Prince Edward Island
CANADA

Transportation and
Infrastructure Renewal

Environmental Protection Plan

Copy #

TRANSPORTATION AND INFRASTRUCTURE RENEWAL

ENVIRONMENTAL PROTECTION PLAN

T A B L E OF C O N T E N T S

Definitions for terms frequently used in this document are provided below:

Borrow - an excavated material used in the construction of a subgrade, the original source of which is located outside of the Provincial right-of-way or the development site.

Buffer Zone - the land within 15m of watercourse boundary or wetland boundary.

Engineer - the person assigned by TIR to be in charge of the work, who is a Member of the Association of Professional Engineers of the Province of Prince Edward Island, acting directly or indirectly through a designated assistant or representative.

Environmental Suspension Order - where an activity causes a serious threat to the environment, an Order may be given in writing or verbally by the EMS Manager or Environmental Coordinator, which directs those conducting the work to stop work. The Order will identify the problem, state the rationale for the Order and the deadline for compliance with the Order, as well as the conditions required to resume work. The Order may apply to a portion of, or, to the total project or work activity.

Environmentally Sensitive Areas - places where the environmental conditions (*i.e.*, biological, ecological, geological) necessitate taking special precautions to prevent pollution of the environment. These areas could be significant if: they contain rare species of animals or plants or a rich diversity of species representative of an ecological zone; their disturbance would have serious environmental consequences; or, they contain geological or other features of specific environmental interest.

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

Plans/Drawings - any plans, profiles, typical cross-sections, supplemental drawings or exact reproductions thereof, which are approved or stamped by the Engineer and show the location, character, dimensions and/or detail of work to be done.

Proponent - in respect of a maintenance or construction project or work activity, means the person, contractor, body, agency, municipal, provincial or federal authority or government that proposes the project or work activity.

Provincial ROW - land reserved by the Province and designated for occupation by a road and associated appurtenances, as defined and controlled by the Provincial Roads Act, generally 20 m (66 ft.) in width but may be of a greater or lesser width.

Responsible Person - the employee of TIR who is in direct charge of the onsite work. For example, the Responsible Person may be: for a Capital Project Division activity project, the Project Manager or Engineer; for a Maintenance Division activity, the District Supervisor, the Crew Chief Supervisor, Equipment Operators and Dispatchers; for Building Maintenance Division activities, the Facility Manager; and, for work conducted by Others within the Provincial ROW (*i.e.* Municipalities, Utilities, etc.), the person identified by the respective agency to TIR in the EMS Application.

Road - that portion of the Provincial ROW included between the outside lines of gutters or ditches including all appertaining structures and all slopes, ditches, channels, and waterways necessary for proper drainage and protection.

Slope - rise to run expressed as a percent, or run to rise expressed as a ratio.

Watercourse - "watercourse" means an area which has a sediment bed and may or may not contain water, and without limiting the generality of the foregoing, includes the full length and width of the sediment bed, bank and shore of any stream, spring, creek, brook, river, lake, pond, bay, estuary or coastal body, any water therein, and any part thereof, up to and including the watercourse boundary: Note that sediment bed refers to material (sand, silt, gravel, rocks, etc) deposited by flowing water. A ditch with terrestrial vegetation (grass) is not a watercourse (unless a sediment bed is present upstream).

Watercourse Boundary - “watercourse boundary” means:
(i) in a non-tidal watercourse, the edge of the sediment bed, and (ii) in a tidal watercourse, the top of the bank of the watercourse, and where there is no discernible bank, means the mean high water mark of the watercourse.

Wetland - "wetland" means: (i) an area which contains hydric soil, aquatic or water-tolerant vegetation, and may or may not contain water, and includes any water therein and everything up to and including the wetland boundary, and (ii) without limiting the generality of the foregoing, includes any area identified in the Prince Edward Island Wetland Inventory as open water, deep marsh, shallow marsh, salt marsh, seasonally flooded flats, brackish marsh, a shrub swamp, a wooded swamp, a bog or a meadow. A wetland by this definition is any area with hydric soils and aquatic/water tolerant vegetation which may/may not be on the inventory and may/may not contain water.

Wetland Boundary - "wetland boundary" means where the vegetation in a wetland changes from aquatic or water-tolerant vegetation to terrestrial vegetation or water-intolerant vegetation.

Work - includes all activities specified in a contract as well as all practices and activities conducted for or by TIR for construction, operations, maintenance and facilities.

Work-Specific EPP Addendum - amendments to this EPP issued as section revisions or additional sections/items which apply directly, on a one-time basis, to specific project or work activities. Work-Specific EPP addendums will be requirements of the work, with the Addendum taking precedence only to the respective EPP sections amended or added for that specific work.

