivation of benefits and values associated with wetland ecosystems, including economic production (e.g., peat, agricultural crops, wild rice, peatland forest production), fish and wildlife habitat, organic carbon storage, water supply and purification (groundwater recharge, flood control, maintenance of flow regimes, shoreline erosion buffering), and soil and



water conservation, as well as tourism, heritage, recreational, educational, scientific, and aesthetic opportunities”.

## **Fisheries Act**

Although the Fisheries Act is administered primarily by DFO, Environment Canada administers Section 36 of the Fisheries Act, which deals with deleterious substances.

The Fisheries Act prohibits the deposit (e.g., direct discharging, dumping, leaking, spilling) of deleterious substances into waters that contain fish or other marine animals. This includes lakes, rivers, oceans, and storm drains that empty into watercourses. The deleterious substances most common to road development projects are petroleum products (e.g., gasoline, diesel, and hydraulic oil) and suspended sediments. The Fisheries Act also prohibits the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat, the destruction of fish by any means other than fishing (including incidental mortality from blasting), and the impediment of fish migration.

There are six sections of the Fisheries Act where the need for authorization is a CEAA Law List trigger, of which, only Section 35(2) commonly applies to this type of development. Under Section 35(2) of the Fisheries Act, no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat without authorization from the Minister of DFO. In practice in New Brunswick, authorization under Section 35(2) (also referred to as a Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat or “HADD Authorization”), is typically required for all culvert and structure installations on fish bearing watercourses. Fish Habitat compensation is a standard condition of a Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat. The amount and type of required compensation is generally decided on a per watercourse basis.

## **Indian Act**

The Indian Act is administered by Indigenous and Northern Affairs Canada. This Act is in place to protect the land base set aside for Aboriginal peoples, and prohibits trespassing, and the removal of resources including plant-life and geological materials, by a non-Aboriginal person, from any reserve lands without permission.

There are three sections of the Indian Act where the need for a permit/authorization triggers an environmental assessment under CEAA, of which, only Section 28(2) commonly applies to this type of development. Section 28(2) allows for the authorization of a non-Aboriginal person to occupy or otherwise use reserve land. Therefore, a CEAA environmental assessment is required for any work within reserve lands.

## **Migratory Birds Convention Act**

The Migratory Birds Convention Act (MBCA) is an international legislation that provides migratory birds in Canada and the United States with protection from indiscriminate harvesting and destruction. The MBCA is administered by Environment Canada (in Canada) and prohibits the disturbance, destruction, taking or possession of a migratory bird, migratory bird nest, egg, or nest shelter. In addition, the Act stipulates that no person shall deposit or permit to be deposited, oil, oil wastes or any other substance harmful to migratory birds in any water or other areas (such as wetlands) frequented by such birds. The MBCA is also linked to SARA through the protection of critical habitat as defined in SARA.

The Migratory Bird Sanctuary Regulations identifies sanctuaries established under the MBCA.

### **Migratory Bird Sanctuary Regulations**

The Migratory Bird Sanctuary Regulation under the Migratory Birds Convention Act is administered by Environment Canada and identifies established sanctuaries throughout New Brunswick and Canada.

The Migratory Bird Sanctuary Regulation prohibits the following within a migratory bird sanctuary:

- Hunting of migratory birds;
- Disturbing, destroying or taking the nests of migratory birds;
- Having in possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird;
- Possession of any firearm or any hunting appliance; or
- Allowing a dog or cat to run at large.

In addition, there are specific activities that are prohibited during certain times of the year at various bird sanctuaries.

The Minister may issue a permit authorizing any person to have firearms in their possession and to shoot and have in their possession migratory birds in such portion of a migratory bird sanctuary.

### **Navigable Waters Protection Act**

The Navigable Waters Protection Act (NWPA) is administered by Transport Canada. Physical works on, in, over, under, through, or across navigable waters in Canada are forbidden without the approval of Transport Canada under the NWPA. Works include bridge, culvert, and tunnel construction, the dumping of fill materials, the placement of overhead wires, or the construction of any other structures which have the potential to interfere with navigation. Likewise, no substance may be deposited in a navigation channel such that navigability is interfered with.

There are four sections of the NWPA where the need for a permit/authorization may trigger an environmental assessment under CEAA, of which, only Section 5(1)(a) commonly applies to road developments. Under Section 5(1)(a), no work shall be built or placed in, over, under, through or across any navigable water unless the work and the site and plans thereof have been approved by Transport Canada. To initiate this process, a NWPA application must be submitted to Transport Canada. The application must include design drawings and clearly labeled water elevations. For new construction, a "formal approval" process may be required. The formal approval process is followed when the work has the potential to substantially interfere with navigation (as determined by Navigable Waters Protection Branch officials).

## **Species At Risk Act**

The Species at Risk Act (SARA) provides a framework for the protection and the recovery of species in Canada, where protected species include: mammals, birds, amphibians, reptiles, fish, mollusks, lepidopterans (moths and butterflies), and plants. SARA provides legal protection to species, subspecies and distinct populations of Canadian species which are listed in Schedule 1 of SARA on federal lands, on all waters, or on any other lands where an environmental assessment under CEAA is required. SARA includes many prohibitions, and the following three are encountered with road development projects:

- No person shall kill, harm, harass, capture or take an individual of a species listed as extirpated, endangered, or threatened;
- No person shall damage or destroy the residence of one or more individuals of a species listed as extirpated, endangered, or threatened; and
- No person shall destroy any part of the critical habitat of any listed endangered or threatened species, or an extirpated species where there is a recovery plan in place to reintroduce the species.

Under SARA, the preferred mitigation for protected species, their residences, and their critical habitat is avoidance. If a project is likely to affect an individual, residence, or critical habitat of any SARA listed species, then the Responsible Authority (below) must send a notification to the following agencies, as applicable:

- Fisheries and Oceans Canada (responsible for aquatic species);
- Environment Canada (responsible for migratory birds protected by the Migratory Birds Convention Act and for all other species); and
- Parks Canada (responsible for any species on lands administered by Parks Canada).

In some cases, mitigation or compensation may be acceptable when avoidance is not possible. SARA does include a provision for obtaining a permit to engage in an activity affecting a protected species, its residence, or its critical habitat.

### **2.1.2 Provincial Acts and Regulations**

The majority of provincial environmental legislation in New Brunswick is administered by the New Brunswick Department of Environment and local Government (NBDELG). Other regulating bodies include the New Brunswick Department of Energy and Resources Development (NBDNR), Department of Health (DH) and the New Brunswick Department of Tourism, Heritage and Culture (NBDTHC). In addition, some approval processes may involve more than one regulating body. An example of this is the Watercourse and Wetland Alteration Regulation process where permit applications are often reviewed by NBDELG, NBDNR and Fisheries and Oceans Canada (DFO).

Within each of the provincial acts are regulations, some of which require permits or authorizations prior to conducting the physical works associated with road development. The applicable provincial acts, regulations, policies and guidelines are summarized in Table 2.2.

**Table 2.2 – New Brunswick Provincial Acts, Regulations, Policies and Guidelines**

<b>Provincial Acts, Regulations, Policies and Guidelines</b>		<b>Administered By</b>
Draft Proposed Wetland Mitigation Guidelines		DNR
Website		
Cemetery Companies Act		Health
Website	<a href="http://www.gnb.ca/0062/acts/acts/c-01.htm">http://www.gnb.ca/0062/acts/acts/c-01.htm</a>	
Clean Air Act		Environment
Website	<a href="http://www.gnb.ca/0062/acts/acts/c-05-2.htm">http://www.gnb.ca/0062/acts/acts/c-05-2.htm</a>	
Clean Environment Act		Environment
Website	<a href="http://www.gnb.ca/0062/acts/acts/c-06.htm">http://www.gnb.ca/0062/acts/acts/c-06.htm</a>	
Air Quality Regulation		Environment
Website	<a href="http://www.gnb.ca/0062/regs/97-133.htm">http://www.gnb.ca/0062/regs/97-133.htm</a>	
Water Quality Regulation		Environment
Website	<a href="http://www.gnb.ca/0062/regs/82-126.htm">http://www.gnb.ca/0062/regs/82-126.htm</a>	
Petroleum Product Storage & Handling Regulation		Environment
Website	<a href="http://www.gnb.ca/0062/regs/87-97.htm">http://www.gnb.ca/0062/regs/87-97.htm</a>	

<b>Provincial Acts, Regulations, Policies and Guidelines</b>		<b>Administered By</b>
Clean Water Act		Environment
Website	<a href="http://www.gnb.ca/0062/acts/acts/c-06-1.htm">http://www.gnb.ca/0062/acts/acts/c-06-1.htm</a>	
Wellfield Protected Area Designation Order		Environment
Website	<a href="http://www.gnb.ca/0062/PDF-regs/2000-47.pdf">http://www.gnb.ca/0062/PDF-regs/2000-47.pdf</a>	
Water Well Regulation		Environment
Website	<a href="http://www.gnb.ca/0062/PDF-regs/90-79.pdf">http://www.gnb.ca/0062/PDF-regs/90-79.pdf</a>	
Guidelines for decommissioning (abandonment) of Water Wells		Environment
Website	<a href="http://www.gnb.ca/0009/0002-e.pdf">http://www.gnb.ca/0009/0002-e.pdf</a>	
Water Classification Regulation		Environment
Website	<a href="http://www.gnb.ca/0062/PDF-regs/2002-13.pdf">http://www.gnb.ca/0062/PDF-regs/2002-13.pdf</a>	
Watercourse and Wetland Alteration Regulation		ENV/DFO/DNR
Website	<a href="http://www.gnb.ca/0062/regs/90-80.htm">http://www.gnb.ca/0062/regs/90-80.htm</a>	
Watershed Protected Area Designation Order		Environment
Website	<a href="http://www.gnb.ca/0062/regs/2001-83.htm">http://www.gnb.ca/0062/regs/2001-83.htm</a>	
Costal Areas Protection Policy		Environment
Website	<a href="http://www.gnb.ca/0009/0371/0002/Coastal-E.pdf">http://www.gnb.ca/0009/0371/0002/Coastal-E.pdf</a>	
Environmental Impact Assessment Regulation		Environment
Website	<a href="http://www.gnb.ca/0062/regs/87-83.htm">http://www.gnb.ca/0062/regs/87-83.htm</a>	
Fish and Wildlife Act		DNR
Website	<a href="http://www.gnb.ca/0062/acts/acts/f-14-1.htm">http://www.gnb.ca/0062/acts/acts/f-14-1.htm</a>	
Fur Harvester Regulation		DNR
Website	<a href="http://www.gnb.ca/0062/PDF-regs/84-124.pdf">http://www.gnb.ca/0062/PDF-regs/84-124.pdf</a>	
Nuisance Wildlife Control Regulation		DNR
Website	<a href="http://www.gnb.ca/0062/PDF-regs/97-141.pdf">http://www.gnb.ca/0062/PDF-regs/97-141.pdf</a>	
Endangered Species Act		DNR
Website	<a href="http://www.gnb.ca/0062/acts/acts/e-09-101.htm">http://www.gnb.ca/0062/acts/acts/e-09-101.htm</a>	
New Brunswick Forest Fires Act		DNR
Website	<a href="http://www.gnb.ca/0062/acts/acts/f-20.htm">http://www.gnb.ca/0062/acts/acts/f-20.htm</a>	
Historic Sites Protection Act		Wellness, Culture & Sport
Website	<a href="http://www.gnb.ca/0062/acts/acts/h-06.htm">http://www.gnb.ca/0062/acts/acts/h-06.htm</a>	
Parks Act		Tourism & Parks/DNR
Website	<a href="http://www.gnb.ca/0062/PDF-acts/p-02-1.pdf">http://www.gnb.ca/0062/PDF-acts/p-02-1.pdf</a>	

## **Draft Proposed Wetland Mitigation Guidelines**

The draft Proposed Wetland Mitigation Guidelines for New Brunswick (NBDNR 2003), are intended “to generate discussion concerning wetland mitigation principles in New Brunswick to support the no net loss of wetland function objective identified in the New Brunswick Wetlands Conservation Policy.” These guidelines have not been approved by the Province, but are currently being used in part by regulators for developing compensation plans. The guidelines recommend that the general mitigation strategy for protecting wetlands is avoidance, followed by minimization of environmental impacts, and lastly by physical compensation. The guidelines provide general ratios for different types of compensation. The preferred compensation is like-for-like habitat, with a premium placed on restoration of existing wetland. Currently, financial compensation is not being accepted.

## **Cemetery Companies Act**

The Cemetery Companies Act is administered by the New Brunswick Department of Health. Under this act, a cemetery (public or private) cannot be altered without approval of the Minister of Health. No person is permitted to disturb a grave or remove a monument or other improvement to a burial plot. The Act includes many prohibitions, including the following:

- Harming trees, shrubs or plants;
- Committing a nuisance;
- Harming a tomb, monument, gravestone or other cemetery structure; or
- Harming a fence or railing erected for the protection of the cemetery.

## **Clean Air Act**

The Clean Air Act along with its regulations is the primary statute protecting the air quality in New Brunswick. The Act oversees emissions potentially affecting air quality and states that without the required authority or permission, no person shall cause or permit an air emission that causes damage to property, substantially interferes with the normal conduct of business, or causes substantial loss of enjoyment of the normal use of any property.

Types of activities potentially regulated by this Act include activities causing smoke or dust.

## **Clean Environment Act**

The Clean Environment Act is the principal statute protecting the environment quality in New Brunswick. The Act states that no person may directly or indirectly discharge, emit, leave, deposit, or throw any contaminant or waste into or upon the environment where such action may:

- Affect the natural quality or constitution of the environment (physical, chemical, or biological);
- Endanger the health, safety, or comfort of a person;
- Endanger the health of animal life;
- Cause damage to property;
- Cause damage to plant life; or
- Interfere with the visibility, the normal conduct of business, or the normal enjoyment of life or property.

Several Regulations made under this Act may be applicable to construction, development and OMR activities, including the following;

- Petroleum Product Storage and Handling Regulation
- Water Quality Regulation

### **Air Quality Regulation**

The Air Quality Regulation under the New Brunswick Clean Air Act is administered by NBDELG and states that:

“no person shall, without permission, cause or permit an air emission that causes substantial loss of enjoyment of the normal use of any property, substantially interferes with the normal conduct of business, or causes damage to property.”

Activities that are potentially controlled under the Air Quality Regulation are the burning of woody debris or slash, and construction activities causing air emissions (e.g., exhaust or dust). While Horizon Management Ltd. must be in compliance with the Air Quality Regulation throughout construction, an authorization is not typically required for these activities, with the exception of burning. Burning however is currently not recommended by Horizon Management Ltd.

### **Water Quality Regulation**

The New Brunswick Water Quality Regulation under the Clean Environment Act is administered by NBDELG and protects New Brunswick’s water, where water includes: coastal waters; groundwater; surface waters; flowing or standing waters; and ice. Under the Water Quality Regulation, it is prohibited to emit, discharge, deposit, leave or throw any contaminant or construct, modify or operate a source of contamination into or near the water without a permit. While Horizon Management Ltd. must be in compliance with the Water Quality Regulation throughout construction and OMR, an authorization is not typically required for these activities under this Regulation.

### **Petroleum Product Storage & Handling Regulation**

The Petroleum Product Storage and Handling Regulation under the New Brunswick Clean Environment Act is administered by NBDELG. Regulated activities include the transportation and handling of petroleum products, use of dispensing facilities, spill prevention and remediation, and the design and construction of petroleum storage tanks. Storage tanks over 2,000 L, total capacity, must be registered and licensed under this Regulation.

### **Clean Water Act**

The Clean Water Act applies to any activity affecting surface waters and groundwaters, including any activity within 30 m of a watercourse or wetland. Under this Act, water includes flowing or standing water, above and below the earth surface, and ice on any body of water.

The Act states that a WAWA permit must be obtained prior to undertaking or proceeding with any project that alters or diverts all or part of a watercourse or wetland. Types of activities potentially regulated by this statute include any structures constructed in, over, or around watercourses and wetlands, and any activity which may result in the deposition of a substance either directly or indirectly into surface water or groundwater.

### **Wellfield Protected Area Designation Order**

More than 150,000 people in New Brunswick get their drinking water from municipal wellfields that are protected by the New Brunswick Wellfield Protected Area Designation Order which is a Regulation under the Clean Water Act. The Wellfield Protected Area Designation Order is administered by the Sustainable Development, Planning & Impact Evaluation Branch of NBDELG. Wellfields can be contaminated by chemicals or bacteria seeping into the groundwater. Potential contaminants associated with construction and operation includes petroleum products, paint, road salt, and fertilizer. Contamination can occur as a result of improper storage, use or disposal, or in the event of an accident. Blasting activities also have the potential to impact wellfield areas.

The *Wellfield Protected Area Designation Order* divides protected wellfields into three zones based on the likelihood and consequence of contamination depending on the distance of the project activity from the wellhead and the nature of the groundwater flow. In this regard, the size and shape of the zones are unique to each wellfield. A map of the zones for each protected wellfield is included within the *Wellfield Protected Area Designation Order* which can be obtained from NBDELG.

### **Water Well Regulation**

The Water Well Regulation under the New Brunswick Clean Water Act is administered by NBDELG.



Thousands of New Brunswick families, living in smaller towns and rural areas, rely on individual wells for drinking water. The quality of the water aquifers produce can be influenced by naturally occurring and/or man-made substances. It is important to plan the location of the well to reduce the risk of influence from other site features such as roads and septic systems. The New Brunswick "Water Well Regulation" specifies well location set back distances from structures, and potential contaminant sources.

The New Brunswick "Clean Water Act" requires that all new well construction, deepening of existing wells and well abandonment must be carried out by a licensed New Brunswick Water Well Contractor and licensed well driller.

### **Guidelines for Decommissioning (Abandonment) of Water Wells.**

The Guidelines for Decommissioning (Abandonment) of Water Wells provides advice on the decommissioning of drilled, dug and/or monitoring wells. Section 27 of the Water Well Regulation states that: "Where a well is not in use and its continued existence might constitute a safety hazard or allow a contaminant to enter the aquifer, the owner of the well shall fill and seal the well using a method approved by the Minister sufficient to prevent the vertical movement of water in the well."

If an individual or company is being contracted to carry out all operations incidental to the abandonment of water wells, they must be a licensed water well contractor who holds a valid New Brunswick Water Well Contractors Permit.

### **Water Classification Regulation**

The Water Classification Regulation under the New Brunswick Clean Water Act is administered by NBDELG. The purpose of water classification is to set goals for surface water quality and promote management of water on a watershed basis. The Water Classification Regulation establishes water quality classes, and associated water quality standards, and outlines administrative processes and requirements related to the classification of water. Water classification places the water of lakes and rivers or segments of rivers into categories or classes based on water quality goals. Each class is then managed according to the goal. The goals associated with a specific class are set according to the intended uses of the water, and the water quality and quantity required to protect the intended uses.

The classifications are as follows;

- Outstanding Natural Waters Class – natural water quality and have had little disturbance from human activities.
- AP Class – watersheds which are designated as municipal drinking water supplies under the Watershed Protected Area Designation Order.

- AL Class – all lakes not classified in the Outstanding or AP Classes will automatically be placed into the AL Class. Lakes are known to be very sensitive systems that must be managed differently from rivers and streams.
- A, B and C Classes – Rivers and other watercourses not included in the above classes will be classified into one of three Classes, A, B or C.

### **Watercourse and Wetland Alteration Regulation**

The New Brunswick Watercourse and Wetland Alteration Regulation (WAWA Regulation) under the Clean Water Act is administered by NBDELG. The WAWA Regulation is designed to protect streams, rivers, wetlands and lakes from alteration resulting from work or ground disturbance near the area. The Clean Water Act applies to all freshwater watercourses. Under the Clean Water Act, an “alteration” is defined as a temporary or permanent change at, near or to a watercourse or wetland, or to water flow of the watercourse or wetland which includes:

- Repairs, modifications or removal of existing structures in the watercourse or wetland;
- Operation of machinery on the bed of a watercourse/wetland other than an approved fording location;
- Operation of machinery in or on a watercourse/wetland;
- Any deposit or removal of material into or from a watercourse/wetland or within 30 metres of a watercourse/wetland;
- Any disturbance of the ground within 30 metres of a watercourse/wetland except by agricultural activities that occur more than 5 metres from the bank of the watercourse/wetland;
- Any removal or breaching of beaver dams, lodges, etc.;
- Any removal of vegetation from the bed or bank or within 30 metres of a watercourse or wetland; and
- Any removal of vegetation from a watercourse/wetland or within 30 metres of the watercourse/wetland except agricultural activities that occur more than five metres from a watercourse/wetland.

A WAWA Regulation permit (often just referred to as a WAWA permit) is required from NBDELG before any one of the above activities is conducted. A provisional permit may be issued where the input of DFO and/or NBDNR is not required, as in the case of geotechnical work that adheres to the conditions outlined in the provisional permit. In all other cases, a standard permit is required and will likely contain conditions of approval that limit the means and time in which the project work can be carried out. WAWA permit requires detailed design drawings and specifications.

Where a watercourse meets the technical definition of a watercourse as outlined in the Clean Water Act, but is not depicted on the digital map layer of the NBDNR Watercourse Database or represented on the black and white 1:10,000 scale orthophoto maps, such watercourses are exempt from the requirement to obtain a permit under the WAWA Regulation. However, NBDELG must be notified of all planned

work within 30 m of a watercourse, regardless of the size or nature of the watercourse, in order for the exemption to be valid.

The Watercourse and Wetland Alteration Technical Guidelines (NBDELG, Latest Approved Version) provide guidance on standard mitigation that must be followed where applicable.

### **Watershed Protected Area Designation Order**

More than 300,000 people in New Brunswick get their drinking water from watersheds protected under the Watershed Protected Area Designation Order which is a Regulation under the Clean Water Act. The Watershed Protected Area Designation Order is administered by the Sustainable Development, Planning & Impact Evaluation Branch of NBDELG. Watersheds can be contaminated as a result of improper storage, use or disposal of petroleum products, paint, road salt, and fertilizer, or in the event of an accident. Contaminants can enter a watercourse directly from a point source such as a leaking hydraulic line from construction equipment, or indirectly from road surface runoff. Under this Order, sediment is also considered as a contaminant.