Acronyms

ATV	-	All Terrain Vehicle
DAF	-	Prince Edward Island Department of Agriculture and Forestry
DFO	-	Department of Fisheries and Oceans Canada
DFARD	-	Prince Edward Island Department of Fisheries, Aquaculture and Rural Development
DELJ	-	Prince Edward Island Department of Environment, Labour and Justice
EEM	-	Environmental Effects Monitoring
EMS	-	Environmental Management Section of the Prince Edward Island Department of Transportation and Infrastructure Renewal
EMP	-	Environmental Management Plan
EPP	-	Environmental Protection Plan
GPCSHC	-	General Provisions and Contract Specifications for Highway Construction, Prince Edward Island Department of Transportation and Infrastructure Renewal
PEI	-	Prince Edward Island
ROW	-	Provincial Right-of-Way
TAC	-	Transportation Association of Canada
TIR	-	Prince Edward Island Department of Transportation and Infrastructure Renewal

The EPP is specifically designed to be revised to meet the changing environmental protection needs of TIR. Maintenance of this Environmental Protection Plan (EPP) will be the responsibility of the TIR ***EPP Coordinator***. The EPP Coordinator will work in consultation with the Environmental Management Section (EMS) of the Prince Edward Island Department of Transportation and Infrastructure Renewal.

The responsibilities of the EPP Coordinator are detailed in Section 2.1.1 of this EPP, and include providing the most current version of this EPP to the EPP Users, which may include staff, applicable regulating agency representatives, construction contractors, municipalities, and other interested stakeholders.

The responsibilities of the EMS are detailed in Section 2.1.1 of this EPP, and include the timely review and approval of Work-Specific EPP revision requests, and the review of EPP content and EPP revision requests on an annual basis.

Initiating EPP Revision

EPP Holders may request revisions to this EPP, or revision addendums for Work-Specific purposes, by forwarding recommended revisions to the EPP Coordinator. Work-Specific revision requests will be forwarded immediately to the EMS and, if approved, will be addressed as an addendum to this EPP.

EPP Revision Procedures

Concurrent with TIR Contract Specifications Review, EPP contents and revision requests will be reviewed once per year by the EMS. The person requesting the revision will be notified of the acceptance or rejection of the revision request. Approved EPP revisions will be conducted in concert with any related revisions to the Contract Specifications in order that both remain consistent.

Revisions distributed by the EPP Coordinator will be accompanied by a Control Sheet that:

- provides the revision instructions; and,
- lists the sections being superseded.

An updated Table of Contents, included with the revision, will indicate the current status of each section.

Within ten working days of receiving an EPP revision, EPP Users will:

- read the text of the revision;
- check the Control Sheet to ensure that all the listed pages have been received;
- remove and destroy the superseded pages;
- insert the revised pages in the proper place;
- check the EPP, using the updated table of contents to ensure it is complete and current;
- enter the revision number and date entered on their Revision Control Record; and,
- take action to incorporate the revision into the area of responsibility, through training or as otherwise appropriate.

Work-Specific EPP Addendums

Within three days of receipt of a Work-Specific revision request, the EMS will review the request and respond to the revision request initiator with an approval or a rejection of the request. Approved requests will be acknowledged by an addendum to the EPP which will be issued on a Work-Specific basis only. Only those EPP users involved in the activity(s) associated with the Work-Specific request shall receive the addendum. This EPP will remain a requirement of the work, with the addendum taking precedence over the revised EPP section(s) only. Once the subject activity(s) is complete, the Work-Specific addendum shall be discarded by the EPP user. The original content of the EPP once again is in effect.

Within two working days of receiving a Work-Specific EPP revision addendum, EPP users will:

- read the text of the revision addendum
- check the Control Sheet to ensure that all the amended sections have been received; and,
- take action to incorporate the revision addendum into the area of responsibility, through training or as otherwise appropriate.

Repeated Work-Specific requests to address the same issue may prompt the EMS to initiate an EPP revision.

Name:_____ **Phone Number:**_____

Revision Requested For:

EPP (Y/N):_____
Work-Specific Addendum
(Identify Work):_____

Section to be Revised:

_____

Nature of Revision:

_____
_____
_____

Rationale for Revision:
(*i.e.*, environment/worker safety, etc.)

_____
_____
_____

Submission:

Please submit this request directly to the **EPP Coordinator** of the Environmental Management Section of Prince Edward Island Transportation and Infrastructure Renewal.

Date Submitted: _____

Signature: _____

1.0 INTRODUCTION

1.1 Development of the EPP
1.2 Purpose of the EPP
1.3 EPP Users
1.4 Environmental Permitting Process

TIR created the EMS to address environmental management issues and be responsible for the development and implementation of an Environmental Management Plan (EMP). This Environmental Protection Plan (EPP) has been developed by the Environmental Management Section (EMS) of Transportation and Infrastructure Renewal (TIR), and by others conducting work within the Provincial ROW.