The Watershed Protected Area Designation Order divides protected watersheds into the following three zones:

- Zone A – Water Body;
- Zone B – 75 m buffer; and
- Zone C – Remainder of the watershed.

Maps of the zones for all protected watersheds are included within the Watershed Protected Area Designation Order. There are different prohibitions within each zone. Road construction is generally allowed within all three zones provided that approval is obtained under the WAWA Regulation and that the specifications given in the Watershed Protected Area Designation Order are followed. These specifications include off-take ditches, sediment basins, riprap stabilizers, shoulder widths, roadbeds, water bars, borrow pits, ditches and culverts and are designed to minimize erosion and ground disturbance. The Watershed Protected Area Designation Order can be obtained from NBDELG.

The storage (temporary or permanent) of petroleum products and salt are not permitted within Zones A and B. New petroleum storage tanks may be installed and operated within Zone C provided that the activities are undertaken in compliance with the Petroleum Product Storage and Handling Regulation of the Clean Environment Act. The Watershed Protection Area Designation Order is enforced through substantial fines, though exemptions to the prohibitions may be obtained under certain conditions.

### **Coastal Areas Protection Policy**

The New Brunswick Coastal Areas Protection Policy (NBCAPP) is overseen by the Sustainable Development, Planning & Impact Evaluation Branch of NBDELG. NBCAPP was designed with the following key objectives:

- To minimize the threats to humans from storm surge and flooding;
- To minimize the contamination of coastal waters and wetlands;
- To protect inland areas from storm surge;
- To maintain coastal plants and animals; and
- To minimize public expenditures required to repair damage to public properties such as roads and bridges.

NBCAPP divides the coastal areas into the following three zones:

- Zone A – the area of coastal features;
- Zone B – a 30 m buffer immediately landward of Zone A; and
- Zone C – the coastal transition zone.

Specific zones are not provided for the New Brunswick coast. A coastal areas professional that is approved by the Province must be used to determine the zones for a given project or area. A list of coastal area professionals in New Brunswick is maintained by NBDELG.

It is noted in the NBCAPP that activities that require operation in these zones may be exempted under the policy provided that appropriate analysis is undertaken. Appendix A of the NBCAPP provides a list of project types that will require formal environmental review under the NB EIA Regulation. Also included in Appendix A of the NBCAPP is a general list of recommended mitigation for projects that must undergo environmental review.

### **Environmental Impact Assessment Regulation**

The New Brunswick Environmental Impact Assessment Regulation (NB EIA Regulation) is part of the New Brunswick Clean Environment Act, and is administered by NBDELG. As stated in the document Environmental Impact Assessment in New Brunswick (NBDELG 2006a), environmental impact assessment is:

“A process through which the environmental impacts potentially resulting from a proposed project are identified and assessed early in the planning process. EIA identifies steps that can be taken to avoid negative environmental impacts or reduce them to acceptable levels before they occur. EIA therefore, represents a proactive, preventative approach to environmental management and protection.”

### **Fish And Wildlife Act**

The New Brunswick Fish and Wildlife Act is administered by NBDNR. Under Section 34(4) of the Fish and Wildlife Act "...the owner or occupant of private land, or a person who would be entitled to hold a license issued under this Act or the regulations and is designated by an owner or occupant of private land may, in accordance with the regulations, hunt, on any day and at any time, except during the night, or trap, snare, remove or relocate on any day and at any time any wildlife listed in subsection (5) that is found under, on or above that private land, where necessary for the prevention of;

- Damage to private property, or
- Injury to owners of private property or owners or occupants of private land.

Section 34(5) of the Fish and Wildlife Act identifies a number of wildlife that can be hunted, trapped, snared, removed or relocated and it includes beavers.

### **Fur Harvester Regulation**

Under the Fur Harvester Regulation (84-124) of the Fish and Wildlife Act, a license is required to trap and remove beaver. The Wildlife Refuges and Wildlife Management Areas Regulation identifies the established wildlife refuges and wildlife management areas in New Brunswick, and the prohibited activities in the areas.

### **Nuisance Wildlife Control Regulation (97-141)**

The Nuisance Wildlife Control Regulation under the New Brunswick Fish and Wildlife Act is administered by DNR. The Regulation states that "no person shall operate a nuisance wildlife control enterprise, or hunt, trap, snare, remove or relocate nuisance wildlife as the employee of a nuisance wildlife control enterprise, unless the person is the holder of an operator's license." It also notes that "the holder of an operator's license shall ensure that every trap and snare set or placed by the holder is checked at least once every twenty-four hours after it is set or placed and shall ensure that any wildlife taken by it is removed from it immediately."

### **Endangered Species Act**

The New Brunswick Endangered Species Act is administered by NBDNR for the protection of species, both plant and animal, that are on the endangered species list along with their habitat. The NB Endangered Species Act prohibits the following:

- To willfully or knowingly kill, injure, disturb or interfere with a member or any part of a member of an endangered species or regionally endangered species;
- To willfully or knowingly attempt to kill, injure, disturb or interfere with a member or any part of a member of an endangered species or regionally endangered species;

- To willfully or knowingly destroy, disturb or interfere with the nest, nest shelter or den of a member of an endangered species of fauna or regionally endangered species of fauna; and
- To willfully or knowingly attempt to destroy, disturb or interfere with the nest, nest shelter or den of a member of an endangered species of fauna or regionally endangered species of fauna.

There are no permits or authorizations for violation of these prohibitions, and therefore, any protected species and its critical habitat must be considered as a constraint to development.

### **New Brunswick Forest Fires Act**

The New Brunswick Forest Fires Act is administered by NBDNR and applies to all fires that are threatening or burning forested lands located outside city/town municipal boundaries (but not including agricultural lands), with the purpose of protecting these lands from fire.

During forest fire season (summer) a burning permit is required for planned open fires, with the exception of campfires and most small brushfires outside of cities, towns and some villages, in which case the burning permit information line (1-866-458-8080) is called to determine if burning is permitted in a particular county.

While a person is within forest land the following actions are prohibited:

- Smoking while moving locations; and
- Discarding or dropping a burning match, ashes from a cigar/cigarette/pipe or any burning substance.

Under the NB Forest Fires Act, a person in charge of a fire, or who accidentally causes a fire, must prevent the fire from spreading, and not leave it unattended.

### **Historic Sites Protection Act**

The New Brunswick Historic Sites Protection Act is administered by NBDTHC, with the purpose of protecting heritage and archaeological resources. Under the Historic Sites Protection Act, no person shall excavate or alter in any way a protected site or remove or cause to be removed there from, any historical or anthropological object without a permit. Non-protected sites are not covered by the Historic Sites Protection Act, and therefore do not require a permit. However, an archaeological and heritage survey is commonly required for road development projects that require authorization under the NB EIA Regulation, or CEAA. A separate Terms of Reference for the archaeological and heritage evaluation is commonly issued by NBDTHC for medium or large-scale road development projects.

### **Parks Act**

The Parks Act is administered by Tourism, Heritage and Culture and DNR. The Act regulates the use and protection of provincial parks in New Brunswick. Specifically, it notes that without the permission of the minister, no person in a provincial park shall;

- Cut, damage or remove any plant, shrub, flower or tree,
- Remove any artifact or natural object, make an excavation,
- Alter, damage or destroy any lake, watercourse or water spring, or
- Remove, damage or deface any real or personal property of the Crown.

In addition, no person shall throw or deposit any litter or waste material in a provincial park except into a waste container or a place designated for that purpose.

### **Pipeline Act**

Under the New Brunswick Pipeline Act, any person proposing to undertake a ground disturbance must take all precautions reasonably necessary to ascertain whether a pipeline exists within the area where a ground disturbance is planned. It is the responsibility of that person to determine who the owner/operator of the pipeline is and to notify the owner/operator. This Act also contains contingency and emergency response plans.

### **Protected Natural Areas Act**

The New Brunswick Protected Natural Areas Act is administered by NBDNR. The purpose of this Act is:

“To protect the biological diversity of fauna and flora within the Province and the relationship between such fauna and flora and the environment by protecting, conserving and managing land ... while providing opportunities for public access to those lands or portions of those lands for outdoor recreational activities, educational activities and scientific research that have minimal environmental impact.”

The Act identifies prohibited activities in established protected natural areas. Existing protected natural areas would represent a constraint in the planning of a new highway.

### **Quarriable Substance Act**

The Quarriable Substance Act is administered by DNR. A “quarriable substance” includes ordinary stone, building or construction stone, sand, gravel, peat, clay and soil. The Act applies to all Crown Lands and any shore area designated by the Lieutenant-Governor in Council.

Under this Act, no person shall remove or take a quarriable substance unless the person has been issued a quarry permit.

### **Topsoil Preservation Act**

The Topsoil Preservation Act is administered by NBDELG. Under the Act, no person shall remove topsoil from a site unless the person is the holder of a permit.

The Minister may issue an order requiring the person;

- To cease removing topsoil from a site or moving topsoil from a parcel or to cease permitting the removal of topsoil from a site or the moving of topsoil from a parcel
  - Permanently,
  - For a specified period, or
  - In the circumstances set out in the order;
- To alter the manner of removal of topsoil from a site; or
- To carry out rehabilitation of the site or the parcel or other remedial action in relation to the site or the parcel from which topsoil is, or has been, removed or moved.

### **Wetlands Conservation Policy**

Wetlands are protected provincially by the New Brunswick Wetlands Conservation Policy. The primary objective of this policy is to prevent any loss of provincially significant wetlands and to achieve no net loss of wetland functions for all other wetlands (e.g., wetlands greater than 1 ha in size but not considered as provincially significant and smaller than 1 ha but contiguous to another water body). Implementation of this policy is the responsibility of NBDELG through existing regulations of New Brunswick's Clean Water Act and the Clean Environment Act.



## **3.0 Construction & OMR**

### **3.1 Clearing**

#### **Description**

Clearing consists of cutting and salvaging all merchantable timber and disposing of all other trees, logs and brush. Merchantable timber is defined, as timber for which there is an established market in the general vicinity of the Contract.

#### **Concerns**

The concerns and potential impacts associated with clearing operations include:

- The use of heavy equipment and removal of mature trees and slash during clearing operations;
- Erosion and sedimentation as a result of the ground exposure due to the use of heavy equipment and the removal of mature trees and slash during clearing operation;
- Clearing practices can also create a variety of problems like, drainage problems, disturb the movement of fish in a watercourse, disturb birds in a critical nesting stage, affect deer wintering areas, etc.;
- Disruption or destruction of ESA's;
- Impact to watercourse/wetlands; and
- Improper equipment maintenance and handling of fuels.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- If burning is allowed, a burning permit must be obtained from NBDELG and NBDNR.

#### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Horizon Management Ltd. employees or other contracted survey personnel shall flag the clearing limits and any ESA's prior to clearing activity.
- c) Most clearing activities must avoid the generally accepted migratory bird-nesting period of between May 1st to August 31st.

- d) Winter clearing, on frozen ground, shall be conducted whenever possible.
- e) Avoid clearing during deep snow conditions which hinder deer movement, or when deer may be yarded up in deer wintering areas within or near the ROW.
- f) Buffer zones will extend a minimum of 30 m each side of a watercourse/wetland and will be clearly identified. Where there are steep grades or highly sensitive watercourses/wetlands, buffer zones shall be extended as required.
- g) Ground disturbance must be minimized to reduce the potential for erosion and sedimentation of watercourses/wetlands.
- h) If rutting or ground disturbance occurs during clearing operations, the ground shall be immediately stabilized. (See Section 3.3 – Erosion and Sediment Management)
- i) Directional hand felling and harvesting must be used where ground conditions are not suitable for access by heavy equipment.
- j) When cable skidders are used, the full length of cable shall be used to avoid rutting soft ground areas.
- k) Trees must be felled away from and not into or over a watercourse or wetland.
- l) Avoid long skids of timber on steep slopes adjacent to watercourses/wetlands.
- m) Slash shall not be placed or left in watercourses/wetlands. Brush, slash and other debris must be piled away from watercourses/wetlands so that they are not washed into the watercourses/wetlands by floodwaters.
- n) Watercourse/wetland crossings must be avoided where possible.
- o) Skidding trees across a watercourse/wetland shall not be permitted.
- p) Temporary bridges can be used to facilitate crossings a watercourse/wetland (See Section 3.11.2 – Temporary Watercourse/Wetland Crossings).
- q) Temporary bridge crossing and fording location shall be approved by NBDELG.
- r) During the installation of water crossings, any trees requiring cutting within 10 m of a watercourse/wetland must be cut by hand or by machinery able to “reach in” to cut and yard the timber out.
- s) Burning is generally not accepted, however if burning is required, NBDELG and NBDNR shall be consulted prior to commencement of the burning and approval

must be obtained.

- t) All necessary precautions must be taken to prevent the discharge or loss of any fuels and oil into the environment.
- u) Machinery and pollutants shall be located or stored in areas not in danger of floodwater, and at least 30 m away from a watercourse, wetland or private water well.
- v) All roads used to access and transport during the clearing operations will follow the measures outlined in Section 3.11.1.
- w) All equipment used during clearing shall be in good working condition and free of leaks.



Properly cleared area. Note that there are no standing trees



Close up of shredded material.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## **3.2 Culverts**

### **Description**

A culvert is a conduit used to enclose a flowing body of water. It is generally used to allow water to pass underneath a road, railway, or embankment. This section outlines the concerns and protection measures associated with the installation, maintenance and removal of culverts.

The installation can be subdivided into minor and major culvert. It should be noted that an integral part of the culvert work might include a temporary or permanent diversion

### **3.2.1 Minor Culvert Installation**

#### **Description**

Minor culverts include those installed for driveways or property access in drainage ditches, and under the roadway surface for cross drainage. To be included in this category, the drainage being serviced by these culverts should not be considered watercourses as defined by NBDELG.

#### **Concerns**

The concerns and potential impacts associated with minor culvert installation include:

- Erosion and sedimentation during the construction;
- Disposal of waste material;
- Improper equipment maintenance and improper handling of fuels;
- Impacts to fish and fish habitat; and
- Impacts to watercourses/wetlands.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a
- watercourse/wetland.

#### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Culvert will be sized with sufficient capacity based on the size of the drainage area being serviced.
- c) The size of the disturbed area and the duration it is exposed will be minimized.
- d) Existing vegetation will be maintained outside work area limits.
- e) Exposed soils must be stabilized daily as the work progresses.
- f) Construction/OMR activities are to coincide with low flow (June 1st – September 30th). The timing of works near watercourses is typically limited to the dryer months of the year, reducing potential for erosion and sedimentation.

- g) Surface run-off will be controlled to permit working in the dry and to avoid sediment from directly entering watercourses/wetlands by:
- Using dykes and/or ditches to divert runoff,
  - Limiting slope/gradient of disturbed areas,
  - Stabilizing erodible soils with mulch, vegetation, riprap, and/or
  - Containing the sediment with the use of check dams in ditches.
- h) Erosion and sediment control measures will be employed to prevent sedimentation of nearby watercourses/wetlands before, during and immediately following culvert installation until the area is permanently stabilized. (See Section 3.5 – Erosion and Sediment Management)
- i) In culverts with steep grades, energy dissipators may be required.
- j) The inlet and outlet of the culvert may have protection against scour. (e.g., Energy Dissipation Pool)
- k) Stockpiled material or waste material is to be located away from the watercourse/wetland and monitored to ensure that sediment is not entering a watercourse/wetland.
- l) Waste disposal shall be in accordance with Section 3.13 – Waste Management.
- m) Permanent stabilization shall be performed immediately after the work is complete.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.2.2 Major Culvert Installation**

#### **Description**

Major culverts are generally those installed for crossing watercourses and wetlands and require fish passage.

#### **Concerns**

The concerns and potential impacts associated with major culvert installation include:

- Erosion due to exposed soils;
- Sedimentation of watercourses/wetlands;
- Impacts to fish and fish habitat; and
- Accidental fuel spills.

### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- An NWPA permit may be required if work is being carried out in a navigable waterbody.
- A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat may be required if work will result in Harmful Alteration, Disruption, Destruction of fish habitat.
- Consultation and/or a Fisheries Act Authorization to Destroy Fish by Means other than Fishing from DFO may be required if blasting takes place in or near a watercourse.

### **General Protection Measures**

- a) A copy of the WAWA, NWPA and Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat (if applicable) must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Culvert will be sized with sufficient capacity based on the size of the drainage area being serviced.
- c) The size of the disturbed area and the duration it is exposed will be minimized.
- d) Existing vegetation will be maintained wherever feasible.
- e) Exposed soils must be stabilized daily as the work progresses.
- f) Construction/OMR activities are to coincide with low flow (June 1st – September 30th). The timing of works near watercourses is typically limited to the dryer months of the year, reducing potential for erosion and sedimentation and avoiding the spawning and juvenile life stages of fish.
- g) Major Culverts will be installed in isolation of stream flow. And surface run-off will be controlled to permit working in the dry and to avoid sediment from directly entering watercourses/wetlands by:
  - Using dykes and/or ditches to divert runoff,
  - Using temporary or permanent diversions,

- Limiting slope/gradient of disturbed areas,
  - Stabilizing erodible soils with mulch, vegetation, riprap, and/or
  - Containing the sediment with the use of check dams in ditches.
- h) When pumping the watercourse, hoses must be fitted with screens according to DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline."
- i) Erosion and sediment control measures will be employed to prevent sedimentation of nearby watercourses/wetlands before, during and immediately following culvert installation until the area is permanently stabilized. (See Section 3.5 – Erosion and Sediment Management)
- j) In culverts with steep grades, energy dissipators may be required.
- k) The inlet and outlet of the culvert may have protection against scour (e.g., Energy Dissipation Pool)
- l) Stockpiled material or waste material is to be located away from the watercourse/wetland and monitored to ensure that sediment is not entering a watercourse/wetland.
- m) Waste disposal shall be in accordance with Section 3.13 – Waste Management.
- n) Permanent stabilization shall be performed immediately after the work is complete.

### **Installation, Inspection and Repair**

Major culvert installations typically involve:

1. Surveying and design of the culvert;
2. Permits and approvals;
3. Erosion and sediment control measures to be installed prior to work commencing including sediment control fencing along banks of watercourses and wetlands;
4. Temporary or permanent diversion, if required;
5. Fish rescue(s) as required.
6. Trench excavation which may include blasting;
  - Blasting in or near watercourses is to be done in accordance with the Guidelines for the Use of Explosives in Canadian Fisheries Waters. Contact



DFO, Habitat Management Program as early as possible to identify resources at risk and to develop an effective mitigation plan. A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat must be obtained, which would require a minimum CEAA screening if instream work is expected to cause a HADD, as determined by DFO. See Section 5.8.2 - Blasting and Section 2.1.1 (Fisheries Act).

- Blasting in or near a watercourse/wetland may be necessary for culvert installation. Blasting can alter/disturb fish habitat, or cause injury or death to fish, and as well as groundwater impacts and public disturbance. Detonation near water causes shockwaves that impact on fish as well as fish eggs. The degree of damage depends on factors such as the type of explosion, size, water depth and species.

#### 7. Base Preparation (if required);

- The culvert must be installed on a firm substrate. A soft foundation must be replaced with clean, granular material (as per drawings and specifications) to prevent sagging.

#### 8. Culvert placement;

- Careful placement of the culvert as per design specifications is crucial to the future success of the culvert and the passage of fish.

The invert of the culvert shall be set 0.2 times the diameter of the culvert to a maximum of 450 mm below the upstream and downstream riffle. This permits the water depth in the culvert to be equal to that in the watercourse depth during low flow conditions.

The culvert shall extend 0.3 m beyond the upstream and downstream toes of fill placed around the structure.

- Riprap and/or concrete headwalls shall be placed at both ends of a culvert to an elevation of at least one half of the pipe diameter above the top of pipe and a minimum of one pipe diameter on each side of the culvert immediately upon completion of the culvert installation. The remainder of foreslopes must be no steeper than 2 horizontal to 1 vertical, and shall be permanently stabilized against runoff.

#### 9. Fish rescue(s) as required.



Temporary Diversion



Permanent Diversion

10. Trench excavation which may include blasting;

- Blasting in or near watercourses is to be done in accordance with the Guidelines for the Use of Explosives in Canadian Fisheries Waters. Contact DFO, Habitat Management Program as early as possible to identify resources at risk and to develop an effective mitigation plan. A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat must be obtained, which would require a minimum CEAA screening if instream work is expected to cause a HADD, as determined by DFO. See Section 5.8.2 - Blasting and Section 2.1.1 (Fisheries Act).
- Blasting in or near a watercourse/wetland may be necessary for culvert installation. Blasting can alter/disturb fish habitat, or cause injury or death to fish, and as well as groundwater impacts and public disturbance. Detonation near water causes shockwaves that impact on fish as well as fish eggs. The degree of damage depends on factors such as the type of explosion, size, water depth and species.

11. Base Preparation (if required);

- The culvert must be installed on a firm substrate. A soft foundation must be replaced with clean, granular material (as per drawings and specifications) to prevent sagging.

#### 12. Culvert placement;

- Careful placement of the culvert as per design specifications is crucial to the future success of the culvert and the passage of fish.

The invert of the culvert shall be set 0.2 times the diameter of the culvert to a maximum of 450 mm below the upstream and downstream riffle. This permits the water depth in the culvert to be equal to that in the watercourse depth during low flow conditions.

The culvert shall extend 0.3 m beyond the upstream and downstream toes of fill placed around the structure.

- Riprap and/or concrete headwalls shall be placed at both ends of a culvert to an elevation of at least one half of the pipe diameter above the top of pipe and a minimum of one pipe diameter on each side of the culvert immediately upon completion of the culvert installation. The remainder of foreslopes must be no steeper than 2 horizontal to 1 vertical, and shall be permanently stabilized against runoff.

#### 13. Backfilling the trench;

#### 14. EDP – Energy Dissipator Pool (if required);

- EDP construction for fish passage and energy dissipation, are constructed at the outlet of culverts on fish bearing streams. EDP's assist with fish passage, create a resting area for fish, reduce scour and dissipate energy. The pool's width should be at least 2 times the culvert diameter and the pool length should be at least 3 times the culvert diameter with a minimum depth of 1 metre.