This EPP provides the procedures, organization, and instructions to ensure that TIR work personnel, as well as contractors, consultants, and others conducting work on behalf of TIR, understand and implement sound environmental protection procedures for materials storage, handling and disposal, contingency plans for unplanned events, and a key contact list.

The EPP content reflects the principles of the Environmental Policy and Code of Ethics developed by the Transportation Association of Canada (TAC).

This EPP forms an integral part of the EMP. Other components of the EMP include:

- Environmental Education and Orientation for Employees and Others;
- Internal TIR Permitting Process;
- Environmental Input into Engineering Design and Planning;
- Environmental Compliance Monitoring;
- Environmental Effects Monitoring;
- Reporting Procedures including Audits;
- Liaison with Regulatory Agencies; and,
- Public Information and Consultation.

This EPP forms an integral component of all work to be done by or for TIR, or on any land governed by TIR.

The purpose of the EPP is to:

- minimize environmental effects;
- provide concise and clear instructions regarding procedures for protecting the environment, and minimizing potential environmental effects;
- document environmental concerns and appropriate protection measures associated with work conducted by TIR;
- provide a reference document for planning and/or conducting specific activities which may have an effect on the environment;
- function as a training document/guide for environmental education and orientation; and,
- communicate changes in TIR's environmental program through the EPP revision process.

The EPP is meant to complement the General Provisions and Contract Specifications for Highway Construction (GPCSHC), with the latter taking precedence over the EPP.

Through field directives and advice offered by more experienced personnel, all users of the EPP should apply appropriate environmental protection practices. The EPP is a stand-alone document that provides guidance for the implementation of sound environmental protection practices.

TIR recognizes that certain specific work may require unique environmental protection procedures that are in addition to, or differ from the components of this EPP. These requirements will be determined from the project review during the Permitting Process described in Section 1.4, or identified by work or EMS personnel through the Revision Process described in Section 2. If required, Work-Specific EPP Addendums will be issued that provide guidance on the implementation of sound environmental protection procedures for specific work activities. This EPP will remain a requirement of the work, with the addendum taking precedence over the revised EPP section(s) only. Repeated Work-Specific requests to address similar issues may prompt the EMS to initiate an associated EPP revision.

EPP Users are all TIR personnel, and all others conducting work by or for TIR or within the Province's ROW, or any land governed by TIR. EPP Users include all persons or companies conducting work for TIR under contracts. EPP Users are required to comply with the procedures and methods contained herein.

Copies of the EPP will be distributed to all TIR management and supervisory personnel, consultants, contractors performing work for TIR, utility companies, municipalities, and other groups or agencies authorized to perform work within the ROW.

Another key component of TIR's Environmental Management Plan is the implementation of the *Environmental Permitting Process*.

The Environmental Permitting Process is distinct from this Environmental Protection Plan, however, it shares the common goal of efficient and effective environmental management for all TIR works.

The purpose of the Environmental Permitting Process is to:

- register the work (for project control);
- assess the environmental sensitivities of the work;
- ensure incorporation of adequate environmental protection and mitigation into the design through issuance of environmental conditions specific to the work and the surrounding environment;
- to apply for any additional applicable regulatory permits; and,
- identify and initiate applicable environmental assessment/studies, if necessary.

Once a TIR maintenance or construction project, or a project by others within the Province's ROW, is formally considered, a Project Registration and Assessment Application Form is to be completed (by the Proponent) and submitted to the EMS for review and approval.

Once a Project Application is approved, an EMS Approval-to-Proceed will be issued to the Proponent. For approval projects or works that require additional regulatory permits or approvals, these will be acquired by the EMS and will accompany the Approval-to-Proceed.

The Proponent is obligated to comply with conditions or directives set forth in the Approval-to-Proceed and any associated permits/approvals that apply to the work, and also to implement the EPP procedures that apply to their work/project. All conditions of Approvals-to-Proceed and any associated permits/approvals must be adhered to and shall take precedence over any pertinent EPP procedures.

Application forms are available from the EMS office or from any TIR Environmental Officer. Additionally, a copy of the detailed Environmental Permitting Process can be obtained through written request to the EMS.

Examples of Applicable Legislation

Work performed by or for TIR may require compliance with legislation listed below.