Energy Dissipator Pool

15. Permanent stabilization.

- Riprap, gabions, geotechnical fabric (not in channel), seeding, mulching or a combination of these methods shall be used to stabilize the area. New streambeds may be lined with materials such as riprap and gravel. If the banks have been cleared, planting of trees and/or shrubs is recommended.



Permanent Stabilization of Worksite, including fill foreslope erosion protection

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

For a Construction Project, Horizon Management Ltd. will be responsible to schedule all meetings required with NBDELG and DFO. In addition, Horizon Management Ltd. will monitor or make arrangements to have the TSS levels monitored when required.

For an OMR Project, Horizon Management Ltd. will be responsible for all of the above.

### **3.2.3 Watercourse Diversions**

#### **Description**

Watercourse diversions allow culvert work to be performed in the “dry” while water and fish are diverted away from the construction area. Diversions are designed to allow fish passage during construction. Diversions can either be temporary or permanent.

A temporary diversion is used to temporarily divert the watercourse away from the culvert construction by way of channels or pumping.



A temporary plastic-lined diversion channel.

A temporary diversion must be capable of handling the anticipated stream flow. Pumps & hoses (fitted with screens) are required, one for pumping the water and another pump for back up.

A permanent diversion is created when the culvert is installed adjacent to the natural streambed in the “dry”. After installation of the culvert the watercourse is diverted through the permanent diversions.

### **Concerns**

The concerns and potential impacts associated with diversions include:

- Erosion due to soil exposure;
- Sedimentation of the watercourse and/or wetland;
- Impacts to fish and fish habitat; and
- Accidental fuel spills.

### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- An NWPA permit may be required if work is being carried out in a navigable waterbody.
- A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat may be required if work will result in Harmful Alteration, Disruption, Destruction of fish habitat.
- Consultation and/or a Fisheries Act Authorization to Destroy Fish by Means other than Fishing from DFO may be required if blasting takes place in or near a watercourse.

### **General Protection Measures**

- a. A copy of the WAWA, NWPA and Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat (if applicable) must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b. Permanent diversions will be designed in consultation with DFO.
- c. Diversions are to be constructed as per the design.
- d. Temporary barriers will be used to isolate the diversion from the watercourse during construction.
- e. Before the diversion is opened, the channel should be free of sediment and the surrounding area stabilized.
- f. If the water does not flow out of the original channel under natural conditions after the streamflow has been diverted, the remaining water must be pumped.
- g. If the water has a high concentration of sediments, the water must be pumped into a sediment pond, a filter fabric bag, or a vegetated area at least 30 m away from any watercourse or wetland.
- h. All exposed areas will be stabilized daily as work progresses. (See Section 3.5 – Erosion and Sediment Management)
- i. When pumping the watercourse, hoses must be fitted with screens according to DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline."
- j. Pumps, when in use, should be monitored to ensure that they are functioning properly.
- k. The ground disturbance shall be kept to a minimum.
- l. The site should be inspected prior to, during and after a rainfall event. Any deficiencies will be immediately repaired.

### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.



For Construction or OMR Projects, Horizon Management Ltd. will be responsible to schedule all meetings required with NBDELG and DFO. In addition, Horizon Management Ltd. will monitor or make arrangements to have the TSS level monitored when required.

### **3.2.4 Culvert Maintenance**

#### **Description**

Culverts are cleaned and repaired as required to ensure their proper operation.

#### **Concerns**

The concerns and potential impacts associated with culvert maintenance include:

- Sedimentation of the watercourse/wetlands;
- Erosion due to exposure of soils;
- Accidental fuels spills; and
- Impacts to fish and fish habitat.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

#### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Proper erosion control measures shall be installed prior to and as required during the maintenance to prevent any sediment from entering a watercourse/wetland.
- c) When pumping the watercourse, hoses must be fitted with screens according to DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline."
- d) Undesirable materials (e.g., branches and debris) must be removed from the culvert and/or watercourse and must be properly disposed of. (See Section 3.13 – Waste Management)

#### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

For a Construction Project, Horizon Management Ltd. will be responsible to schedule all meetings required with NBDELG and DFO. In addition, Horizon Management will monitor or make arrangements to have the TSS level monitored when required.

For an OMR Project, Horizon Management Ltd. will be responsible for all of the above.

### **3.2.5 Culvert Removal**

#### **Description**

Culverts may need to be replaced at some point due to age, condition, failure, inadequate flow capacity, and/or obstructing fish passage.

#### **Concerns**

The concerns and potential impacts associated with culvert removal include:

- Sedimentation of the watercourse/wetlands;
- Erosion due to exposure of soils;
- Accidental fuels spills; and
- Impacts to fish and fish habitat.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat may be required if work will result in Harmful Alteration, Disruption, Destruction of fish habitat.

#### **General Protection Measures**

- a. A copy of the WAWA and Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat (if applicable) must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b. The removal of an existing culvert shall be done in isolation of stream flow.
- c. A dam-and-pump or temporary plastic-lined diversion shall be used to ensure natural flow is uninterrupted and water quality is maintained during culvert removal. (See Section 3.2.3 – Watercourse Diversions)
- d. When pumping the watercourse, hoses must be fitted with screens according to DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline."

- e. All exposed erodible soil shall be stabilized by placement of rip rap, hydroseeding, or seeding by conventional means and blanketing with hay/straw mulch. (See Section 3.5 - Erosion and Sedimentation Management)

### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

For a Construction Project, Horizon Management Ltd. will be responsible to schedule all meetings required with NBDELG and DFO. In addition, Horizon Management will monitor or make arrangements to have the TSS level monitored when required.

For an OMR Project, Horizon Management Ltd. will be responsible for all of the above.

## **3.3 Detouring**

### **Description**

The construction or OMR of roadways and structures often requires the diversion of traffic around the site using existing roadways or constructing a temporary detour adjacent to the work site.

### **Concerns**

The environmental concerns associated with detouring traffic include:

- Noise pollution;
- Dust pollution; and
- Erosion or sedimentation

### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

### **General Protection Measures**

- a. A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b. A temporary structure required for a detour shall be assessed by Horizon Management Ltd. in consultation with appropriate regulatory agencies with respect to watercourse hydrology, construction timing, fish passage, navigation,

stream channel material, bank material, type and size of temporary structure, and overall costs.

- c. Erosion control measures shall be in place prior to construction.
- d. Approach fills of temporary detour structures shall be stabilized against erosion.
- e. No temporary infilling of any portion of a watercourse/wetland is to be carried out during construction of a detour, unless authorized in the WAWA Permit.
- f. Abandoned detour sites shall be shaped and permanently stabilized. See Section 3.5 – Erosion and Sediment Management.
- g. Dust control shall be carried out in accordance with Section 3.4 – Dust Control.
- h. Noise control shall be carried out in accordance with Section 3.15 – Working Near Environmental Sensitive Areas.

### **Installation, Inspection and Repair**

The following are the general suggested steps that should be followed when establishing a construction detour:

1. Drive the detour both in the daytime and at nighttime. Verify that the signs are properly installed and are reflective. If the signing is not, reinstall and/or replace signs.
2. Drive the detour and verify that the increase in traffic will not create erosion and sedimentation problems. If there is a potential, install all erosion and sedimentation control measures.
3. Verify that the detour will not create a dust control problem. And if there is potential for such problem, ensure that dust suppressant is available.
4. Verify that the increase in traffic will not increase noise pollution. If so, ensure that protection measures are considered as per Section 3.15– Working Near Environmental Sensitive Areas.

### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## **3.4 Dust Control**

### **Description**

Airborne dust during dry and/or windy conditions can create hazardous conditions, including effects on human health. Application of dust suppressants such as water or chemical suppressants is carried out to minimize the amount of airborne dust.



Worksite that requires dust suppressants.

### 3.4.1 Water

#### Description

Water is the most commonly used dust suppressant method and can be applied on projects for dust control as needed to minimize fugitive dust.

#### Concerns

The concerns and potential impacts associated with the use of water as a dust suppressant include:

- Water is not a long lasting solution for dust control and several applications may be required on dry and windy days;
- Erosion and sedimentation of watercourses and wetlands due to uncontrolled surface run-off;
- Accidental fuel leaks where pumping from a watercourse/wetland is required; and
- Impacts to fish and fish habitat.

#### Required Permits

- A WAWA permit is required for the withdrawal of water from a watercourse/wetland.

### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Activities that generate fugitive dust shall be minimized during high winds.
- c) Water withdrawal from streams shall be limited as to maintain sufficient flow and depth to ensure that fish habitat is protected, and fish passage is maintained (e.g., so as not to noticeably reduce the flow of the stream). Water withdrawal should not exceed 37.5% of the July, August and September mean flow. A none fish habitat or a large pond or lake is a preferred water source during the summer months as stream flows are reduced.
- d) If the ground within 30 m of a watercourse/wetland is disturbed the area is to be stabilized by an approved erosion control method. (See Section 5.7- Erosion and Sediment Management).
- e) Rock and gravel may be moved by hand to obtain a pool for a suction pipe, but a pool cannot be created by using any powered equipment.
- f) When pumping the watercourse, hoses must be fitted with screens according to DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline."
- g) Refueling or repairs of water trucks, pumps or any other machinery shall not be conducted within 30 m of a watercourse, wetland or private water well.
- h) Storage of fuel shall be conducted in accordance with Section 3.9 – Storage and Handling of Petroleum Products.
- i) Spill kits will be available in the equipment.
- j) Alternatives to water as a dust suppressant must be approved by Horizon Management Ltd.
- k) The water used for dust control must not directly runoff and enter into the watercourse/wetland.
- l) The water trucks shall have a method of controlling the application rate, so that no excess water flows into a watercourse/wetland.
- m) Erosion and sediment control measures will be installed as per design to control runoff.

### **Responsibilities**

For a Construction Project, the Contractor is responsible for obtaining the required permits.

For an OMR Project, Horizon Management Ltd. is responsible for obtaining the required permits.

Horizon Management Ltd. and its Contractor, Developers and Operators are responsible for ensuring the protection measures outlines above are adhered to.

### **3.4.2 Chemical Dust Suppressants**

#### **Description**

Chemical dust suppressants can be applied to dirt roads for dust control. Liquid chemical dust suppressants must be applied by tanker truck under controlled conditions. Flake chemical suppressants are applied for spot treatment under controlled conditions.

#### **Concerns**

The concerns and potential impacts associated with the use of chemical dust suppressants include:

- Accidental spill of hazardous materials;
- Storage and handling of hazardous material; and
- Improper application rates.

#### **Required Permits**

None identified.

#### **General Protection Measures**

- a) The “Best Practices for the Use and Storage of Chloride-Based Dust Suppressants (Environment Canada, 2004b)” will be followed.
- b) All Chemical Dust suppressants shall be stored in accordance with Section 3.10 – Storage and Handling of Other Hazardous Material.
- c) Application shall be restricted to the driving surface only.
- d) Tankers used in the application of liquid calcium chloride shall not be washed out within 30 m of a watercourse, wetland or other environmentally sensitive area.
- e) Chemical dust suppressant shall not be applied within 30 m of a watercourse, wetland or private water well.
- f) Lignosulphonate or water shall be used in recognized ESA’s.

#### **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

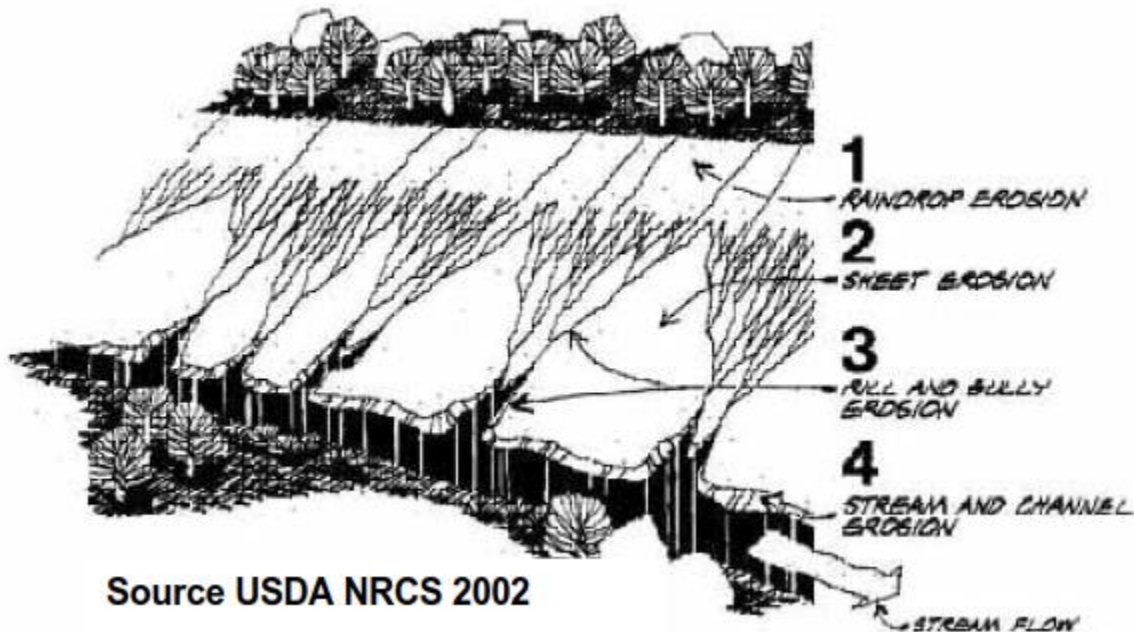
## **3.5 Erosion and Sediment Management**

### **3.5.1 Erosion Control**

#### **Description**

Erosion is the loss or removal of soil/material via wind, water, ice or gravity. Forms of water erosion may include:

- Raindrop (splash) erosion;
- Sheet erosion;
- Rill erosion;
- Gully erosion; and
- Stream/channel erosion.



Factors that influence erosion include:

- Soil characteristics;
- Vegetative cover;
- Topography; and
- Climate.

Erosion control prevents/minimizes erosion through the use of natural or manufactured materials. If properly installed and maintained, erosion control measures can reduce the amount of soil/material loss.

## Concerns



The concerns and potential impacts associated with activities with the potential for erosion include:

- Sedimentation of watercourses and/or wetlands;
- Dust control pertaining to erosion caused by wind; and
- Impacts to fish and fish habitat.

### **General Protection Measures**

The following general protection measures shall be considered when planning construction and/or OMR activities with the potential for erosion.

- a) The size of the disturbed area and the duration it is exposed will be limited.
- b) Stabilization of the exposed areas will be carried out in accordance with the applicable permits and Section 3.14 – Work Progression.
- c) Construction/OMR activities within 30 m of a watercourse or wetland will be carried out between June 1st and Sept 30th.
- d) All erosion and sediment control measures will be installed prior to the commencement of the work and as required or as directed by the Engineer, throughout the work.
- e) Existing vegetation will be maintained wherever feasible.
- f) Off takes, ditches and dykes will be used to divert runoff flow into vegetated areas away from watercourses and wetlands.

The following erosion control measures will be used to minimize and/or prevent erosion.

- Topsoil;
- Mulching;
- Hydroseeding;
- Jute Mats;
- Riprap;
- Sod;
- Trees and Shrubs.

These erosion control measures are described in detail below.

#### **3.5.1.1 Topsoil**

##### **Description**

Topsoil is generally a mixture of soil, sand and organics used in conjunction with hydroseed to provide cover for erodible material. Topsoil sustains and promotes the growth of vegetation and therefore aids in the reduction of erosion.

Topsoil must be used in conjunction with other forms of erosion control in order to be effective.

## **Concerns**

The concerns and potential impacts associated with topsoil application include:

- Erosion of un-established areas;
- Sedimentation of watercourse/wetlands;
- Impacts to fish and fish habitats; and
- Accidental spills and fuels leaks.

## **Required Permits**

None identified.

## **General Protection Measures**

- a) Areas to be topsoiled will be shaped and completed to the final grade.
- b) Areas to be topsoiled will be scarified or otherwise loosened to a depth of 50 mm within 1 day preceding the placement of topsoil.
- c) Topsoil should be applied evenly and uniformly on the prepared areas to a depth of 100 mm (+/- 25mm).
- d) Large clods, roots, stones and rocks larger than 75 mm shall be removed from the slopes.
- e) Once topsoil has been applied and is free of roots, stones, etc, it shall be brought to an even surface meeting the required grade.



Topsoil on backslope. Roots being removed by hand.



Back-dragging topsoil.

- f) Topsoil stockpiles shall be located a minimum of 30 m away from a watercourse/wetland, where they will not block the natural drainage or be a potential source of siltation of watercourses/wetlands.
- g) Topsoil stockpiles will be mulched in accordance with Section 3.14 – Work Progression.
- h) Sediment control fence shall be installed around the stockpile to contain sediment in runoff.
- i) Upon completion of the topsoil placement, the area must be stabilized with either hydroseed or mulch, according to the contract documents and Section 3.5.1.2 and 3.5.1.3.
- j) Erosion control and sediment structures must be installed as outlined in the contract document and in accordance with Section 3.5.2.

- k) Topsoiled areas shall be monitored and maintained from the time of application until the vegetation is established as an effective form of erosion and sediment control.
- l) Topsoil shall be inspected prior to, during and after any rainfall events for signs of erosion.
- m) All deficiencies noted during an inspection of the topsoiled area, will be repaired immediately.
- n) Topsoiling is not permitted after the week of Sept 30th unless approved by Horizon Management Ltd.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.1.2 Mulching**

#### **Description**

Mulching provides a temporary cover for exposed soils to reduce erosion. Mulch is applied to slopes and other exposed ground to prevent erosion and siltation of watercourses. Mulching is also used in conjunction with hydroseeding to increase the soils temperature, retain moisture and reduce compaction which promotes vegetation growth.

Mulch can be one of the following;

- Unprocessed hay or straw in rolls or bales;
- Processed (i.e. pre-packaged bags) shredded straw, newsprint and/or cotton fibres; or
- Shredded trees and (bark or woody material).

#### **Concerns**

The concerns and potential impacts associated with mulching include:

- Erosion and sedimentation as result of
  - Poor work progression;
  - Improper application (i.e. length of exposure and timing of mulching); and
  - Lack of maintenance of mulched areas.

#### **Required Permits**

- A WAWA permit is required for the withdrawal of water from a watercourse/wetland.

### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Exposed areas will be mulched in accordance with Section 3.14 – Work Progression.
- c) Mulch will be reasonably free of noxious weeds and other undesirable material.
- d) Areas to be mulched will be shaped and completed to the final grade prior to the application of mulch.
- e) Mulching shall be carried out according to the Contract documents or as directed by the Engineer.
- f) A binder (tackifier) will be applied to the mulched area according to the manufacturer recommended application rate, to ensure that the mulch remains in place and is not washed or blown away.
- g) In cases where a small area requires temporary stabilization mulch can be applied by hand and must be applied evenly, uniformly and at a thickness that will ensure effective protection against erosion and sedimentation.
- h) Mulch shall be monitored and maintained from the time of application until the vegetation is established as an effective form of erosion and sediment control.
- i) Mulch shall be inspected prior to, during and after any rainfall event.
- j) Damaged mulched areas and/or bare spots (due to wind, water or other causes) will be repaired in a timely manner.
- k) Mulching will be carried out in accordance with Section 3.14 – Work Progression.
- l) Mulch is temporary; therefore areas will be permanently stabilized as soon as possible.
- m) If water is required, water trucks shall not be driven into the watercourse/wetland. And they shall not be driven down to the edge of the watercourse/wetland unless the area is firm enough so that action does not cause rutting.

- n) Water withdrawal from streams shall be limited as to maintain sufficient flow and depth to ensure that fish habitat is protected, and fish passage is maintained (e.g., so as not to noticeably reduce the flow of the stream). Water withdrawal should not exceed 37.5% of the July, August and September mean flow. A non fish habitat or a large pond or lake is a preferred water source during the summer months as stream flows are reduced.
- o) When pumping the watercourse, hoses must be fitted with screens according to DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline."
- p) Mulch shall be maintained in a functional condition from the time of application until the work is completed, including during shutdown due to weather, during winter months and during spring runoff and/or as per the WAWA permit conditions.
- q) Prior to winter shutdown, an onsite meeting shall be held between all parties involved in the project to evaluate the site conditions and to identify specific requirements for erosion control. Any deficiencies are to be addressed prior to spring runoff.



Mulching – Application by mechanical means.





Proper coverage.

## **Responsibilities**

For a Construction Project, the Contractor is responsible for obtaining the required permits.

For an OMR Project, Horizon Management Ltd. is responsible for obtaining the required permits.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.1.3 Hydroseeding**

#### **Description**

Hydroseeding can be carried out to establish permanent vegetation growth in areas where the ground is exposed, in order to prevent erosion. Hydroseeding is a mixture of seed, fertilizer, hydraulic mulch, binder, green dye and water.

There are five types of hydroseeding;

- Hydroseeding A – Roadside mix with no mulch;
- Hydroseeding AM – Municipal mix with no mulch;
- Hydroseeding B – Roadside mix with mulch;
- Hydroseeding BM – Municipal mix with mulch; and
- Hydroseeding C – Roadside mix with bonded fibre matrix.

In general, Hydroseeding A & B (roadside mixes) are used on all construction and OMR activities. Hydroseeding AM & BM (municipal mixes) are used inside municipalities and for residential lawns. Hydroseeding C is used on steep slopes.

### **Concerns**

The concerns and potential impacts associated with the hydroseeding include:

- Erosion & sedimentation due to
  - Poor work progression (i.e. length of exposure and timing of seeding);
  - Improper application rates;
  - Lack of maintenance of hydroseeded areas;
- Areas to be hydroseeded shall be back dragged or otherwise left in a loosened condition, free of ruts, ridges and materials such as weeds, sticks, roots, large rocks which would impede growth of seed mix and mowing; and
- Hydroseeding will be carried out as per the design or as directed by the Engineer.

### **Required Permits**

- A WAWA permit is required for the withdrawal of water from a watercourse/wetland.

### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Hydroseeding will not be carried out on harden, crusted or eroded soil.
- c) Areas to be hydroseeded will be shaped or completed to the final grade prior to hydroseeding.
- d) Hydroseeding must be completed within 48 hours of surface preparation.
- e) Seed material will be kept dry at all times until applied.

- f) Large areas requiring seeding will be done by mechanical means.