As noted in previous sections, following their receipt of an EMS Project Registration and Assessment Application, the EMS shall obtain all permits, authorizations and/or approvals deemed necessary through these Legislative Acts and any other legislation as required:

- *Canadian Environmental Assessment Act* (i.e., Federal Jurisdiction);
- *Canadian Environmental Protection Act* (i.e., Ocean Disposal);
- *Fisheries Act* (i.e., Harmful Alteration, Disruption or Destruction of Fish Habitat);
- *Navigable Waters Protection Act* (i.e., Marine Excavation and Infilling);
- *Canadian Shipping Act* (i.e., *Oil Pollution Prevention Regulations*);
- *Prince Edward Island Environmental Protection Act* (i.e., Environmental Impact Assessment, Watercourse, Wetland or Buffer Zone Activity Permit, Land Based Disposal);
- *Prince Edward Island Roads Act* (i.e., Road Construction and Maintenance);
- *Prince Edward Island Occupational Health and Safety Act* (i.e., work safety);
- *Prince Edward Island Planning Act* (i.e., Building Permit); and,
- *Prince Edward Island Fire Prevention Act* (i.e., Burning Permit)

2.0 ROLES AND RESPONSIBILITIES

Section 10 provides specific contact information for the "positions" described below.

2.1.1 EPP General

Environmental Management Section (EMS)

Responsibilities of the EMS include:

- offer necessary training for personnel, including contractors, to ensure proper implementation of the EPP;
- review Work-Specific EPP amendment requests in a timely manner;
- conduct a full review of the contents of the EPP, and revision requests on an annual basis to ensure that the recommended environmental protection procedures are current and complete;
- implement TIR Permitting Process including pre start-up inspections and assessments, and issuance of Work-Specific conditions for environmental control;
- conduct compliance inspections to ensure requirements of the EPP are being achieved;
- act as liaison between regulatory authorities and TIR for work activities; and,
- enforce the EPP through issuance of Environmental Suspension Orders for non-compliant activities, often times in consideration of recommendations from the Environmental Officer.

EPP Coordinator

An employee of the EMS, the EPP Coordinator will:

- distribute copies of the EPP;
- maintain an up-to-date list of all EPP Holders;
- keep a record of all EPP revision requests and present them to the EMS when the annual EPP document review/revision is held;
- issue approved revision pages of the EPP and updated Table of Contents to all EPP Holders;
- keep a record of all Work-Specific EPP revision requests and immediately present them to the EMS; and,
- immediately forward addendums for approved Work-Specific EPP revision requests to affected EPP Holders.

2.1.2 EPP Work-Specific

Responsible Person

An employee of TIR in direct charge of the onsite work, the Responsible Person will:

- retain overall responsibility for the work's environmental management and onsite implementation of the EPP for work under their charge;
- facilitate training for implementation of the EPP in coordination with the EMS;
- comply with all relevant regulations, authorizations and approvals;
- initiate EPP revision requests if required;
- be responsible for the day to day field monitoring; and,
- enforce the EPP through implementation of Environmental Suspension Orders as required.

EMS Environmental Officer

An employee of the EMS, the Environmental Officer will:

- liaise with the Responsible Person and assist the Responsible Person in ensuring that environmental compliance is being enforced;
- conduct environmental inspections of work activities to verify that the EPP procedures are implemented and functioning as planned;
- conduct necessary training on EPP procedures in coordination with the Responsible Person; and,
- enforce the EPP through recommendations to EMS Management for Environmental Suspension Orders as necessary for non-compliant activities.

EPP Users must be trained to become familiar with the procedures described herein. Training of TIR personnel will be conducted by the EMS in coordination with the Responsible Person(s). Contractors are responsible to provide staff training on EPP requirements and procedures, however, the EMS will provide training as necessary, and if requested by a contractor. The following will be included in the training program:

- communication on TIR's commitment and obligations to the EPP;
- work description with discussion of the individual activities and the particular environmental concerns associated with each activity;
- instruction on the specific environmental protection procedures for the work;
- maintenance of the EPP;
- communication procedures to report any unplanned events requiring emergency response; and,
- enforcement of the EPP.

The Responsible Person will be responsible for the day-to-day field monitoring and for ensuring that the EPP is implemented. The Environmental Officer will liaise with the Responsible Person and assist the Responsible Person in ensuring that compliance with the EPP and other permits is being achieved. The Environmental Officer has the authority to make recommendations to remedy insufficient environmental procedures, or, if need be, to make recommendations to EMS Management to have the work, or a portion of the work, suspended.

In circumstances where the insufficient environmental protection poses no immediate threat to the environment, the necessary remedies shall be implemented to the satisfaction of the EMS within 48 hours from receipt of notification of the circumstances. Failure to meet this requirement can result in suspension of the work, or a portion of the work, by the EMS through the issuance of an Environmental Suspension Order.

In circumstances where insufficient environmental protection, ongoing work activities or site conditions do pose an immediate threat to the environment, either the work can be suspended immediately, or immediate action to remedy the situation can be ordered, whichever is deemed appropriate by the EMS.

Any suspension of work will be coordinated with the Responsible Person and will be issued by the EMS as an Environmental Suspension Order for that specific non-compliant activity. After an Environmental Suspension Order has been issued, work may re-commence when the Responsible Person completes measures to correct the non-compliance, to the satisfaction of the EMS.

The EMS will act as a liaison between TIR and other Provincial and Federal regulatory bodies responsible for environmental protection. Work-Specific issues/requests raised by such other bodies will be discussed with the Responsible Person for consideration of changes to the work, and the beneficial environmental effects resulting from the changes. Additionally, issues raised by such other bodies will be considered for future incorporation into the EPP.

3.0 SITE DEVELOPMENT INCLUDING ROAD CONSTRUCTION

3.1 Vegetation Clearing and Disposal
3.2 Grubbing, Stripping and Materials Excavation on Land
3.3 Ditching
3.4 Disposal of Excavated Waste Materials
3.5 Fill Placement and Grading
3.6 Paving Operations
3.7 Dewatering
3.8 Drilling on Land
3.9 Surveying
3.10 Equipment Movement
3.11 Blasting on Land
3.12 Dust Control (Water)

Site development and road construction projects require a variety of construction practices to complete the work. Potential environmental interactions related to these construction practices are identified in this section. Environmental protection procedures, designed to reduce potential for environmental effects, are included within each subsection.

General environmental protection procedures applicable to the various subsections of this **Section 3.0** are listed below:

- Work will comply with conditions outlined in the EMS's Approval-to-Proceed and any associated permits/approvals.

- A 15 m buffer zone will be maintained around all watercourses/wetlands, unless otherwise directed by the EMS.

- Work conducted in the vicinity of watercourses/wetlands will be conducted in a manner which ensures that erosion and sedimentation of wetlands/watercourses is minimized.

- Erodible soils will not remain exposed for longer than absolutely necessary. In areas where extensive erosion occurs (*i.e.*, along steep slopes) or in environmentally sensitive areas, an active re-vegetation program will be implemented as soon as possible following disturbance to ensure rapid re-vegetation.

- Appropriate erosion control measures as outlined in **Section 7.1** shall be installed prior to conducting the work.

- Work will be completed as soon as possible, and will be suspended during and immediately after intense rainstorms and during periods of high runoff.

- The area of disturbance will be limited to that which is absolutely necessary to conduct the work.

- Environmentally sensitive areas will be identified prior to work operations so that these areas are protected.

- Necessary means will be undertaken to ensure that work does not intrude on private property. Any work required on private property shall be completed in accordance with all relevant provincial and federal environmental legislation.

- When required, written permission to work on private property must be obtained by the Project Manager.

- Property boundaries should be identified before work commences.

Activity-specific environmental protection procedures are provided in the following subsections. Specific environmental protection measures and devices are presented in **Section 7.0**.

Vegetation clearing consists of the removal and disposal of all trees, shrubs, fallen timber, logs and other surface litter within the work area as directed and designated by the plans/drawings or the Responsible Person. Vegetation clearing may be required prior to the removal of soil during site development and/or road construction.

Principal Environmental Concerns

Cut vegetation piled near or in a watercourse/wetland could degrade aquatic habitat or obstruct fish passage. Other potential environmental effects include altering of wildlife habitat. Over-cutting can subject the remaining trees to an increased risk of blowdown. The uncontrolled burning of slash could accidentally start a forest fire.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of vegetation clearing and disposal.

(a) Clearing of vegetation will allow for an adequate firebreak around buildings.

(b) Risk of blowdown can be minimized by thinning or selectively clearing the edges of the stand and removing those trees most vulnerable to blowdown.

(c) Clearing will consist of the removal or onsite burning (in accordance with the provisions of the *Fire Prevention Act and Regulations*) of all shrubs, debris and other perishable materials from the area indicated on the engineering/survey drawing, as well as the cutting and disposal of only those standing trees required to complete the project. These trees will be cut off to a remaining height of not greater than 300 mm above the ground.

(d) All slash will be piled for subsequent disposal outside the buffer zone of a watercourse/wetland or any identified environmentally sensitive area, and will be located so that it is not washed into a watercourse/wetland or other environmentally sensitive area during precipitation events or periods of high water.

(e) Watercourse/wetland crossings are to be avoided where possible. Equipment is not permitted to enter a watercourse other than at approved fording locations approved through the EMS.

(f) Non-merchantable timber, logs, and brush shall be disposed of by burning, chipping, or placement in an EMS approved disposal area.

(g) Tires shall not be used to start or maintain fires.

(h) A *Burning Permit* must be obtained from PEI Department of Agriculture and Forestry (DAF) before burning brush or slash. Any materials required to control the burning operation must be on site.