Hydroseeding – Application by mechanical means

- g) Small areas, requiring hydroseeding may be hand sowed using an available commercial seed mix following manufactures directions.
- h) Hydroseed will be applied evenly and uniformly. The use of green dye in the mix allows for visual inspection of the coverage.



Proper coverage.

- i) Application rates for hydroseeding are noted in the Standard Specifications under Item 614 – Hydroseeding.
- j) After Labour Day, only Hydroseeding B shall be used.
- k) Hydroseeding will not be carried out during windy conditions or during heavy rainfall.
- l) Hydroseed shall be monitored and maintained from the time of application until vegetation is established as an effective erosion and sedimentation control.
- m) Hydroseeding shall be inspected prior to, during and after any rainfall event.
- n) Damaged hydroseeded areas, areas that do not receive proper coverage and areas with bare spots will be repaired in a timely manner.
- o) Hydroseeding will be carried out in accordance with Section 3.14 – Work Progression.

- p) Water withdrawal from streams shall be limited as to maintain sufficient flow and depth to ensure that fish habitat is protected, and fish passage is maintained (e.g., so as not to noticeably reduce the flow of the stream). Water withdrawal should not exceed 37.5% of the July, August and September mean flow. A none fish habitat or a large pond or lake is a preferred water source during the summer months as stream flows are reduced.
- q) When pumping the watercourse, hoses must be fitted with screens according to DFO's "Freshwater Intake End-of-Pipe Fish Screen Guideline."
- r) Hydroseeding shall be maintained in a functional condition from the time of application until the work is completed.
- s) Prior to winter shutdown, an onsite meeting shall be held between all parties involved in the project to evaluate the site conditions and to identify specific requirements for erosion control. Any deficiencies are to be addressed prior to spring runoff.

## **Responsibilities**

For a Construction Project, the Contractor is responsible for obtaining the required permits.

For an OMR Project, Horizon Management Ltd. is responsible for obtaining the required permits.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.1.4 Jute Mats**

#### **Description**

Jute mats are manufactured from jute yarn. This yarn is woven into a mesh blanket and contains small openings to allow grass growth. Jute mats can be used in ditches or on slopes to minimize erosion until the areas have been re-vegetated. Jute mats are usually used in conjunction with hydroseeding.

#### **Concerns**

The concerns and potential impacts associated with jute mats include:

- Poor work progression (i.e. length of exposure and timing of jute mate placement);
- Improper installation of jute mats; and

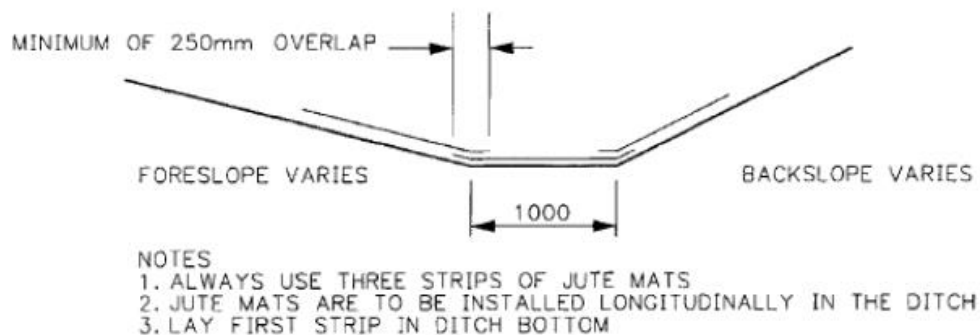
- Lack of maintenance of jute mats.

## Required Permits

None identified.

## General Protection Measures

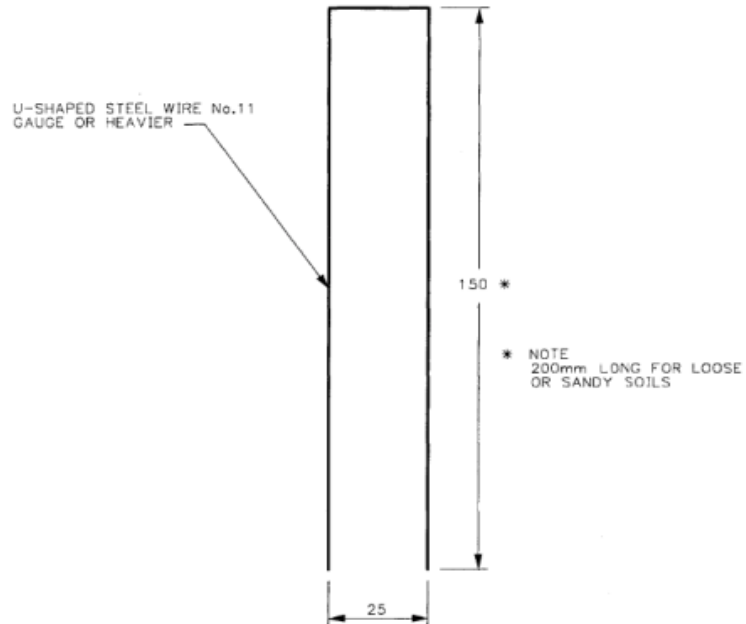
- Jute mats will be installed as per the design documents or as directed by the Engineer.
- Only install jute mats if there is enough growing season left for vegetation to establish. If it is late in the season, keep erosion control structures in and mulch the entire area.
- Areas to receive jute mats will be shaped and completed to the final grade.
- Any erosion control structures in the ditch must be removed prior to installing the jute mats.
- Jute mats will be installed along the full length of the prepared ditch and/or slope and secured in place with staples.
- For ditch applications, the following applies:
  - Three (3) strips of jute mats must be used.
  - The first strip must be installed in the bottom of the ditch.
  - The next two strips are installed on the foreslope and backslope of the ditch and will overlap the bottom strip by 250 mm.



Ditch Application

- For slope applications, the following applies:

- Enough strips of jute mat will be use to cover the required area.
  - Strips will be overlapped by 250 mm.
- h) Once the jute mats are installed, they will be pinned to the ground with staples to prevent movement.
- i) Areas with jute mats must be hydroseeded immediately in accordance with Section 3.5.1.3– Hydroseeding.



Staple Detail

- j) Areas with jute mats shall be inspected prior to, during and after any rainfall event.
- k) Any damaged areas will be repaired immediately by covering the damaged area with a strip of jute mat and stapling it into the ground.
- l) Jute mats shall be maintained in a functional condition from the time of installation until the work is completed and the vegetation has established.



Jute mat installation in ditch.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.1.5 Riprap**

#### **Description**

Riprap is often used to control erosion on long steep slope/ditches where water volume and velocity are expected to be high and vegetation is difficult to establish. It can also be used where seepages are exposed on slopes as well as to stabilize slope failures. Riprap is also used as protection around culverts and in watercourse channels. Riprap is considered a permanent erosion control measure.

#### **Concerns**

The concerns and potential impacts associated with the use of riprap include:

- Erosion and sedimentation as a result of:
  - Improper sizing of riprap leading to displacement of material and exposed areas, which are susceptible to erosion; and



- Improper placement of riprap leading to displacement and slope failures.

### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Riprap will be properly sized based on the requirements for the intended use and the application.
- c) The required size of riprap will be placed according to the designs or as directed by the Engineer.
- d) Riprap will not be obtained from a source that has the potential to be acid generating.
- e) Slopes, ditches and channels to be riprapped will be constructed as per the design or as directed by the Engineer.
- f) Where required according to the contract documents or as directed by the Engineer, geotextile will be placed and pinned to the ground to prevent slippage prior to placement of riprap. Note: Geotextile is not to be used in or on the banks of flowing fish bearing watercourses.
- g) Where multiple strips of geotextile are required, ensure that the strips are laid in an overlapping fashion.



Placement of riprap on backslope.

- h) Riprap protection will be placed to the toe of the slope to prevent the material from sliding down the foreslope.
- i) Riprap protection will be placed to the bottom of the backslope to prevent the material from sliding down the backslope.
- j) Excavated material must be disposed of at least 30 m away from the watercourse/wetland.
- k) Waste material will be stabilized.
- l) Riprapped areas will be maintained from the time of installation until the completion of the project.
- m) Riprap shall be inspected prior to, during and after any rainfall event.
- n) Any damaged areas are to be repaired immediately.
- o) If riprap is to be placed within 30 m of a watercourse or wetland, a WAWA permit will be obtained.
- p) All of the conditions in the WAWA permit will be followed.



Riprap used as culvert protection and channel protection.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.1.6 Sod**

#### **Description**

Sod is mature lawn that has been cultivated; cut into thick squares or rolls with the underlying soil and roots. Sod may be used in late season for small areas where there is not sufficient time for hydroseeding but “instant” stabilization is required. Sod is considered a permanent erosion control measure.

#### **Concerns**

The concerns and potential impacts associated with the placement of sod include:

- Erosion and sedimentation as a results of:
  - Poor work progression (i.e. timing for placement of sod);
  - Improper installation of sod; and
  - Lack of maintenance of sodded areas.

### **Required Permits**

None identified.

### **General Protection Measures**

- a) Sod will only be installed if there is enough growing season left for vegetation to establish.
- b) Areas to receive sod will be shaped and completed to the final grade.
- c) The area to receive sod will be topsoiled in accordance with Section 3.5.1.1 – Topsoil.
- d) Fertilizer will be placed prior to the placement of sod.
- e) The entire area will be pre-wet prior to placing sod.
- f) Strips of sod will be laid over the area such that adjoining rows of sod are staggered to ensure that the joints don't line up (brick pattern).
- g) When placing sod on a slope, the sod may be stapled or staked to ensure that it remains in place.
- h) Once sod is placed, it must be watered thoroughly.
- i) Sod shall be monitored and maintained from the time of installation until the area has become established as an effective erosion and sediment control.
- j) Sod shall be inspected prior to, during and after any rainfall event.
- k) Damaged and/or dead areas will be repaired and/or replaced immediately.



Sod prior to installation

## Responsibilities

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### 3.5.1.7 Trees and Shrubs

#### Description

Trees and Shrubs are another method used to stabilize slopes. The root system of trees and shrubs penetrates deep into the subsurface soil, providing increased soil stability. Trees and shrubs are also used to provide shade to watercourses, which lowers the temperature of the water to improve fish habitat.

#### Concerns

The concerns and potential impacts associated with the use of trees and shrubs include:

- Erosion and sedimentation as a result of:
  - Poor work progression (i.e. timing for planting trees and shrubs);
  - Improper planting of trees and shrubs; and
  - Improper maintenance of planted trees and shrubs.

#### Required Permits

None identified.

### **General Protection Measures**

- a) Trees and shrubs will only be planted if there is enough growing season left for vegetation to establish.
- b) Areas to be planted will be shaped and completed to the final grade.
- c) Trees and Shrubs will be planted according to suppliers recommendations.
- d) Trees and shrubs shall be watered as per the supplier's recommendation.
- e) Trees and shrubs shall be monitored and maintained from the time of planting until they become established.
- f) Dead trees and shrubs shall be replaced.



Trees and shrubs planted along watercourse channel.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.1.8 Other Types of Erosion Control**

#### **Description**

Other materials that may be used for erosion control are;

- Plastic Film (polyethylene)
  - Plastic film (polyethylene) may be placed on areas where immediate protection is required. Generally plastic is used for temporary stream diversions although it can also be used to cover small stockpiles.
- Gravel
  - Gravel may be used to cover erodible material. Gravel must be clean to ensure it does not cause sedimentation.
  
- Gabions
  - Gabions may be specified on steep slopes where stability is a concern.

#### **Concerns**

Each material noted has benefits and challenges and must be reviewed prior to installation.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

#### **General Protection Measures**

- a) The type of material used will depend on a number of factors such as
  - Length and grade of slope;
  - Soil conditions;
  - Water source (rainwater, sheet flow, seepages); and
  - Volume of water expected.
- b) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.2 Sediment Control**

#### **Description**

Sediment is the fine soil material that is generated by erosion. Sedimentation is the transportation and deposition of sediment as a result of erosion. Sediment control measures are used to contain, control and filter sediment-laden water prior to discharge. If properly installed and maintained, sediment control measures can reduce the effects of sedimentation.

Once soil has become exposed, there is potential for the sediment to enter a watercourse and/or wetland. The following are some protection measures utilized by the Department to prevent sedimentation.

- Sediment Control Fence;
- Sediment Ponds;
- Erosion Control Structures;
- Flume (Slope Drain).

These sediment control measures are described in detail below.

#### **Concerns**

The concerns and potential impacts associated with activities potentially causing sedimentation include:

- Sedimentation of watercourses can negatively affect fish habitat;
- Suspended solids can abrade or clog fish gills causing fish to die;
- Particles can settle in the spawning beds smothering/killing incubating eggs;
- Turbidity (lack of water clarity) decreases the amount of sunlight that can reach the algae and aquatic plants which reduces the food supply for aquatic life;
- Sediment clogged gravel substrate will leave the area unacceptable for fish spawning;
- Sediment deposited in the watercourse channel can decrease the water depth which increases the water temperature and may result in unacceptable water temperature for fish habitat; and
- Fish feeding may be affected by smothering of food sources, or by reduced visibility in some species due to the turbidity level.

#### **3.5.2.1 Sediment Control Fence**



## **Description**

Sediment Control Fence is a geotextile supported on posts in order to handle the stress from sediment loading. It is a temporary barrier for containing sediment in sheet runoff. It is used to protect watercourses and wetlands from sediment contamination. Sediment control fence filters suspended sediment from sheet runoff. The sediment accumulates behind the fence for future removal and/or stabilization.

## **Concerns**

The concerns and potential impacts associated with the use of sediment control fence are sedimentation of watercourses and wetlands include:

- Poor work progression (i.e. improper timing of installations);
- Improper installation, inspection, maintenance and repair of the fence.

## **Required Permits**

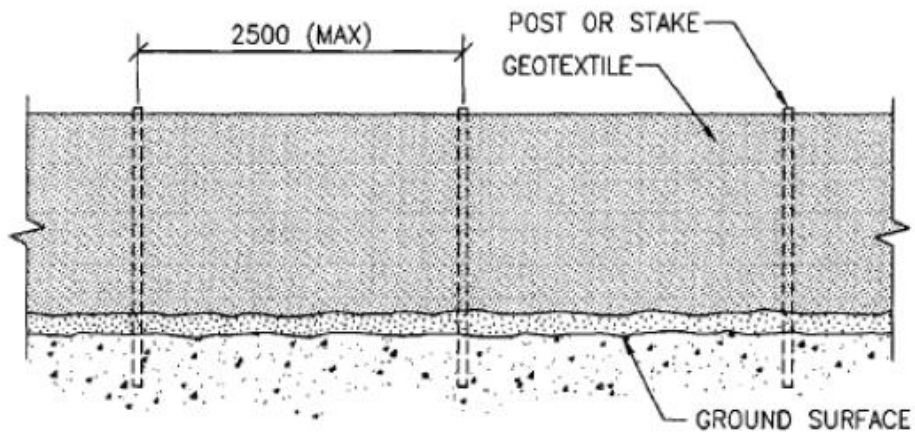
- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

## **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Sediment control fence will be installed prior to ground disturbance.
- c) Sediment control fence will be installed downslope of disturbed areas.
- d) Sediment control fence will be installed along the upland edge of the undisturbed vegetation of a watercourse/wetland in order to intercept and filter sheet runoff before it enters a watercourse/wetland.
- e) Sediment control fence will not be installed on top of a hill or in a ditch as a sediment check dam.
- f) Sediment control fence will not be installed across areas with a concentrated channel flow.
- g) Sediment control fence will be located in a continuous fashion, perpendicular to the direction of flow.
- h) Sediment control fence will be used in the following situations/locations:

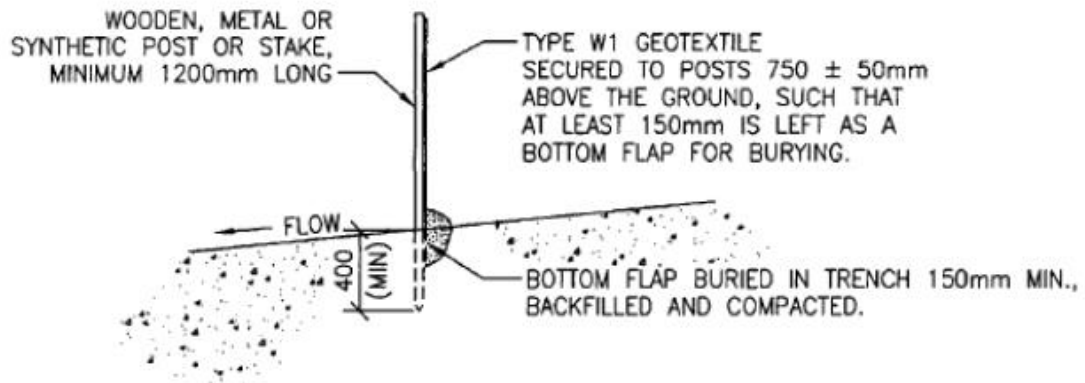
- To delineate buffer zones;
- Along the contour of exposed slopes;
- At the toe of embankments;
- The downhill side of large cut area; and
- Adjacent to watercourses/wetlands.

- i) Stakes/posts will be wooden, metal or synthetic, a minimum of 1200 mm long and shall be anchored as least 400 mm below the ground surface and located no more than 2500 mm apart.

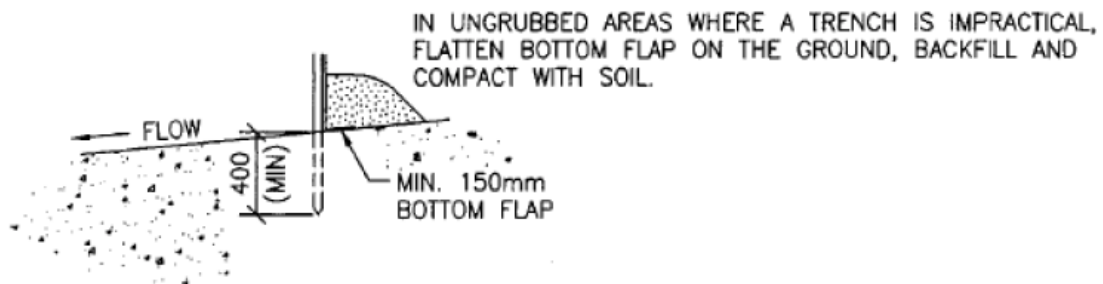


Stake/post details.

- j) Sediment control fence will be installed such that it extends 700 to 800 mm above the ground surface and a minimum of 150 mm below the surface in a trench. In cases where the trench is impractical, such as in ungrubbed area, the bottom flap shall be flattened along the ground. In either case, earth shall be compacted over the bottom flap so that no flow can pass under the fence.



Sediment control fence installation in grubbed areas.



Sediment control fence installation in ungrubbed areas.

- k) If more than one roll of fencing is required, the end shall be rolled together to form one continuous line of fencing.



Ends rolled together.



Sediment passing around end of fence.

- l) Posts will be positioned on the downstream side of the installation. This minimizes tearing from sediment loading.
- m) The geotextile shall be securely fastened to the posts.
- n) Sediment must be removed after it has accumulated to a level not exceeding  $\frac{1}{2}$  the height of the fence.
- o) Sediment that has been removed must be disposed of at least 30 m away from the watercourse/wetland.
- p) Sediment control fence shall be inspected prior to, during and after any rainfall event.
- q) Sediment control fence shall be inspected daily during embankment construction to ensure embankment materials do not damage fence.

r) Any deficiencies shall be repaired immediately.



Large rocks have buried the fence allowing sediment to pass over.

s) Repairs to the geotextile shall be done at the posts only.

t) If a section of the fence is torn, it will be replaced with a new section.

u) If repairs to existing fence are impractical, another line of fencing will be installed.



Proper installation of sediment control fence at toe of fill.



Sediment control fence not properly installed

- v) Sediment control fence shall be removed once permanent stabilization has been carried out and it is no longer required.
- w) Prior to removal of the sediment control fence, any remaining sediment shall be removed and disposed of in accordance with Section 3.13 – Waste Management.
- x) Once the sediment fence is removed, all exposed areas resulting from of the removal will be stabilized.
- y) Sediment control fences shall be maintained in a functional condition from the time of installation until the work is completed, including during shutdown due to weather, during winter months and during spring runoff and as per the WAWA permit conditions.
- z) Prior to winter shutdown, an onsite meeting shall be held between all parties involved in the project to evaluate the site conditions and to identify specific requirements for erosion control. Any deficiencies are to be addressed prior to spring runoff.



aa) Permission must be obtained in order to dispose of sediment onto a private property.

bb) Disposal areas must be stabilized.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.2.2 Sediment Ponds**

#### **Description**

Sediment ponds are constructed to control and contain sediment-laden runoff water prior to discharge into watercourse or wetland. Sediment settles to the bottom of the pond rather than flowing in to the watercourse or wetland. Clean water flows out of the pond through an outlet or the turbid water can be pumped and discharged to a stable area capable of filtering the effluent before reaching a watercourse/wetland.

#### **Concerns**

The concerns and potential impacts associated with the use of sediment ponds include:

- Sedimentation of watercourses and wetlands as a result of:
  - Improper work progression; and
  - Improper sizing, construction, inspection, maintenance and repair of sediment ponds.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- Permission from the land owner to pump water onto private property must be obtained prior to pumping.

#### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.

- b) Sediment ponds will be designed by an Engineer, and will be sized with sufficient capacity based on the size of the drainage area being serviced.
- c) As a rule of thumb, for every hectare of exposed construction area, sediment basins or traps having a total storage volume of at least 190 cubic metres shall be constructed to intercept overland flow.
- d) Sediment ponds will be constructed as per the design.
- e) Where practical, contributing drainage areas shall be subdivided into smaller areas and multiple sediment ponds shall be installed.
- f) Sediment ponds will be located to ensure that there is a minimum of 30 m between the pond and the nearest watercourse or wetland.
- g) Sediment ponds will be constructed to the required dimensions.
- h) A safety fence must be installed around the perimeter of the pond.
- i) The safety fence will be highly visible to pedestrian and vehicular traffic.
- j) Exposed slopes or berms will be stabilized with plastic, geotextile, mulch or rock.
- k) Existing vegetation will be maintained between the pond and the watercourse or wetland to allow the water that is discharged from the pond to filter through the vegetation prior to entering the watercourse or wetland.
- l) Sediment ponds shall be inspected prior to, during and after any rainfall event.
- m) Any deficiencies shall be repaired immediately.
- n) If heavy rain is forecasted, sediment ponds will be dewatered and cleaned out to ensure it can handle the potential rainfall and runoff.
- o) Ponds requiring dewatering shall be pumped in such a manner that sediment-laden water is not introduced into a watercourse or wetland. Dewatering shall not increase the suspended solids level of a receiving watercourse or wetland more than 25 mg/L above background levels. The effluent and receiving waters shall be monitored to verify the effectiveness of the suspended solids treatment.
- p) If there is little or no vegetation available to filter the discharged water, the water will be pumped into a sediment filter bag.
- q) Sediment from ponds shall be removed when the sediment level reaches half the height of the spillway.