Grubbing refers to the removal of all stumps, roots, rootmat and other debris, while stripping refers to the removal of topsoil. Materials excavation refers to the excavation of all other soil materials as included in earthworks, preparation of roadbed, site development, trenches, drains, borrow from adjacent land or pits, intersections, private entrances, and other similar works.

Principal Environmental Concerns

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems, and environmentally sensitive areas.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of grubbing, stripping and materials excavation on land:

(a) Where construction can be completed without grubbing and stripping, none shall occur.

(b) Grubbing shall be carried out for a distance not to exceed 1 km ahead of grading operations for linear projects.

(c) Grubbing will not be done at the base area of embankments that are 2 m or more in height, unless otherwise directed by the Responsible Person.

(d) Topsoil and excavated overburden and bedrock will be stored in separate stockpiles, at EMS approved locations, for later use in rehabilitation and backfilling, respectively.

(e) Dewatering of excavated areas will make use of measures to minimize and control the release of sediment-laden water through the use of filtration through vegetation, erosion control devices, sediment collection ponds, check dams or other devices, as per **Section 7.1**.

Ditching consists of excavation and grading to construct a new ditch or to re-establish an existing deteriorated ditch. Ditching is undertaken to affect drainage within the road ROW and to correct deficiencies such as erosion, non-conformity in grade and restrictive vegetative growth that impedes drainage within the ROW.

Principal Environmental Concerns

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of ditching:

(a) Ditching shall proceed in the upslope direction.

(b) Trapezoidal ditches (Figure 3.1-1) result in less erosion of the ditch bottom and should be installed where space requirements allow. In cases where the available ROW is insufficient in width to achieve the desired cross-section, the alternative V-bottom ditch will be constructed.

(c) Where ditching takes place near a watercourse, no ditching shall be completed within 30 m of the watercourse/wetland unless approved through the EMS. Vegetation located in this 30 m buffer area acts to filter any sediment-laden runoff water prior to entering the watercourse/wetland.

(d) Within 48 hours of doing ditching work, or as directed by the Responsible Person, all exposed soils will be either seeded or receive straw/hay mulch application.

(e) Ditching shall not be done prior to May 1 or after September 30 without written approval from the EMS.

(f) When ditching is approved within 30 m of a watercourse/wetland, the following schedule will apply:
- seed must be applied on exposed soils;
- if ditching prior to June 1 or after September 30, mulch or an erosion control blanket (*i.e.*, jute mat, erosion control mat) must be applied overtop of the seed;

- if, due to lateness of the season, seeding is not possible, the exposed soils shall be completely covered for "overwintering" with either mulch or an erosion control blanket. Then, early in the next growing season, the erosion control materials shall be removed, the area shall be prepared for seeding, and then seeded; and,
- the EMS or the Responsible Person will direct additional seeding or erosion control requirements within this 30 m zone as appropriate on a site-specific basis.

(g) A check dam, constructed as per **Section 7.1**, shall be installed at the end of the ditch where it meets the undisturbed portion. Additional erosion control structures shall be installed further up the ditch as required or as directed by the Responsible Person or the EMS.

(h) Natural drainage will be maintained whenever practical.

(i) Ditches will be directed into surrounding vegetation where possible, or a sediment collection pond, rather than emptying into a natural watercourse/wetland.

(j) Depending on the erosion potential or to ensure stabilization, the ditch may be hay mulched, hand seeded, hydroseeded or lined with an erosion control mat (*i.e.*, jute mat and/or vegetative erosion control blanket).

(k) Rip-rap or an erosion control blanket designed for high flows should be used to line the bottom of ditches that have steep grades and/or excessive erosion as directed by the Responsible Person or the EMS.

(l) Petroleum, septic wastes or otherwise contaminated material encountered in the ditch, shall be reported to EMS or to the CCG Emergency Response as per **Section 9.1**.

FIGURE 3.1-1 TRAPEZOIDAL DITCH

Waste materials are generated during excavations involved with site development and road construction practices.

Principal Environmental Concerns

The principle concern associated with this activity is the potential for erosion of disposed materials and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas. Occasionally, excavated earthen waste material is contaminated with petroleum hydrocarbons, metals, Polycyclic Aromatic Hydrocarbons (PAH's), and sodium chloride. The presence of any of these contaminants can pose a risk to the environment.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of the disposal of excavated waste materials:

It is important to note that once material is deemed to be waste material, it becomes the property of the Contractor or other party. When the material is removed from the TIR job site, the Department, its responsible person, and the EMS are no longer in control of how this material is disposed of. However, we recommend where this occurs, these same protection measures are to be followed by the user of the material once it is removed from the site. All provincial and federal environmental regulations must be followed:

(a) Should the material remain on site, the following will apply: If the excavated earthen waste material is to remain in one stockpile location for a period of time, appropriate protection measures shall be taken, such as stabilization of the material and/or perimeter sediment control (see **Section 7.1.5**). Silt fencing and straw bale barriers may be required to ensure that sediment does not enter a watercourse/wetland.

(b) Excavated earthen materials shall not be disposed of within 30 m of a watercourse/wetland, unless otherwise approved through the EMS.

(c) Should the material be determined to be contaminated (through testing), appropriate procedures for proper disposal must be followed. A waste disposal permit must be obtained from DELJ for disposal at IWMC Wellington, or disposal may be co-ordinated with EMS on a provincially-approved site.

Fill Placement consists of placing soil and/or rock for site development and construction purposes. This includes preparation and construction of roadbeds, embankments and slopes. Placing material in depressions to level surfaces helps to minimize ponding. Grading consists of shaping the unpaved road or site surface and is used to stabilize a surface, improve surface drainage and to provide for runoff in a controlled manner.

Principal Environmental Concerns

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of infilling and grading:

(a) When grassed areas are encountered during grading, every effort will be made to leave such grassed areas intact.

(b) Areas where little or no vegetation exists can be graded after a light rain when the surface is in an optimum state for compaction, but not after heavy rains which would promote runoff conditions.

(c) Where possible, a berm (windrow) will not be left at the edge of the road. Grading unpaved roads often results in the creation of a windrow along the edge of the road by the grader blade. The windrow will be collected and re-used in construction or properly disposed of off site. In cases where this is not possible, diversions will be installed in the windrows at locations 30 m or greater from the watercourse/wetland boundary, to allow surface water to drain into a ditch or vegetated area.

(d) The elevation of the infilled or graded area will be maintained higher that the ditch it is draining into.

Paving operations refers to the application of prime coat, tack coat and asphaltic concrete mix to a road surface as a form of permanent surface stabilization.

Principal Environmental Concerns

Prime coat, tack coat and asphaltic concrete mix are potentially hazardous materials in aquatic environments, and should be handled appropriately to prevent losses to the aquatic environment.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of paving operations:

(a) Asphaltic mixes will be transported to the work site in leak-resistant vehicles.

(b) When placing asphaltic mix, care shall be taken to avoid spillage of the mixture.

(c) When placing prime coat and tack coat, care shall be taken to avoid overspraying.

(d) The application of prime coat and tack coat shall not exceed beyond the limit of asphaltic concrete to be spread and compacted in a day, unless otherwise directed by the Responsible Person.

(e) All prime coat spray nozzles are to be in good condition and capable of positive cut-off.

(f) Personnel will make reasonable efforts to minimize the volume of waste materials. Surplus materials will be used at other locations where possible or property disposed of as directed by EMS. Waste material will not be disposed of within 30 m of a watercourse/wetland or any identified environmentally sensitive area.

(g) Release agents used in truck boxes will be lightly coated. If liquid release agent is used, the trucks will be drained after each application and before each loading. Draining of liquid release agent will be conducted in approved locations, so as not to release liquids into surrounding watercourse/wetlands, buffer zones, or identified environmentally sensitive areas.

(h) Asphalt emulsion pumps will be cleaned only at the maintenance depot. All used fuel will be collected in closed containers, recycled or disposed of, at an EMS approved facility.

(i) Shovels, rakes and hand tools requiring cleaning at the site will be cleaned in/over empty drums, in a manner that allows for the containment of fuels or cleaning products and to minimize their escape into the environment.

(j) Hazardous cleaning materials contained in empty drums shall be returned to the maintenance depot, and from there disposed of in a manner approved by the EMS.

Certain areas of road or site development may require de-watering prior to fill placement.

Principal Environmental Concerns

The principal concern associated with this activity is the potential for siltation and its associated effect on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of dewatering:

(a) Efforts to reduce the turbidity of water pumped from work areas will be implemented, prior to final discharge, through the use of filtration through vegetation, erosion control devices such as sediment collection ponds, check dams or other devices, as per **Section 7.1**.

(b) The area of sediment collection ponds and any other devices will be sized accordingly to accommodate the anticipated volume of discharged water.

(c) Discharged water will be encouraged to follow natural surface drainage patterns.

(d) Proper precautionary measures will be employed to prevent the alteration, disruption, or destruction of fish habitat.

Drilling may be required on land during geotechnical investigations.

Principal Environmental Concerns

The environmental concerns associated with drilling on land are surface disturbances, release of drilling fluids and cuttings, generation of dust and the potential effects on aquatic ecosystems, environmentally sensitive areas and air quality. Equipment noise may disturb local residents and wildlife.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of drilling on land:

(a) Access for hand drilling will be cleared of vegetation following the procedure detailed in **Section 3.1**.