- r) Sediment removed from the pond must be disposed of at least 30 m away from the watercourse or wetland.
- s) When the sediment pond is no longer required, the pond should be backfilled, shaped and stabilized.
- t) A WAWA permit will be obtained for work within 30 m of a watercourse or wetland.
- u) Sediment ponds shall be maintained in a functional condition from the time of installation until the work is completed, including during shutdown due to weather, during winter months and during spring runoff and/or as per the WAWA permit conditions.
- v) Prior to winter shutdown, an onsite meeting shall be held between all parties involved in the project to evaluate the site conditions and to identify specific requirements for erosion control. Any deficiencies are to be addressed prior to spring runoff.
- w) Disposal area must be stabilized.



## Large Sediment Pond with Safety Fence

### Responsibilities

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

For a Construction Project, Horizon Management Ltd. will be responsible to schedule all meetings required with NBDELG and DFO. In addition, Horizon Management Ltd. will monitor or make arrangements to have the TSS level monitored when required.

For an OMR Project, Horizon Management Ltd. will be responsible for all of the above.

### 3.5.2.3 Erosion Control Structures

#### Description

Erosion control structures (ECS) are temporary structures installed in ditches in order to slow concentrated water flow and to allow for any sediment to settle out of the runoff before discharging into a watercourse or wetland.

There are four types of erosion control structures.

- Type A – Spillway Structure
  - Type A structures are used as spillways for sediment ponds as well as used at the cut/fill transition where runoff leaves the ditch to enter a watercourse.
- Type B – Riprap Structure
  - Type B structures are used in ditches having a grade over 8 % with medium to high flows as well as in rock ditches.
- Type C – Straw/Hay bale Structure
  - Type C structures are used in ditches having a grade up to 8 % and/or low flows (except in rock ditches).
- Type D – Straw/Hay bale Structure (alternate design)
  - Type D structures can also be used in ditches having a grade up to 8 % and/or low flows (except in rock ditches).

Erosion control structures are to be installed at intervals of  $200 \text{ m} \div \text{the ditch grade \%}$ . For example, if the ditch grade is 2%, then the recommended spacing is  $200 \text{ m} \div 2$  or 100 m. The spacing should decrease if the soil has a high silt content (over 50% passing the 75  $\mu\text{m}$  sieve)

## Concerns

The concerns and potential impacts associated with the use of ECS's include:

- Sedimentation of watercourses and wetlands as a result of:
  - Improper work progression; and
  - Improper installation, inspection, maintenance and repair of ECS's.

## Required Permits

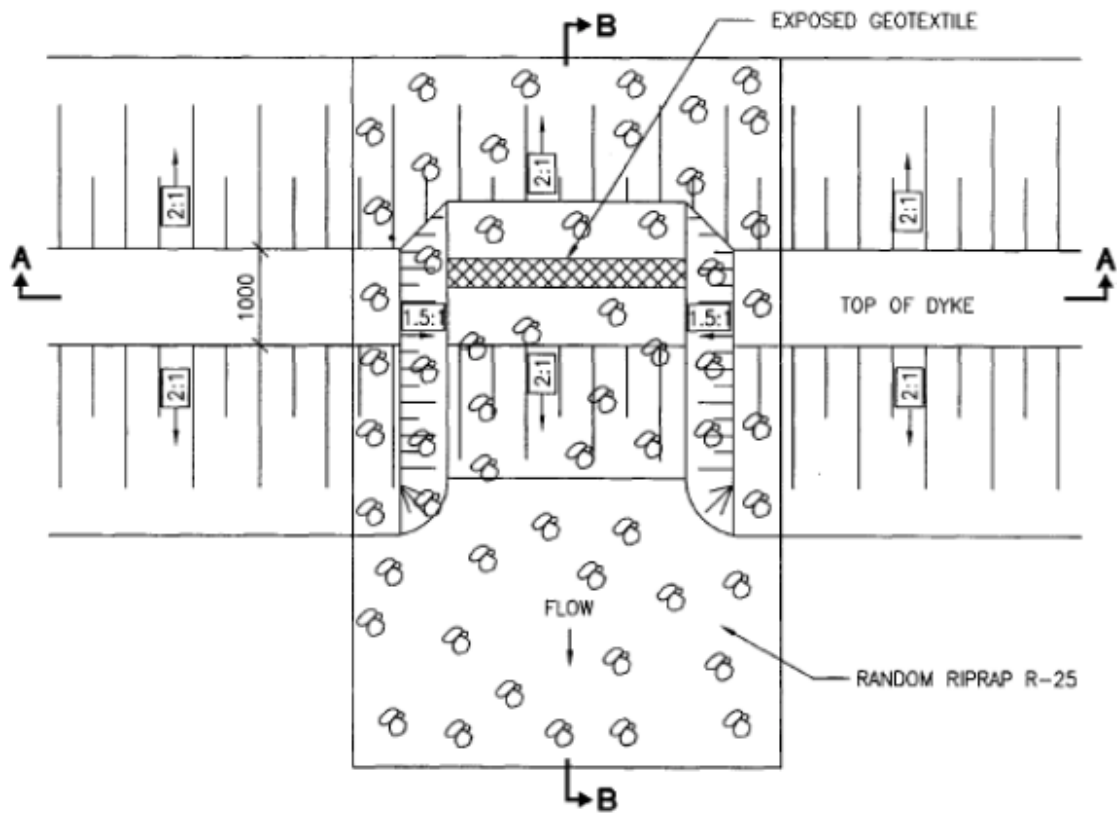
None Identified

## General Protection Measures

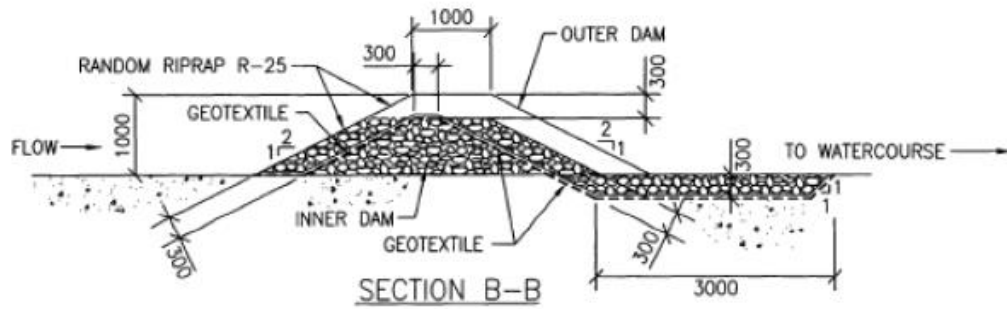
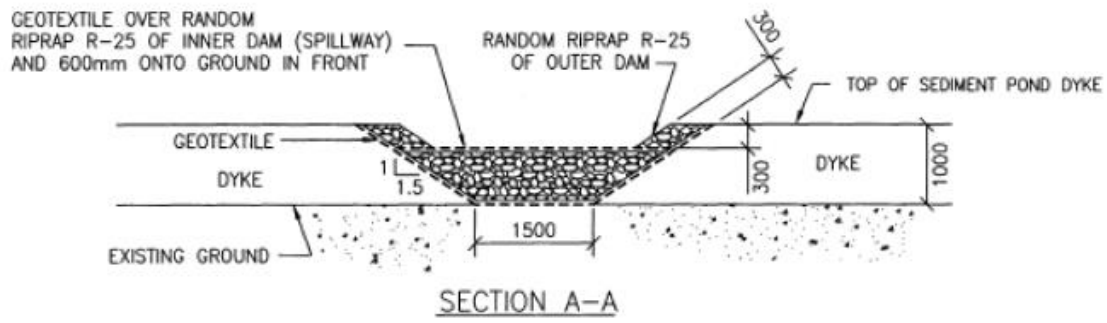
- a) Erosion control structures will be installed as the work progresses, not after the work is complete.
- b) Erosion control structures will be installed at the locations shown in the design or as directed by Horizon Management Ltd.

## Type A Structure

- a) Type A Structures are usually installed in completed ditches and/or sediment ponds.
- b) Structures should be installed in the dry.
- c) For Sediment ponds;
  - Construct berm (dyke) and/or excavate a sediment pond large enough to contain a large volume of water. Excavated material can be used to build the berm around the pond.
- d) For Ditch purposes;
  - Construct berm (dyke) large enough to contain runoff in the ditch.
- e) For the spillway, excavate a 3 m apron on the downstream end of the structure. (approximately 300 mm deep)
- f) Build the spillway out of riprap to a height that is approximately 300 mm below the top of the berm.
- g) Lay geotechnical fabric on the apron and up over the riprap spillway and down the other side. The fabric should extend approximately 300-400 mm beyond the spillway.
- h) Cover the fabric with riprap but do not cover the top of the spillway.
- i) The centre of ECS is low to allow for water to spill over.



Type A Erosion Control Structure – Plan View



Type A Erosion Control Structure – Sections

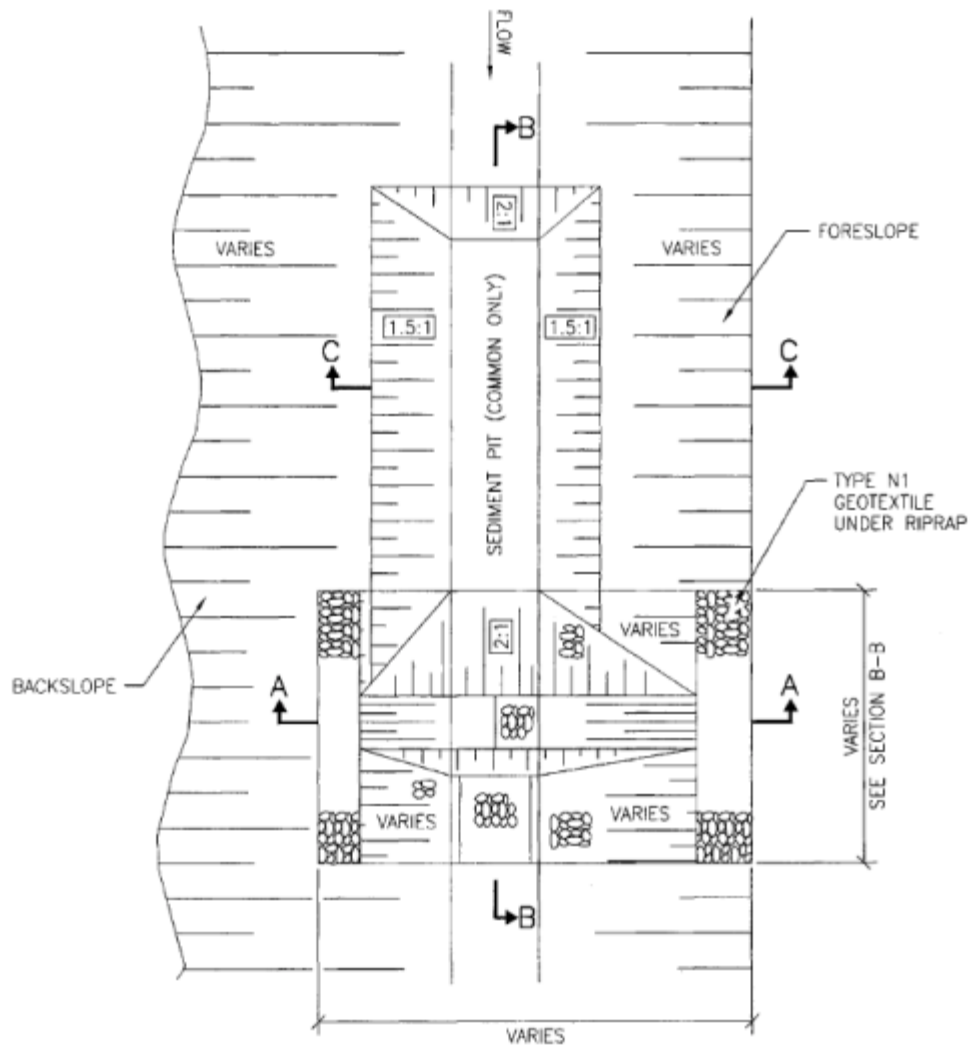


Completed Type A Erosion Control Structure

### **Type B Structure**

- a) Type B Structures are usually installed in completed ditches.
- b) Structures should be installed in the dry
- c) Construct sediment pit.
- d) Lay geotechnical fabric on ground right to the edge of the sediment pit. Make sure the fabric extends far enough to cover the apron.
- e) Cover the exposed fabric with riprap and build the berm (dyke) and apron.
- f) Place geotechnical fabric on the upstream side of the berm (dyke) and drape the fabric down into sediment pit.
- g) To complete the structure, cover the exposed fabric with riprap.
- h) The centre of ECS is low to allow for water to spill over.

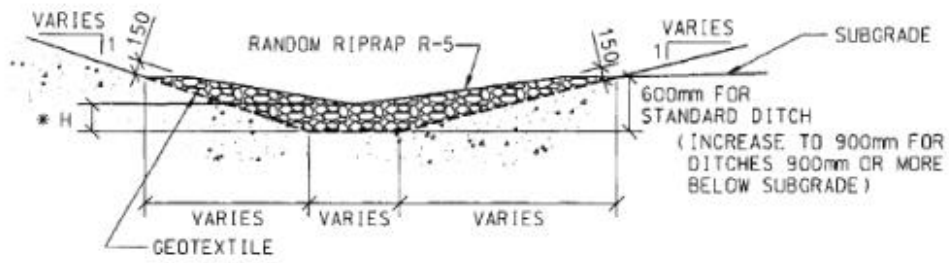




NOTES:

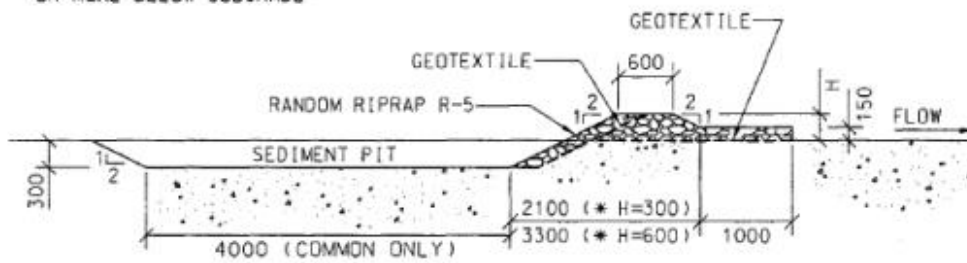
1. DEPTH, WIDTH AND SIDE SLOPES OF SEDIMENT PIT MAY VARY WITH SOIL CONDITIONS AS DIRECTED BY THE ENGINEER
2. ALL RIPRAP SHOWN IS R-5 SIZE

Type B Erosion Control Structure – Plan View

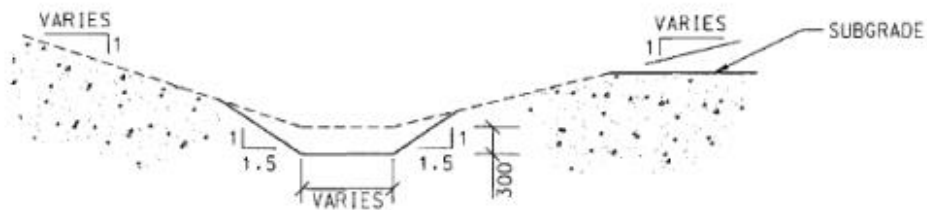


**SECTION A-A**

\* H = 300mm FOR STANDARD  
DITCH DEPTH OF 600mm  
OR  
600mm FOR DITCHES 900mm  
OR MORE BELOW SUBGRADE



**SECTION B-B**



**SECTION C-C**  
(COMMON ONLY)

Type B Erosion Control Structure – Sections

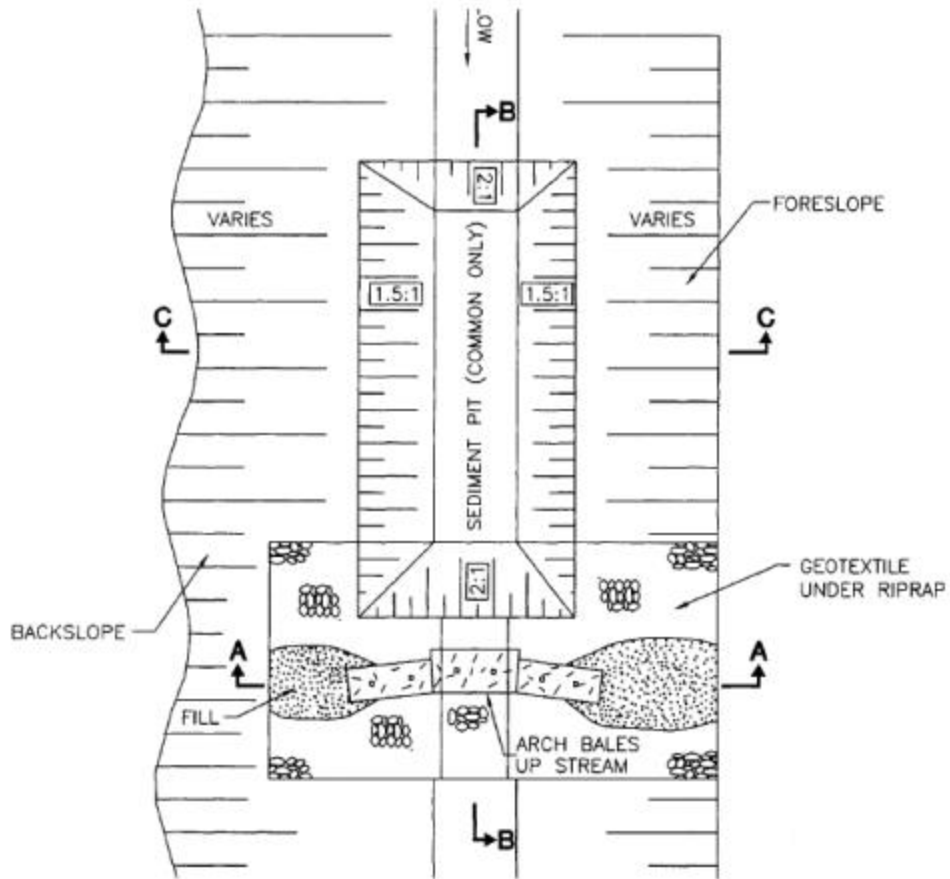


Completed Type B Erosion Control Structure

### **Type C Structure**

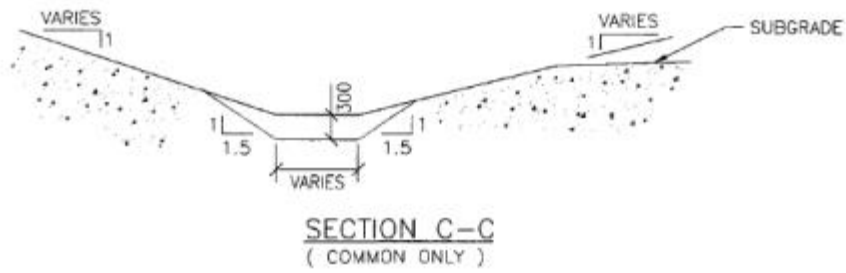
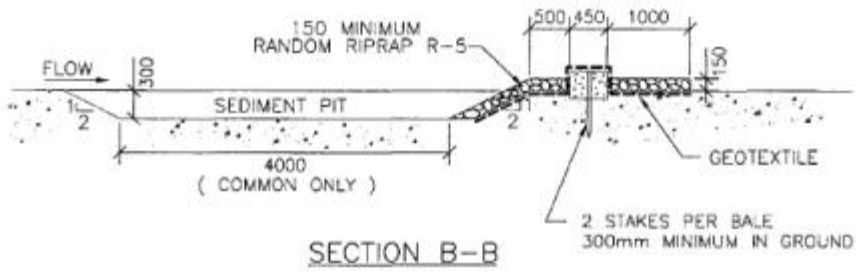
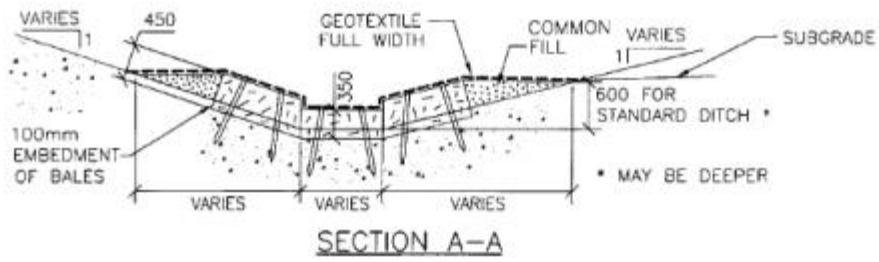
- a) Type C Structures are generally installed as road construction or ditching activities progress. Ditches do not have to be completed in order to place these types of erosion control.
- b) Structures should be installed in the dry.
- c) Bales must be “keyed” into foreslope, backslope, and the bottom of the ditch, and built to ensure that the water flows over the center of the dam and not around either end.
- d) If the trench excavation is larger than the bales, the remaining area must be backfilled and compacted.
- e) Care should be taken to keep the bale twine from contacting ground. Twine will rot faster when in contact with the ground.
- f) Bales should be set such that they are 450 mm high.

- g) Gaps between the bales should be packed with loose straw/hay to prevent seepage.
- h) The centre of ECS is low to allow for water to spill over. This can be done by either embedding the centre bale deeper into the ground or by rotating the bale to its least dimension.
- i) Stakes must be a minimum of 300 mm into the ground. The stakes should be flush with the top of the bale.
- j) Construct sediment pit.
- k) Build Common Excavation berm (dyke) on both sides of bales to contain water.
- l) Place geotechnical fabric over the bales and CE berms (dykes).
- m) Place riprap over fabric on both sides of structure to help hold fabric down and hold bales in place.



- NOTES:
1. NUMBER OF HAY/STRAW BALES REQUIRED VARIES DEPENDING ON BACKSLOPE AND FORESLOPE, AND DITCH WIDTH AND DEPTH.
  2. DEPTH, WIDTH AND SIDE SLOPES OF SEDIMENT PIT MAY VARY WITH SOIL CONDITIONS AS DIRECTED BY THE ENGINEER.
  3. THE GEOTEXTILE MUST BE PLACED OVER THE BALES AND DYKES AND EXTEND ALONG THE GROUND IN FRONT AND BACK OF THIS DAM, AND BE HELD IN PLACE BY THE RIPRAP R-5.

Type C Erosion Control Structure – Plan View



Type C Erosion Control Structure – Sections

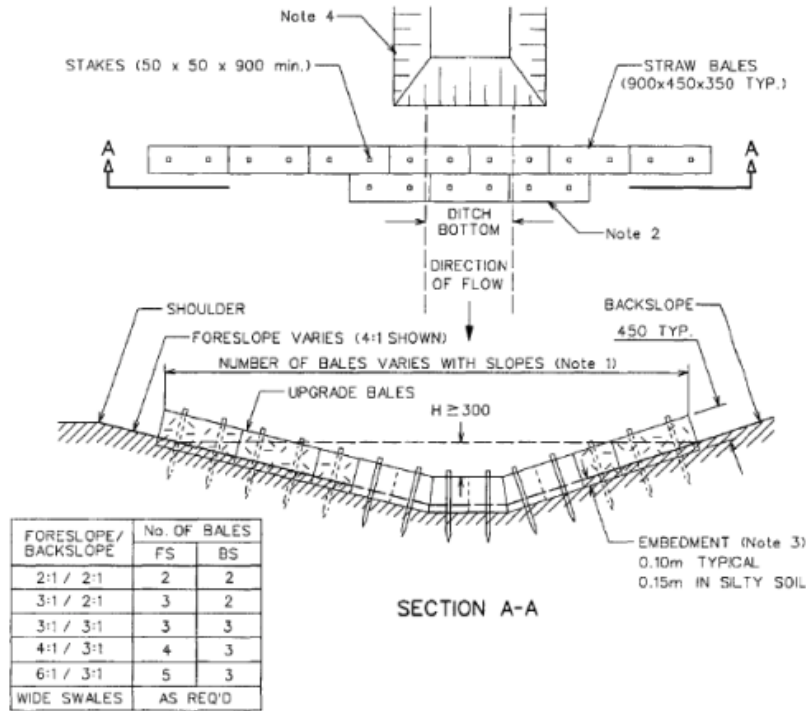


Completed Erosion Control Structure C

### **Type D Structure**

- a) Type D Structures are generally installed as road construction or ditching activities progress. Ditches do not have to be completed in order to place these types of erosion control.
- b) Structures should be installed in the dry.
- c) Bales must be “keyed” into foreslope, backslope, and the bottom of the ditch, and built to ensure that the water flows over the center of the dam and not around either end.
- d) If the trench excavation is larger than the bales, the remaining area must be backfilled and compacted.
- e) Bales should be set such that they are 450 mm high.
- f) Gaps between the bales should be packed with loose straw/hay to prevent seepage.
- g) Bale twine should not come in contact with ground.
- h) Centre of ECS is low to allow for water to spill over.

- i) Stakes must be a minimum of 300 mm into the ground. The number of bales required is dependent on the grades of the foreslope and backslope. The flatter the grade, the more bales are required.
- j) Stagger joints of downstream bales.
- k) Construct sediment pit.



**NOTES:**

- 1) SEE TABLE FOR TYPICAL NUMBER OF UPSTREAM BALES WHICH ARE REQUIRED TO ENSURE MIN. 300mm FOR HEIGHT 'H' (FROM TOP OF BALES AT DITCH CENTRE TO POINT WHERE HIGHEST BALES INTERCEPT SLOPES.)
- 2) INSTALL MINIMUM OF 3 BALES DOWNGRADE AS REINFORCEMENT. JOINTS OF DOWNGRADE BALES SHOULD BE STAGGERED FROM UPSTREAM BALES.
- 3) IF TRENCH FOR BALE EMBEDMENT IS EXCAVATED WIDER THAN BALES, BACKFILL WITH EXCAVATED MATERIAL.
- 4) THE SEDIMENT PIT OF STANDARD DWGS 605-5 AND 605-6 IS REQUIRED FOR TYPE 'D' STRUCTURE.

**Type D Erosion Control Structure – Plan and Section**





Completed Type D Erosion Control Structure

**For all Erosion Control Structures**

- a) ECS shall be maintained from the time of installation until the area has become re-vegetated and/or until jute mats are installed.
- b) Retained sediment will be removed when it reaches a level 300 mm below the low point of the Type A structure and 100 mm below the low point of Type B, C and D structures.
- c) Removed sediment must be disposed of at least 30 m away from a watercourse/wetland.
- d) Erosion control structures shall be inspected prior to, during and after any rainfall event.
- e) Any deficiencies shall be repaired immediately.
- f) The erosion structures shall be removed when no longer required.

- g) Once an ECS removed, any remaining sediment shall be removed and disposed of at least 30 m away from a watercourse or wetland.
- h) The area where the ECS was removed will be stabilized.
- i) Erosion control structures shall be maintained in a functional condition from the time of installation until the work is completed, including during shutdown due to weather, during winter months and during spring runoff and/or as per the WAWA permit conditions.
- j) Prior to winter shutdown, an onsite meeting shall be held between all parties involved in the project to evaluate the site conditions and to identify specific requirements for erosion control. Any deficiencies are to be addressed prior to spring runoff.
- k) Permission of the landowner must be obtained in order to dispose of sediment onto a private property.
- l) Disposal area must be stabilized.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.2.4 Flume (Slope Drain)**

#### **Description**

Flumes (slope drains) are channels or ditches utilized to drain water from the top of a slope to the bottom. These types of structures minimize erosion on a slope by concentrating the water to specific area. Flumes can be used in conjunction with cutoff ditches.

Flumes can be constructed from various types of material including metal and concrete but in general they are typically constructed with geotextile and riprap.

Flumes are permanent structures.

#### **Concerns**

The concerns and potential impacts associated with the use of flumes include:

- Sedimentation of watercourse or wetlands as a result of;
  - Improper sizing and construction of the flume.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

### **General Protection Measures**

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Flumes will be sized with sufficient capacity based on the size of the drainage area being serviced.
- c) Flumes will be constructed as per the specified dimensions.
- d) Where practical, contributing drainage areas shall be subdivided into smaller areas and multiple flumes shall be installed.
- e) Flume will be located in natural drainage areas where possible.
- f) Geotextile will be placed in the channel.
- g) If using multiple strips of geotextile, strips will be laid according to the manufacturer's specifications and item 601 of the Standard Specifications.
- h) Adequately sized riprap will be placed on top of geotextile.
- i) Riprap protection will be provided at the bottom of the flume.
- j) Excavated material must be disposed of at least 30 m away from the Watercourse/wetland.
- k) Permission of the landowner must be obtained in order to dispose of excavated material onto a private property.
- l) Disposal area must be stabilized.



This slope requires a flume (slope drain) to carry flow from the top of the slope to the ditch.



Completed Flume (Slope Drain)

### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.5.2.5 Other Protection Measures**

#### **Wet Weather Shutdown Guideline**

Notwithstanding the requirement to maintain erosion and sediment control measures throughout the construction and OMR activities, there are times when adverse weather conditions may warrant the shut down of work. Continued activity during extreme wet conditions may cause unacceptable disturbance and subsequent discharges of sediment into a watercourse or wetland. Shut down of work is at the discretion of the Engineer (for construction projects) or the Supervisor (for OMR projects). The Wet Weather Shutdown Guidelines (Appendix D) shall be used in the decision-making process.

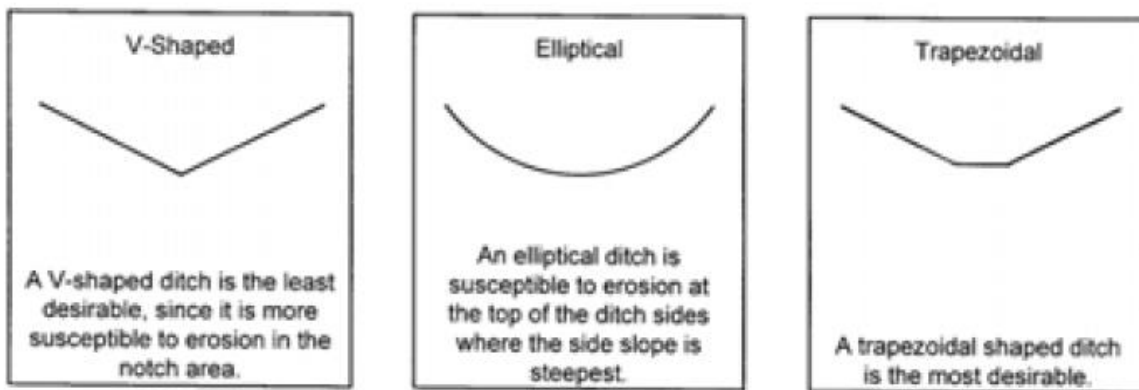
### 3.5.3 Ditching

#### Description

Ditches are primarily constructed to direct water away from roadways. Cutoff ditches are utilized to capture water draining onto the project site at the top of cuts or at the toe of fills. Ditching is undertaken to correct deficiencies such as erosion, non-conformity in grade, line or cross section of the ditch, water ponding on the roadway and restrictive vegetation that impedes the drainage of the roadbed.

There are three types of ditch configurations.

- V-shaped;
- Elliptical;
- Trapezoidal.



Ditch Types

#### Concerns

The concerns and potential impacts associated with ditching include:

- The erosion and sedimentation of watercourses and wetlands; and
- Impacts to fish and fish habitat.

#### Required Permits

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

#### Protection Measures

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Where possible, a 30 m buffer zone of vegetation will be maintained between the end of the ditching and the watercourse/wetland.
- c) Ditching will be constructed to the shape shown on the construction plans or as directed by the Horizon Management Ltd.
- d) Ditching will commence at the lowest point and work towards the highest point, allowing the work to be carried out in the dry.
- e) Vegetation and soil removed by ditching must be disposed of at least 30 m away from the watercourse/wetland.
- f) Install erosion control structures as the work progresses. Follow Section 3.5.2.3 – Erosion Control Structures for the installation, maintenance and removal.
- g) Ditches will not break the bank of a watercourse or enter directly into a wetland.
- h) The end of the ditch will be directed into a vegetated area.
- i) Natural drainage will be maintained where possible.
- j) Trapezoidal ditches will be used where possible. V-shaped or elliptical ditches are more prone to erosion and therefore will only be used where a trapezoidal ditch cannot be constructed.
- k) Ditches must be stabilized by either hydroseeding or lining the ditch with riprap.
- l) The type of stabilization will be determined based on the slope and volume of water expected in the ditch.
- m) Erosion and sediment control measures shall be maintained in a functional condition from the time of installation until the work is completed, including during shutdown due to weather, during winter months and during spring runoff and/or as per the WAWA permit conditions.
- n) Prior to winter shutdown, an onsite meeting shall be held between all parties involved in the project to evaluate the site conditions and to identify specific requirements for erosion and sediment control. Any deficiencies are to be addressed prior to spring runoff.
- o) Permission of the landowner must be obtained in order to dispose of sediment onto a private property.

p) Disposal area must be stabilized.



Ditching operation.

### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## **3.6 Fire Prevention and Contingency**

### **Description**

The purpose of fire prevention and contingency plan in relation to fires in and around a work site is to minimize the potential for the start of fires, and to ensure that fires, which do occur, can be controlled immediately.

### **Concerns**

The concerns and potential impacts associated with fires include:



- Loss or destruction of property and wildlife habitat; and
- Impacts to air quality

### **Required Permits**

- If burning is allowed, burning permits must be obtained from NBDELG and from NBDNR.

### **General Protection Measures**

- a) All necessary precautions must be taken to reduce the potential for fires by controlling/limiting fire hazards at the worksite.
- b) The worksite shall be kept free of all flammable waste.
- c) No burning shall occur on site without the applicable permits and without prior approval from Horizon Management Ltd., NBDELG and DNR.
- d) All equipment shall be kept in good working order.
- e) All fires within or threatening forest habitat will be reported to NBDNR.
- f) The nearest Natural Resources office or 911 will be called and the following information will be provided:
  - Your name.
  - Your telephone number.
  - The exact location of the fire.
  - A description of what is burning.
  - The size of the fire.
  - Is anyone fighting the fire?
  - Access to the fire.

### **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible for ensuring that the protection measures outlined above are adhered to.

## **3.7 Grubbing**

### **Description**

Grubbing is the removal and disposal of stumps and roots. A root rake, or similar equipment, removes the roots and stumps and the topsoil is left for salvage.

## Concerns

The concerns and potential impacts associated with grubbing include:

- Improper waste disposal;
- Improper work progression;
- Erosion and sedimentation of watercourses/wetlands; and
- Impacts to fish and fish habitat.

## Required Permits

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- If burning is allowed, burning permits must be obtained from NBDELG and from NBDNR.

## General Protection Measures

- a) A copy of the WAWAP must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Erosion control measures shall be installed prior to commencement of the work in accordance with Section 3.5 – Erosion and Sediment Management.
- c) A 30 m buffer zone shall be maintained on both sides of each watercourse and/or around wetlands where no grubbing or filling is to take place until erosion control devices, and drainage structures are installed.
- d) Grubbing may be carried out by means of a root rake or similar equipment in order to preserve as much topsoil as possible.
- e) Grubbings may be disposed of by the following methods:
  - Tub-grinding of the roots and stumps, along with any slash, brush and non-merchantable timber from the clearing operation, which can be used as mulch;
  - Burying in fills (planned to be over 5 m in finished height), tramped and compacted to within 0.6 m of original ground; or
  - In an approved Disposal area in accordance with Section 3.13 – Waste Management.



Root rake attached to excavator used to remove roots and stumps only.

#### NBDELG

- f) Burning is generally not accepted, but if burning is permitted, NBDELG and DNR shall be consulted prior to commencement of the burning.
  
- g) Grubbing materials shall not be placed within 30 m of a culvert, bridge or any other structure.
  
- h) The appropriate erosion control devices must be installed prior to commencing the grubbing operation to prevent sediment from leaving the work area and entering watercourses/wetlands or private property.
  
- i) The buffer zones will be clearly identified.

#### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## 3.8 Spill Management

### Description

Accidental releases of petroleum, oil and lubricants (POL) as well as other hazardous materials into the environment can occur.

This section deals with spills that may occur during construction and OMR operations. See Section 3.9 – Storage and Handling of Petroleum Products and Section 3.10 – Storage and Handling of Other Hazardous Materials and for the protection measures associated with the storage and handling of petroleum products and hazardous materials.

### Concerns

The concerns and potential impacts associated with the accidental releases of pollutants into the environment, such as by spills, refueling losses and leakage from equipment include:

- Contamination of soil, groundwater, and watercourses/wetlands;
- Transportation of contaminants off site to down gradient aquifers or watercourses and/or wetlands; and
- Impacts to waterfowl, fish, shellfish and vegetation.

### Required Permits

None identified.

### General Protection Measures

- a) Plans and procedures must be in place to respond to such emergency situations.
- b) For hazardous substances, WHMIS information fact sheets will be reviewed to be fully aware of the nature of the product and the precautions to be taken in handling and other important information.
- c) Onsite fuelling must not occur within 30 m of a watercourse, wetland or private water well.
- d) Designated fuelling and storage areas on a construction site must be at least 100 m away from any watercourse, wetland or private water well.
- e) Materials to facilitate rapid containment and clean up of spills must be available during any construction/OMR activity in or near any watercourse, wetland, private water well or environmentally sensitive area.
- f) Equipment should be inspected daily for leaks.

- g) All leaks will be repaired immediately.

### **Small Spills**

For spills of petroleum, oils, or lubricants (POL's) that occur during refueling of machinery or through breaks in hydraulic lines and are highly localized and easily cleaned up by onsite crews using standard equipment, sorbent materials, and the following protection measures will be followed:

- a) Identify the material involved and refer to MSDS or call CANUTEC (1-613-996-6666) for precautionary measures, if necessary.
- b) Stop the flow of the product being spilled, if safe to do so, taking precautions to avoid personal injury.
- c) Control and contain the spilled product, if it can be done safely, using onsite materials found in a spill cleanup kit. Contaminated materials and soils shall be disposed of at an approved facility.
- d) Record the details of the spill, including:
  - Name and contact info of the person reporting the spill;
  - Date and time of spill;
  - Type and approximate amount of product spilled;
  - Location of spill or leak;
  - Source of spill or leak;
  - Type of accident;
  - Weather conditions;
  - Proximity to watercourse, wetland or other sensitive feature; and
  - Status of the spill (ongoing or contained, cleanup efforts).
- e) Contact the local NBDELG office or the Coast Guard Environmental Emergency number (1-800-565-1633).
- f) Report the spill to the Resident Engineer and Construction Foreman/Supervisor.
- g) Small spills (i.e., less than 20 L) that occur on level ground and are easily controlled and cleaned up must be cleaned up and reported following the protection measures detailed above.
- h) For spills at fuelling facilities, notification must also include:
  - The Horizon Management Ltd. Supervisor;
  - Vehicle Management Agency;

- Maintenance and Traffic Branch; and
  - The local Fire Prevention Authority.
- i) All maintenance depots must be equipped with at least one spill kit, containing absorbent pads and booms for petroleum spills.
  - j) The clean up kit must be maintained.
  - k) Bags of peat moss or sawdust will also be available to control and clean up small spills.
  - l) The contaminated soil will be removed for disposal at a proper disposal facility.

### **Large Spills**

For a large spill that is not highly localized and easily cleaned up by on-site crews using standard equipment and sorbent materials or where soil, groundwater, and surface water contamination may occur, the following protection measures will be followed:

- a) Stop the flow of the product being spilled, if safe to do so, taking precautions to avoid personal injury.
- b) Identify the material involved and refer to MSDS or call CANUTEC (1-613-996-6666) for precautionary measures, if necessary.
- c) Perform a quick assessment of the spill:
  - Is there a concern for human health? If so, should the area be cordoned off?
  - How extensive is the spill?
  - Are there any watercourses, wetlands, or other sensitive environmental features nearby and down gradient of the spill?
  - Are there drainage systems that lead to these features?
- d) Control and contain the spilled product, if it can be done safely, using onsite materials.
- e) Contact the Coast Guard Environmental Emergency number (1-800-565-1633).
- f) Notify the Horizon Management Ltd. or other designated representative.
- g) For large spills at a maintenance depot, notify
  - The Maintenance Supervisor;
  - Vehicle Management Agency;

- Maintenance and Traffic Branch; and
- The local Fire Prevention Authority.

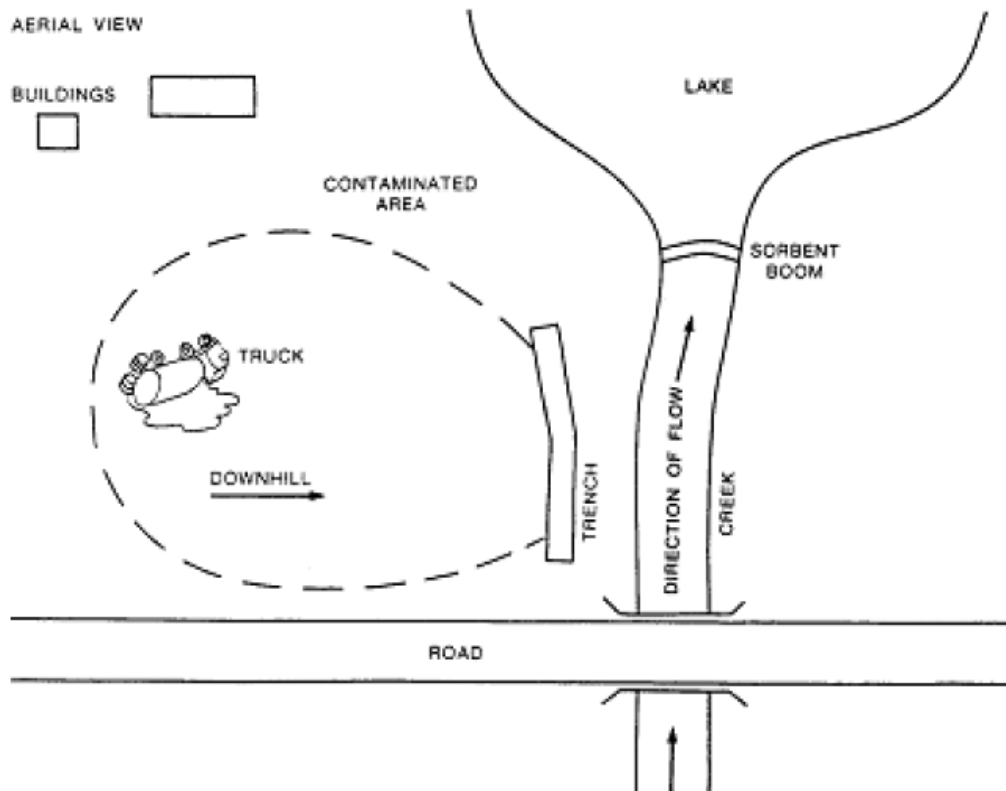
h) Record the details of the spill, including:

- Name and contact info of the person reporting the spill;
- Date and time of spill;
- Type and approximate amount of product spilled;
- Location of spill or leak;
- Source of spill or leak;
- Type of accident;
- Weather conditions;
- Proximity to watercourse, wetland or other sensitive feature; and
- Status of the spill (ongoing or contained, cleanup efforts).

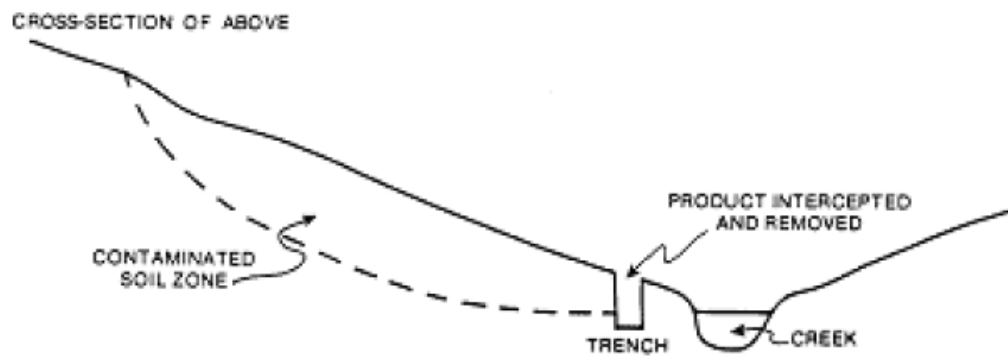
### **Containment Options for Large Spills**

The following containment options will be used for Large spills.

- a) On level land, excavate a sump hole (line with plastic if soils are porous) and pump the spilled product into a temporary container or other non-porous storage option.
- b) On sloped land, dig a trench (lines with plastic if soils are porous) downslope from the spill to intercept the spilled material.



Plan view of trench excavation on down gradient.

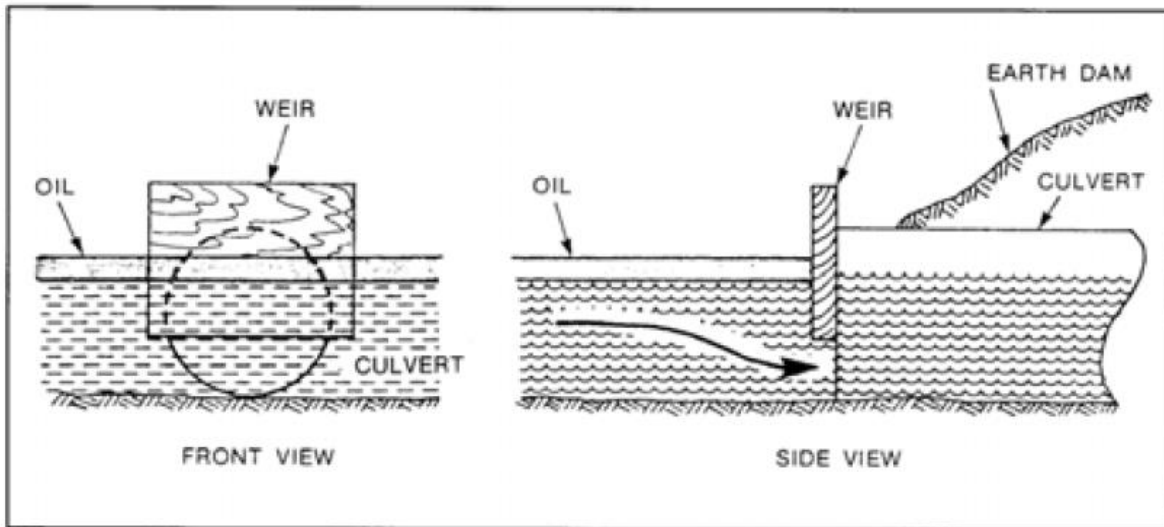


Profile of trench excavation

- c) Within a drainage ditch, watercourse or wetland, a number of options are possible:



- i. A culvert weir can be used to stop oil from entering a culvert. The top half of the culvert is blocked off, blocking oil on the surface of the water, and allowing water to drain underneath. If water levels are too low, the culvert shall be temporarily blocked off completely.



Culvert weir.

- ii. A weir on a small watercourse can be constructed using plywood, planks, logs, or other available material anchored in the bank of the watercourse, allowing water to flow underneath, trapping the oil above.



Use of culvert weir on a small watercourse.

- iii. For larger watercourses, sorbent booms may be used to intercept spilled material downstream of a spill, or contain in the marine environment.

## **3.9 Storage and Handling of Petroleum Products**

### **Description**

The proper storage, handling and use of petroleum products can greatly reduce the risk of accidental spills or discharges into the environment.

The Petroleum Product Storage and Handling Regulation (Regulation 87-97) regulates the storage, transport, and handling of petroleum products, which includes asphalt, engine oil, gasoline, and lubricants. Regulated activities include the storage of petroleum products, the transportation and delivery of these products to dispensing facilities, use of dispensing facilities, prevention of spillage and remediation in the event of a spill of a petroleum product into the environment.

There are two general classes of storage, those being Temporary Storage and Permanent Storage.

### **3.9.1 Temporary Storage of Petroleum Products**

## **Description**

Temporary storage of petroleum products is often required for construction projects, and typically involves the use of aboveground storage tanks for ancillary facilities such as a mobile asphalt plant, and the use of portable tanks and containers for refueling and other uses.

## **Concerns**

The concerns and potential impacts associated with temporary storage of petroleum products include:

- Impacts to surface and ground water quality;
- Accidental spills; and
- Potential fire hazards.

## **Required Permits**

- All temporary storage tank systems on a site with a capacity of 2,000 L or more must be registered and approved under Regulation 87-97. Tank systems must be installed by a licensed installer, as outlined in the regulation. Regulation 87-97 Schedule A, Part I and Part II, contains a site approval form and an environmental approval form for new installations or modifications to an existing system, and must be forwarded to NBDELG at least one month prior to the anticipated start of construction.
- Properties that have 2,000 liters or more, of petroleum product storage capacity, are required to register the tanks on site with NBDELG and receive an annual Petroleum Storage Site License for the systems on sites.

## **General Protection Measures**

- a) All containers used for temporary storage of petroleum products shall be in good condition, and checked for leaks regularly.
- b) Containers must be clearly marked and stored in clearly marked areas, on a flat surface, at least 100 m from a watercourse, wetland or private water well.
- c) Any above ground fuel container with a capacity of greater than 30 L shall be stored on an impervious mat and shall be surrounded by an impervious dyke of sufficient size to contain not less than 110% of the capacity of the tank, plus 150 mm of freeboard.
- d) Any above ground fuel container with a capacity of greater than 30 L shall also be measured for liquid level weekly and for water level weekly (See Section 65 of the Petroleum Product Storage and Handling Regulation – Clean Environment Act (New Brunswick Regulation 87-97)).

- e) Fuel storage areas and non-portable transfer lines shall be clearly marked or barricaded to ensure that they are not damaged by moving vehicles. The markers should be visible under adverse weather conditions.
- f) The storage area should be sloped or drained such that any spilled material flows to a safe collection area.
- g) Smoking shall be prohibited within 10 m of a fuel storage area.
- h) Project sites shall be equipped with at least one clean-up kit, containing absorbent pads and booms for petroleum spills. The kit shall be maintained. Bags of peat moss or sawdust will also be available, to help absorb larger spills.
- i) Waste oils and lubricants or other petroleum products shall be retained in a clearly labeled tank or closed container, and recycled or disposed of at an approved facility. Temporary storage of such wastes prior to disposal shall also have an impervious mat and be surrounded by an impervious dyke of sufficient size to contain not less than 110% of the capacity of the storage containers, plus 150 mm of freeboard.
- j) All empty containers are returned to a designated location for proper disposal. Empty containers are not to be disposed of on site.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

Horizon Management Ltd. and Contractor personnel shall be responsible for the safe storage and handling of petroleum products used during construction and OMR.

Horizon Management Ltd., petroleum system users and Contractor's personnel shall be responsible for reporting any spills that may occur.

## **3.9.2 Fueling and Fuel Transport**

### **3.9.2.1 Fuel Handling and Transfer at Worksites**

#### **Description**

Gasoline and Diesel are required on site to refuel equipment. These products may be dispensed from a temporary storage tank or from portable equipment that comes to the jobsite (fuel trucks).

#### **Concerns**

The concerns and potential impacts associated with temporary storage of petroleum products include:

- Impacts to surface water and groundwater quality;
- Accidental spills; and
- Potential fire hazards.

### **Required Permits**

- All temporary storage tank systems on a site with a capacity of 2,000 L or more must be registered and approved under Regulation 87-97. Tank systems must be installed by a licensed installer, as outlined in the regulation. Regulation 87-97 Schedule A, Part I and Part II, contains a site approval form and an environmental approval form for new installations or modifications to an existing system, and must be forwarded to NBDELG at least one month prior to the anticipated start of construction.
- Properties that have 2,000 liters or more, of petroleum product storage capacity, are required to register the tanks on site with NBDELG and receive an annual Petroleum Storage Site License for the systems on sites.

### **General Protection Measures**

- a) Only approved, portable containers shall be used for collecting, transporting and fuelling with gasoline or fuel oil. The container must be metal or plastic, bearing the ULC or CSA label of approval. If refilling a plastic gas can, the can should be removed from the vehicle and placed on the ground. This should minimize the risk of static electricity sparking any gasoline fumes.
- b) Care shall be taken at all times when products are being handled or transferred, to prevent any product from being spilled, misplaced, or lost and prevent the possibility of the product to contaminate the soil, watercourses, wetlands and/or groundwater.
- c) Onsite fuelling must not occur within 30 m of a watercourse, wetland or private water well.
- d) Designated fuelling and storage areas must be at least 100 m away from any watercourse, wetland or private water well.



Petroleum products stored too close to a watercourse.

- e) Equipment should be inspected daily for leaks.
- f) All leaks shall be repaired immediately.
- g) Materials to facilitate rapid containment and clean up of spills must be available during any activity in or near any watercourse/wetland or environmentally significant area.
- h) In the event of a spill, Section 3.8 – Spill Management will be followed.
- i) In the event of a spill, all used sorbent materials will be returned to the appropriate storage yards for reuse or safe disposal.
- j) If fuelling is done from a bulk tanker, the hose/nozzle assembly shall not be left unattended during fueling, and shall be placed in its proper position upon completion.
- k) Fueling sites and fuel trucks shall have clean-up kits, containing absorbent pads and booms for minor spills that may occur during fueling.

- l) All containers used for temporary storage of petroleum products shall be in good condition, and checked for leaks daily.
- m) The pour spout will be properly installed and secured on fuel containers and verified prior to fueling.
- n) Re-fueling will be carried out to avoid spilling fuel on the machine.
- o) After re-fueling the cover on the fuel container and the cap on the machine will be put into place.
- p) The fuel container will be move away from the machine before starting it.
- q) All empty containers will be returned to a designated location for re-use or proper disposal. Empty containers are not to be disposed of on site.
- r) Petroleum product suppliers that do not see a valid license for the fuel storage systems are prohibited from refueling the tanks.

### **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

Horizon Management Ltd. and Contractor personnel shall be responsible for the safe storage and handling of petroleum products used during construction and OMR.

Horizon Management Ltd., petroleum system users and Contractor's personnel shall be responsible for reporting any spills that may occur.

## **3.10 Storage and Handling of Other Hazardous Materials**

### **Description**

This section addresses hazardous materials other than petroleum products and explosives that may be stored, handled and used during construction and OMR.

For the purpose of this manual, hazardous material is defined as a material which, by reason of its properties, is a hazard to health or to the environment and which is explosive, gaseous, flammable, poisonous, radioactive, corrosive, oxidizing or leachable or is designated as a hazardous material, and any object classed by regulation as a hazardous material.

Some of the frequently used hazardous materials would include paint, solvents, antifreeze, road salt and winter sand.

### **Concerns**

The concerns and potential impacts associated with the storage and handling of hazardous material include:

- Accidental spills;
- Contamination of soil, surface water and groundwater; and
- Potential fire hazards.

### **Required Permits**

- Hazardous materials shall be stored in appropriate storage areas in accordance with federal and provincial legislation and permits.

### **General Protection Measures**

- a) All products shall be stored in approved product storage areas (e.g., with spill containment capability) in a well ventilated area.
- b) Hazardous materials shall be stored at least 30 m from any watercourse, wetland or private water well and at a location where lost or spilled product cannot enter a watercourse, wetland or private water well.
- c) Hazardous waste shall be dealt with in compliance with federal and provincial regulations. A professional hazardous waste management company shall be contacted for disposal of most hazardous wastes.
- d) All products shall be handled by trained, qualified personnel.
- e) All products and fuel storage areas shall be properly labeled, with labels visible at all times.
- f) All necessary precautions shall be taken to minimize spills, misplacement or loss of hazardous materials.
- g) In the event of a spill, Section 3.8 - Spill Management will be followed.
- h) Smoking shall be prohibited within 10 m of a hazardous materials storage area.
- i) Storage sites shall be inspected regularly (at least weekly) to ensure compliance.
- j) Hazardous waste will be collected and disposed of at an approved disposal facility.











The four key programs for protection measures used by the Department of Transportation for identification, handling, transportation and storage of hazardous products are the Workplace Hazardous Materials Information System, Material Safety Data Sheets, CANUTEC and Transportation of Dangerous Goods.

### **Workplace Hazardous Materials Information System (WHMIS)**

WHMIS is a system put in place to provide a safe workplace. The WHMIS program delivers information on products using labels, Material Safety Data Sheets (MSDS) and education programs. Storage of hazardous (controlled) materials must comply with WHMIS requirements.

Controlled products are those that fall under the following categories:

<ul style="list-style-type: none"><li>• Class A – Compressed Gas</li></ul>	
<ul style="list-style-type: none"><li>• Class B – Flammable and Combustible Material</li></ul>	
<ul style="list-style-type: none"><li>• Class C – Oxidizing Materials</li></ul>	
<ul style="list-style-type: none"><li>• Class D1 – Materials Causing Immediate and Serious Toxic Effects</li></ul>	
<ul style="list-style-type: none"><li>• Class D2 – Materials Causing Other Toxic Effects</li></ul>	
<ul style="list-style-type: none"><li>• Class D3 – Biohazardous Infectious Materials</li></ul>	
<ul style="list-style-type: none"><li>• Class E – Corrosive Material</li></ul>	
<ul style="list-style-type: none"><li>• Class F – Dangerously Reactive Materials</li></ul>	

## **Material Safety Data Sheets (MSDS)**

MSDS provide information on the controlled product that includes the hazardous ingredients of the product, health hazards, protective measures and emergency procedures. MSDS of a controlled product should be reviewed prior to working with the product.

## **Canadian Transport Emergency Centre (CANUTEC)**

CANUTEC is operated by Transport Canada. CANUTEC's mandate is to provide assistance via the telephone to emergency response personnel when dealing with a dangerous goods emergency. CANUTEC has a scientific data bank of products/chemicals where technical information can be accessed in the event of an emergency providing:

- Properties of the dangerous good;
- Health hazards and first aid;
- Fire, explosion, spill or leak hazards;
- Remedial actions;
- Evacuation distances; and
- Personal protective clothing and decontamination.

**CANUTEC may be contacted in the event of a spill or emergency  
phone to receive prompt advice:  
1-613-996-6666**

CANUTEC staff also provides an information service on all aspects of the regulatory requirements for the handling, offering for transport and transporting of dangerous goods by all modes of transport. CANUTEC is the primary contact point for the Transport of Dangerous Goods Directorate on questions regarding the transportation of dangerous goods regulations and chemical products.










For general information CANUTEC should be reached by calling the information number (613) 992-4624, to keep the emergency telephone lines free.

## **Transportation of Dangerous Goods (TDG)**

The Transportation of Dangerous Goods Act is a federal legislation to promote public safety during the transportation of dangerous goods. The transportation of goods can be by means of road, rail, water or air.

Federal and provincial legislation provide for the regulation of an extensive list of products, substances or organisms classified as dangerous. The products fall into one

of nine classes. A system of diamond-shaped placards and labels is used to identify dangerous goods.

<b>Class 1 explosives</b>	
<b>Class 2 gases</b>	
<b>Class 3 flammable liquids</b>	
<b>Class 4 flammable solids, spontaneously combustibles and substances that, on contact with water, emit flammable gases</b>	
<b>Class 5 oxidizing substances and organic peroxides</b>	
<b>Class 6 poisonous (toxic) and infectious substances</b>	
<b>Class 7 radioactive materials</b>	
<b>Class 8 corrosives</b>	
<b>Class 9 miscellaneous products or substances</b> <ul style="list-style-type: none"> <li>• miscellaneous identified dangerous goods</li> <li>• certain specified goods considered dangerous to the environment</li> <li>• dangerous wastes</li> </ul>	

### Responsibilities

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## 3.11 Temporary Ancillary Facility Management

### 5.11.1 Temporary Access Roads

## **Description**

Temporary access roads are necessary to provide access during construction.

## **Concerns**

The concerns and potential impacts associated with temporary access roads include:

- Erosion and sedimentation of watercourses/wetlands;
- Impacts to fish and fish habitat;
- Impacts to ESA's;
- Impacting watercourse/wetland banks.

## **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

## **General Protection Measures**

- a. A copy of the WAWA permit must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b. Dust control shall be carried out in accordance with Section 5.6 – Dust Control.
- c. Erosion and sedimentation control measures shall be installed and maintained in accordance with Section 3.5 – Erosion and Sediment Management.
- d. Erosion and sedimentation control shall be installed prior to the construction of temporary access roads.
- e. Proper ditching shall be constructed to prevent runoff from flowing directly into watercourses or wetlands.
- f. Additional erosion and sediment control measures shall be installed as required along the temporary access road.
- g. The access road will be capped with rock/gravel to ensure sedimentation does not occur.
- h. Temporary roads may be placed on geotechnical fabric to reduce mixing of existing ground material with fill material, to facilitate removal of fill

material and to facilitate restoration of the site after the road is no longer required.

- i. Abandoned detour sites shall be cleaned up, and approaches and streambanks are stabilized by seeding and mulching, placing of riprap, or a combination of these measures.
- j. If a temporary watercourse crossing is required, it shall be installed in accordance with Section 3.11.2 – Temporary Watercourse/Wetland Crossings.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.11.2 Temporary Watercourse/Wetland Crossings**

#### **3.11.2.1 Temporary Watercourse/Wetland Crossings with a Structure**

##### **Description**

A temporary watercourse crossing is a structure that is placed in/over watercourse to provide access across the watercourse for a limited period of time. They may be used to provide access to heavy equipment prior to and/or during construction of a permanent crossing, or to maintain traffic flow while an existing culvert or structure is being repaired or replaced.

##### **Concerns**

The concerns and potential impacts associated with temporary watercourse/wetland crossing with a structure include:

- Erosion and sedimentation of watercourses/wetlands; and
- Impacts to fish and fish habitat.

##### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat may be required if work will result in Harmful Alteration, Disruption, Destruction of fish habitat.

- A NWPB permit may be required if work is being carried out in a navigable waterbody.

### **General Protection Measures**

- a) A copy of the WAWA and NWPB permits and Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat (if applicable) must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Where feasible, temporary crossing structures will be used instead of culverts to reduce the impact on aquatic habitat.
- c) Temporary crossings will be designed/sized for peak flows expected during the life of the crossing.
- d) Ice crossings over watercourses may be used.
- e) Crossings locations will be chosen where the stream channel is straight and narrow.



Temporary crossing at narrow location. Note sideboards on structure to limit the amount of debris that can enter the watercourse.

- f) Temporary crossings will be constructed at right angles to the watercourse, where possible.
- g) When no longer needed, the crossing structure and all construction materials shall be removed from the watercourse, the banks and all exposed soil stabilized against erosion, and the channel restored to its original condition.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.11.2.2 Fords**

#### **Description**

Fording is crossing a watercourse where the water is shallow enough to be traversed by vehicles.

#### **Concerns**

The concerns and potential impacts associated with fords include:

- Erosion and sedimentation of the watercourses/wetlands; and
- Impacts to fish and fish habitat.

#### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat may be required if work will result in Harmful Alteration, Disruption, Destruction of fish habitat.

#### **General Protection Measures**

- a) A copy of the WAWAP and Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat (if applicable) must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff



must be familiar with the requirements outlined in the permits.

- b) A ford should only be considered as an alternative to constructing a bridge or installing a culvert.
- c) Fording locations must be chosen to minimize disturbance to the banks.
- d) Fording must take place perpendicular to the watercourse.
- e) Equipment utilizing fords are to be clean and free of leaks.
- f) The number of crossings shall be kept to a minimum and confined to the low flow period between June 1st and September 30th.
- g) Approaches to the crossing shall be stabilized and access roads to crossing shall be covered with clean gravel.
- h) Exposed soils must be stabilized at crossing locations.
- i) Felled trees, slash and/or debris shall not be hauled through or allowed to enter the watercourse.
- j) Crossings shall be removed as soon as they are no longer necessary and approaches shall be mulched or otherwise stabilized so as to minimize any sediment runoff into the watercourse.
- k) The crossing area shall be restored to a condition equivalent to the condition prior to construction.
- l) Fords are prohibited in watercourses located in designated drinking water supply watersheds.

### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management a Ltd. nd its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.11.3 Marshalling Yards and Laydown Areas**

#### **Description**

Marshalling yards and lay down areas are areas used on a temporary basis to store equipment and materials.

## Concerns

The concerns and potential impacts associated with marshalling yards and lay down areas include:

- Erosion and sedimentation of watercourses/wetlands;
- Noise; and
- Fugitive Dust

## Required Permits

- None Identified.

## General Protection Measures

- a) Locate marshalling yards and lay down areas using the same constraints and environmental considerations used in the siting of roadway alignments.
- b) Brownfield sites are preferred to greenfield sites.
- c) Open sites are preferred to forested sites that require clearing.
- d) Incorporate environmental protection measures for clearing (Section 3.1), dust control (Section 3.4), erosion and sediment control (Section 3.5.2), grubbing (Section 3.7), and other relevant sections, as required.

## Responsibilities

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### 3.11.4 Decommissioning of Temporary Ancillary Facilities

#### Description

Decommissioning involves the removal of temporary access roads, laydown areas, temporary watercourse crossings, and materials storage sites.

#### Concerns

The concerns and potential impacts associated with decommissioning of temporary Ancillary facility include:

- Erosion and sedimentation of watercourses and wetlands.

## Required Permits

None Identified.

## General Protection Measures

In addition to facility-specific protection measures as outlined above, the following protection measures must be implemented during the decommissioning of temporary ancillary facilities:

- a) Sites containing temporary ancillary facilities shall be cleaned up, and stabilized by seeding and mulching, placing of riprap, or a combination of these measures.
- b) Erosion and sediment control measures shall be maintained until which time vegetation has established, and protection measures are no longer warranted.
- c) Wastes shall be disposed of in accordance with Section 3.13 – Waste Management.
- d) Sediment ponds containing “clean” material (i.e., from aggregate piles or general site runoff) shall be cleaned of sediment. The excavated sediment shall be disposed of at a location approved by the Engineer, at least 30 m from a watercourse and such that it cannot enter a watercourse. Disposal areas shall also be mulched and/or hydroseeded. If required for treatment of site run-off, they may be maintained, and later filled in with clean fill when no longer needed.
- e) Where sediment ponds may contain “suspect” material (e.g., used with wet scrubbers at a mobile asphalt plant), sediment removed from the pond should be characterized by laboratory testing to determine if disposal as a contaminated sediment is required. If the sediment is unsuitable as clean fill, then the material should be disposed of as contaminated waste at an approved hazardous waste disposal facility. The sediment pond shall be filled in with clean fill, and mulched/hydroseeded.
- f) Where the quality of soils affected by construction and operation of temporary ancillary facilities is unable to support the growth of vegetation (e.g., due to compaction), the soil shall be restored and adequately prepared using mechanical means, or amended with topsoil.

## Responsibilities

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## 3.12 Topsoil

## **Description**

Topsoil is the surface layer of the soil profile and is responsible for supplying water and nutrients to plants. Topsoil can be salvaged from on site, if adequate quality and quantities exist, or it may come from sources off site. Preserving and using undisturbed soil yields a more successful planting medium. Topsoil may be required as per the planning and design of a site or may be requested by the Horizon Management Ltd.

## **Concerns**

The concerns and potential impacts associated with Topsoil include:

- Erosion and sedimentation of watercourses/wetlands; and
- Impacts to fish and fish habitat.

## **Required Permits**

None identified.

## **General Protection Measures**

- a) Topsoil stockpiles shall be located a minimum of 30 m from any watercourse or wetland, where they will not block natural drainage or be a potential source of sedimentation of watercourses and wetlands.
- b) Stockpiles shall be mulched in accordance with Section 3.5.1.2 – Mulching.
- c) Sediment control fencing will be installed around the stockpile to contain any sediment.
- d) Once the areas have been topsoiled, hydroseed shall be applied in accordance with Section 5.7 – Erosion and Sediment Management.
- e) Topsoil shall not be placed after the end of the week, which September 30th occurs without the permission of the Horizon Management Ltd. and is not to be placed on frozen or wet ground. If vegetation cannot be established prior to the onset of winter conditions, then the soil must be adequately stabilized using alternate measures, to ensure runoff is not conveyed to nearby watercourses.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

# **3.13 Waste Management**

## **Description**

Waste Management is an important environmental issue for Horizon Management Ltd. construction projects and operations. This section outlines the requirements and procedures for:

- Disposal areas;
- Construction and demolition debris;
- Garbage and other wastes;
- Litter barrels and litter pick-up (operation);
- Recycling or reuse of highway construction waste; and
- Vegetation waste.

### **3.13.1 Disposal Areas**

#### **Description**

Disposal areas are used for the disposal of waste from clearing, grubbing, asphalt, beaver dam removal, and excavation surplus materials not identified for stockpiling and later use. This material would meet the definition of “Clean Fill” under the Clean Fill Guidelines (NBDELG 2002d).

#### **Concerns**

The concerns and potential impacts associated with Waste Management include:

- Erosion and sedimentation of watercourses/wetlands;
- Impacts to ESA;
- Interference with natural drainage; and
- Destruction of landscape.

#### **Required Permits**

- Approval from the land owner and Horizon Management Ltd. will be required for disposal sites located within or outside the property.
- Approval from NBDELG will be required for disposal sites located outside Horizon Management Ltd. property if the proposed site is near any ESA's.
- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

#### **General Protection Measures**

- a) A copy of the WAWA permit must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) The disposal of ‘clean fill’ will be encouraged within the project limits.

- c) Disposal area locations need to be identified.
- d) Disposal areas shall be located taking into consideration the environmental constraints identified.
- e) Determine best disposal configuration such that it blends in with the surrounding topography.
- f) Horizon Management Ltd. as well as the property owner must provide approval of the proposed Disposal Area. This may require the proposed site to be inspected for ESA's and further approval from NBDELG.
- g) Disposal areas shall be located no closer than 30 metres from a watercourse, wetland or marine environment and where runoff from the disposal area cannot enter a watercourse or wetland or cause sedimentation of a watercourse or wetland. Additional setback requirements may apply in protected watersheds and designated groundwater protection areas, or may be warranted by site-specific conditions.
- h) Clear proposed disposal area if required.
- i) Disposal areas shall not block natural drainage.
- j) Erosion and sediment control measures will be installed to control run off.
- k) Disposal areas shall be left with a neat and finished appearance and permanently stabilized in accordance with Section 3.5 – Erosion and Sediment Management.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

For Construction projects, the Contractor is responsible to identify the disposal locations, to get the approval from the landowner and to get approval from NBDELG (if required) to utilize the property.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.13.2 Construction and Demolition Debris**

#### **Description**

Construction and Demolition (C&D) Debris may be generated during highway construction, including materials from the demolition of buildings and structures.

### **Concerns**

The concerns and potential impacts associated with construction and demolition debris include:

- Improper disposal of C&D debris.

### **Required Permits**

For both an existing and a new C&D site, an Approval to Operate from NBDELG is required. Both of these options need to meet the following:

- Guidelines for the Siting and Operation of a Class 1 Land Reclamation Site Utilizing Construction and Demolition Debris (NBDELG 2002b) for more than 100 tandem truck loads; or the
- Guidelines for the Siting and Operation of a Class 2 Land Reclamation Site Utilizing Construction and Demolition Debris from the Demolition of a Residential or Small Commercial Building (NBDELG 2002c) for less than 100 tandem truck loads, without a nearby (within 30 km) existing full time Construction and Demolition Debris Disposal Site facility, transfer station, or sanitary landfill.

### **General Protection Measures**

- a) C&D debris will be disposed of at an approved C&D site.
- b) Only material that meets the NBDELG definition of C&D will be disposed of at an approved C&D site.

### **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.13.3 Garbage and Other Wastes**

#### **Description**

Garbage and other highway construction and OMR wastes addressed in this section include all wastes excluding:

- Those suitable as “clean fill” (Section 3.13.1);
- Construction and Demolition Debris (Section 3.13.2); or

- Recyclable or reusable materials (Section 3.13.5).

## **Concerns**

The concerns and potential impacts associated with Garbage and other waste disposal include:

- Contamination of groundwater;
- Improper handling of hazardous material; and
- Wildlife encounter.

## **Required Permits**

None identified.

## **General Protection Measures**

- a) Rags and other potentially combustible materials used in equipment maintenance shall be kept in a covered container separate from other materials until the combustible material can be removed from site for disposal. Contact a professional hazardous waste management company for disposal of such wastes.
- b) Hazardous waste shall be collected and disposed of off-site at a certified disposal facility approved for receiving liquid industrial wastes. Solvents, acids and caustic liquid waste shall be collected separately and stored for removal and disposal by a certified waste management company specializing in liquid and hazardous wastes.
- c) There shall be no burning of waste on the site.
- d) Domestic waste from site offices and camps shall be gathered daily and stored in closed steel containers for removal and disposal at an approved Regional Solid Waste Commission Landfill.
- e) In order to minimize wildlife encounters, food waste is to be removed from site.
- f) Compostable waste should be considered for disposal separate from wastes destined for a landfill.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.13.4 Litter Barrels and Litter Pick-up**



## **Description**

Litter barrels are provided for the convenience of the public to dispose of their litter at various roadside locations.

## **Concerns**

The concerns and potential impacts associated with litter barrels and litter pick up include:

- Improper maintenance of the litter barrels;
- Improper disposal of the litter collected; and
- Wildlife encounters.

## **Required Permits**

None identified.

## **General Protection Measures**

- a) All litter collected shall be disposed of at the closest Regional Solid Waste Commission landfill.
- b) Litter barrels shall be serviced at regular intervals to minimize the nuisance potential of the sites.
- c) Pick up of litter along the ROW by highway maintenance personnel is encouraged.

## **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.13.5 Recycling or Reuse of Construction Waste**

#### **Description**

Horizon Management Ltd. and Contractors should always look at opportunities for reduction, reuse and recycling of waste materials. Recycling refers to a process of utilizing existing materials in a newly manufactured product. Reuse involves the removal and use of existing materials in substitution of importing newly manufactured material. In the past, materials that were discarded on projects typically included excavated materials such as topsoil, poor or wet subsoils, old asphalt concrete, and Portland cement concrete.

## **Concerns**

The concerns and potential impacts associated with recycling and reusing construction waste include:

- The Recycling and Reusing of existing material may mean that those materials will need to be stockpiled for a period of time.

## **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland or if storing material within 30 m of a watercourse/wetland.

## **General Protection Measures**

- a. A copy of the WAWA permit must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b. Topsoil shall be stripped off cuts and shallow fill areas and reused on finished slopes.
- c. Contractors shall use poor subsoils, usually in deep fills, and moisture condition (dry out) wet subsoils instead of disposing of them.
- d. Any stockpiled material shall be stabilized in accordance with Section 3.5 – Erosion and Sediment Management.
- e. Stockpiled material shall be kept 30 m away from watercourse/wetland and/or private well.
- f. Material not deemed to be recyclable shall be disposed of in accordance with Section 3.13.2 – Construction and Demolition Debris.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.13.6 Vegetation Waste**

## **Description**

There is a possibility that vegetation waste (wood chips, stumps, etc) may be left behind after the clearing and grubbing operations are completed.

## **Concerns**

The concerns and potential impacts associated with vegetation waste disposal include:

- Increased use of disposal areas; and
- Improper disposal of materials

## **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland or if storing material within 30 m of a watercourse/wetland.

For both an existing and a new C&D site, an Approval to Operate from NBDELG is required. Both of these options need to meet the following:

- Guidelines for the Siting and Operation of a Class 1 Land Reclamation Site Utilizing Construction and Demolition Debris (NBDELG 2002b) for more than 100 tandem truck loads; or the
- Guidelines for the Siting and Operation of a Class 2 Land Reclamation Site Utilizing Construction and Demolition Debris from the Demolition of a Residential or Small Commercial Building (NBDELG 2002c) for less than 100 tandem truck loads, without a nearby (within 30 km) existing full time Construction and Demolition Debris Disposal Site facility, transfer station, or sanitary landfill.

## **General Protection Measures**

- a) A copy of the WAWA permit must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Chipped vegetation waste will be spread over ground or used in the fill to minimize the size of disposal areas.
- c) Chipped vegetation shall not be spread into any watercourse and/or wetland.
- d) Chipped vegetation waste can be used for mulch.

- e) Grubbings can be placed in one lift (not to exceed 600 mm) in fills to minimize the use and size of disposal areas.
- f) If vegetation waste cannot be disposed of in one of the methods outlined above, it will be disposed of by burying or disposal at a regional landfill.
- g) Stockpiled or disposed material shall be kept 30 m away from watercourse/wetland and/or private well.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## **3.14 Work Progression**

### **Description**

Work Progression is the orderly and timely progression of excavation, embankment work and stabilization of erosion-prone materials to ensure the protection of the environment.

Work Progression minimizes erosion potential by limiting the extent and timeframe that areas are exposed.

### **Concerns**

The concerns and potential impacts associated with improper Work Progression include:

- Contamination of watercourses/wetlands;
- Impacts to fish and fish habitat; and
- Impacts to ESA's.

### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.

### **General Protection Measures**

- a) A copy of the WAWA permit must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Existing vegetation will be maintained wherever possible.
- c) Work Areas will be identified prior to commencing earthwork activities.
- d) Disposal areas shall be included in the identified work areas and must be stabilized in accordance to work progression and Section 5.7.
- e) The size of the work area will be based on the area that can be completed and stabilized within 30 days after the area is started.
- f) Stabilization shall mean hydroseeding of all erodible materials or, mulching when hydroseeding is deemed to not be practicable.
- g) Erosion-prone cuts shall be excavated such that all runoff is directed to one or two exit points.



Area stripped of all vegetation – Poor Work Progression



Areas stabilized as work progresses - Good Work Progression

- h) Runoff will be controlled and erosion and sediment control measures will be installed prior to the commencement of the work and as required during the work.
- i) Work Areas that cannot be completed within the 30-day period due to overly large cut/fill quantities or prolonged wet weather shall have all erodible soil mulched.
- j) Work shall continue diligently on these cuts and/or fills, and shall be stabilized each successive 30-day period until the final shaping and hydroseeding are completed.
- k) Work Areas which have uncompleted cuts and fills and completed grubbing and stripping which have not been under continuous and/or diligent construction, or have been abandoned shall be mulched to avoid the potential of fines being deposited into a watercourse/wetland.
- l) Work Areas not completed at the time of winter shutdown shall be mulched.
- m) Stockpiles that contain erodible materials shall be mulched.
- n) Inspection of the work area must be conducted prior to, during and after any rainfall to ensure the effectiveness of work progression. This would include monitoring the effectiveness of any installed erosion and sediment control structures and the monitoring of any stabilized areas.

- o) Any deficiencies shall be repaired immediately.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

## **3.15 Working Near Environmentally Sensitive Areas**

### **Description**

This section outlines environmental protection measures to minimize the potential impact of highway construction and operation on particular areas of environmental concern that could not be avoided during highway planning and design.

It is recognized that in unique circumstances, environmental management plans, site-specific environmental protection plans or other measures may need to be developed in consultation with appropriate provincial or federal departments.

### Identification/Flagging of Environmentally Sensitive Areas

During environmental investigations, usually conducted in support of an environmental assessment, a number of environmental sensitive areas may be identified in close proximity to the property. Environmentally sensitive areas that may require flagging include:

- Rare plants;
- Wetlands;
- Archaeological and/or heritage resources;
- Protected areas; and/or
- Deer wintering areas.

The environmentally sensitive areas shall be flagged by persons capable of identifying the feature.

### **3.15.1 Archaeological, Heritage and Paleontological Resources**

#### **Description**

Historic resources include archaeological and historic sites and objects that are protected under provincial legislation. The main mechanism of protection is avoidance wherever possible. Objects of historical significance, however, may be found during construction and OMR. Provisions must be made for protection of these discovered objects and sites.

## **Concerns**

The concerns and potential impacts associated with Archaeological, Heritage and Paleontological Resources include:

- Loss of archaeological, heritage and paleontological resources.

## **Required Permits**

- A permit from ASU is required in order to excavate or alter in any way a protected site.

## **General Protection Measures**

- a) Where archaeological investigations have identified archaeological, or heritage resources that would be affected by the development, options for protection or other mitigation are developed in conjunction with the Archaeological Services Branch (New Brunswick Department of Tourism, Heritage and Culture), and subsequently implemented.
- b) The NB Museum will be contacted with regards to the discovery of paleontological resources, to determine applicable mitigation.
- c) In the event of the discovery of an archaeological or other heritage resource, all work shall cease in the immediate area of the discovery until such time as Horizon Management Ltd. personnel, having consulted with the Archaeological Services Branch, advise those involved as to the disposition of the discovery, and authorize resumption of the work.
- d) All fossils and other remains or items of geological or archaeological interest or value discovered during highway construction or operations are deemed to be the property of the Crown. The Contractor and Horizon Management Ltd. shall take all reasonable precautions to prevent employees or other persons from removing or damaging any such articles or items.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

Horizon Management Ltd. is responsible for contacting and hiring a qualified archaeologist to be present during the work.



### **3.15.2 Noise Sensitive Areas**

#### **Description**

Noise sensitive areas are defined as residential or commercial areas affected by noise from machinery used during construction and OMR of highway facilities. NSA are identified during the Planning and Design phases.

#### **Concerns**

The concerns and potential impacts associated with Noise Sensitive Areas include:

- Interference and/or disturbance of the public within the NSA.

#### **Required Permits**

None identified.

#### **General Protection Measures**

- a) All equipment shall be maintained in good working order for noise suppression standards.
- b) Where complaints of excess noise are received during construction, noise monitoring shall be conducted and corrective action taken if warranted, where noise levels exceed 65 dBA over a 24 hour period (Leq). Construction activities may be restricted to daylight hours if complaints and follow-up noise monitoring identify a problem.

#### **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.15.3 Rare Plants**

#### **Description**

Rare plants are an environmental resource considered during the planning and design of highways. While efforts are taken to avoid rare plants, portions of populations may be found within the property, as well as in close proximity to the property boundaries.

#### **Concerns**

The concerns and potential impacts associated with Rare Plants include:

- Impacts to and/or loss of rare plants population.

### **Required Permits**

None identified.

### **General Protection Measures**

- a) Specific mitigation for rare plants must be addressed in a project-specific EMP or site-specific EPP.
- b) Where populations of rare plants are located within or adjacent to the property, the clearing limits shall be flagged.
- c) Site staff will be made aware of any rare plant locations.
- d) Ancillary facilities will not be placed in an area outside of the property where rare plant populations have been identified.

### **Responsibilities**

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.15.4 Watercourses, Fish and Fish Habitat**

#### **Description**

Under the NB Clean Water Act, a watercourse is defined as the full width and length, including the bed, banks, sides and shoreline, or any part of a river, creek, stream, spring, brook, lake, pond, reservoir, canal, ditch or other natural or artificial channel open to the atmosphere, the primary function of which is the conveyance or containment of water whether the flow be continuous or not. However for the purpose of this document, watercourse may include marine shore drainage areas, intertidal zones and wetland areas.

Marine shore drainage areas are coastal lands that are effectively close enough to the shoreline to have an impact on the intertidal zone; this typically includes a 30 m area from each watercourse bank, in the portion of the watercourse which is under salt water influence. An intertidal zone is the area of the main coastline between the extreme high and low watermarks.

Water quality relates to the quantity of physical and chemical substances suspended or

dissolved in the water. The physical activity or equipment and personnel in and around a watercourse may result in sediment entering the watercourse. As well hazardous material may enter a watercourse from equipment activity or maintenance.

Sediment in a watercourse may affect fish both directly and indirectly. Direct mortality, by suffocation due to sediment clogging of gill surfaces or from extreme stress due to hyperventilation, is a rare problem and will occur only under severe circumstances. Indirect effects such as loss of habitat and food supply are more common. High turbidity caused by excessive sediment in the water may disrupt spawning activities, impair feeding efficiency of fish, damage the breathing organs and clog the feeding apparatus of aquatic invertebrates, resulting in the loss of this food source to fish species. Settled sediment may fill in rearing pools, reduce the intra-gravel flow of water in spawning areas, and suffocate the eggs of both fish and aquatic invertebrates.

Watercourse crossings during highway construction and OMR can result in the direct removal of small amounts of fish habitat and, if not done properly, could result in barriers to fish migration. Crossings at spawning areas can result in the direct loss of eggs.

## **Concerns**

The concerns and potential impacts associated with Watercourses, Fish and Fish Habitat include:

- Erosion and Sedimentation;
- Accidental spills;
- Disruption or alteration of watercourse flow; and
- Impact to fish and fish habitat.

## **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat may be required if work will result in Harmful Alteration, Disruption, Destruction of fish habitat.

## **General Protection Measures**

- a) A copy of the WAWA and Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat (if applicable) must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.

- b) Other protection measures related to construction and OMR activities around watercourses, fish and fish habitat have been detailed in Section 3.
- c) Site-specific erosion and sediment control plans (or site-specific EPP) developed for work within 30 m of a watercourse shall be followed, as required.
- d) No blasting shall be carried out in or near a watercourse without consultation and/or the authorization from DFO.
- e) Equipment shall be in good working condition and its surfaces shall be free of deleterious substances such as oil and grease, before working in the wetted portion of a watercourse.
- f) When equipment is working within 30 m of a watercourse, a spill kit will be kept on board or nearby to permit rapid containment of leaks.
- g) Prior to structure or culvert installation or maintenance, Horizon Management Ltd. may be required by DFO to carry out fish rescues on fish populations where there is potential for direct impacts. Fish rescues must be carried out by qualified aquatic biologists.
- h) All erosion and sediment control measures will be in place, inspected and maintained.

## **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.

### **3.15.5 Wetlands**

#### **Description**

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water at some time during the growing season. Wetlands are characterized by poorly drained soils and predominantly hydrophytic or water tolerant vegetation.

Wetlands support a variety of important functions including groundwater recharge and discharge, flood control, water quality control, sediment stabilization, nutrient transport/transformation, fish habitat, wildlife habitat, and biomass production/export.

#### **Concerns**

The concerns and potential impacts associated with Wetlands include:

- Erosion and Sedimentation;
- Accidental spills;
- Loss of wetlands; and
- Impacts to wildlife habitat.

### **Required Permits**

- A WAWA permit is required prior to commencement of work within 30 m of a watercourse/wetland.
- A Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat may be required if work will result in Harmful Alteration, Disruption, Destruction of fish habitat.

### **General Protection Measures**

- a) A copy of the WAWAP and Fisheries Act Authorization for Works or Undertakings affecting Fish Habitat (if applicable) must be kept at the site for the duration of the work, and the conditions of approval shall be followed. Field staff must be familiar with the requirements outlined in the permits.
- b) Other protection measures related to construction and OMR activities around watercourses, fish and fish habitat have been detailed in Section 3
- c) Construction and related activities in wetlands shall be limited to within the ROW.
- d) Vehicles and equipment used during construction shall only use designated roadways and access areas.
- e) Construction machinery shall be in good working condition and be cleaned of mud and vegetation prior to entering and leaving wetlands within the construction area during groundbreaking activities (e.g., grubbing and grading), to minimize the spread of invasive plant species (e.g., purple loosestrife).
- f) As required, wetlands remaining following partial impacts by highway construction shall be monitored after construction to visually assess the wetland hydrology, the introduction of invasive plant species, the chloride levels in the soil and the use by recreational vehicles.

### **Responsibilities**

Horizon Management Ltd. is responsible for obtaining the required permits, unless otherwise noted in the contract documents.

Horizon Management Ltd. and its Contractors, Developers and Operators are responsible to ensure that the protection measures outlined above are adhered to.