(b) Dust will be controlled during drilling by applying water where necessary (refer to **Section 3.12**).

(c) The use of water for dust control or lubrication will be undertaken in a manner which ensures that runoff does not enter watercourses/wetlands or other environmentally sensitive areas.

(d) The drilling fluid will be primarily water. When required to enhance core recovery, an environmentally benign drilling product will be injected along with the drill cooling water on a continuous basis at a maximum rate of approximately 1.0 g/L. The use of the drilling fluid will be restricted to that which is necessary to enhance core recovery. The type/amount of drilling fluid and rate used will be under the approval of the EMS, and will be recorded and logged as part of the drilling operation by the Responsible Person.

(e) Where applicable/possible, drilling equipment will have muffled exhaust to minimize noise.

Surveying includes gathering all the information required for the design and identification of a property or the right-of-way of a specific section of road. This includes cutting centerline and cross-section offsets of sufficient width to provide a clear line of sight for survey equipment and access to the site for soils testing equipment.

Principal Environmental Concerns

Disturbance to terrestrial and watercourse/wetland habitats and species are the primary environmental concerns associated with surveying.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of surveying:

(a) The cutting of survey lines will be kept to a minimum. Where possible, alternate areas not requiring cut lines will be used.

(b) Whenever possible, cutting lines to the boundary between treed and open areas will be avoided.

(c) Survey lines will be limited in width to that which is absolutely necessary for line of sight and not more than 1.5 m.

(d) As required, trees and shrubs will be cut off at a height not greater than 300 mm above the ground.

(e) All trees not exactly on survey lines shall be left standing and trees partly on line should be notched (notch not to exceed 1/3 tree diameter) instead of removal, to allow sighting.

(f) Trees will be felled in a way that damage to standing trees adjacent to the survey line is minimized. Trees will be felled away from and not into or over a watercourse/wetland. Slash shall not be placed or left in watercourses/wetlands or buffer zones. Any debris material removed from a watercourse/wetland and buffer zone should be disposed of, or placed in a manner such that it cannot enter a watercourse/wetland.

(g) Felled trees having a top diameter of 8 cm or more will be cut in lengths and piled for reuse as merchantable timber. Non-merchantable timber will be disposed of as described in **Section 3.1**.

(h) Discretion should be used when trees are encountered. For example, baseline trees 30 cm in diameter or larger are not to be removed or damaged unless prior permission from the EMS has been obtained. On grid lines, trees of 30 cm in diameter or larger shall be left intact and shall be traversed to continue the line.

(i) When surveying construction layouts, areas that will be cleared do not require strict adherence to the above, except trees, shrubs and areas to be saved or left natural as noted on the plans or marked in the field.

(j) Vehicles will yield the right-of-way to wildlife and no attempt to harass or disturb wildlife will be made by any person.

(k) There will be no cutting within the 15 m buffer zone of any watercourse/wetland or within environmentally sensitive areas identified by EMS (unless an EMS Approval to Proceed is issued).

(l) ATVs will remain within the right-of-way except as approved by the Responsible Person.

(m) No heavy equipment or motorized vehicles will enter the areas designated as environmentally sensitive by the Responsible Person and/or the EMS.

(n) The extent of activities in environmentally sensitive areas will be minimized, including the restriction of walking to established walking paths if available.

(o) Petroleum products will be handled, stored and disposed of in a manner that will minimize the potential for spills (see **Section 8.1**).

(p) Fueling of equipment will not occur within 30 m of a watercourse/wetland or other identified environmentally sensitive areas.

A variety of equipment is required to complete the many facets of site development and road construction.

Principal Environmental Concerns

The environmental concerns associated with equipment movement are the potential impacts on aquatic ecosystems and water quality, as well as disturbance to environmentally sensitive areas.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of equipment movement:

(a) Equipment and vehicles will only operate on cleared ROWs or areas designated for construction activities in the Plans/Drawings.

(b) Construction equipment will not enter within 30 m of watercourses/wetlands or identified environmentally sensitive areas unless otherwise approved by the EMS.

(c) Erosion control measures, implemented under **Section 7.1**, will be monitored during construction activities within the ROW and any areas associated with project construction activities. Where damage to these erosion control measures is observed, they will be promptly repaired to prevent siltation of watercourses/wetlands or other environmentally sensitive areas.

Blasting of land is very rarely used during road construction or site development work on Prince Edward Island, but may be required on occasion.

Principal Environmental Concerns

The principal concerns associated with blasting on land include the following potential effects:

- destruction of vegetation and vegetation mat outside and within clearing limits, respectively;
- noise disturbances to wildlife and nearby residents; and,
- siltation of watercourses/wetlands, groundwater and/or groundwater wells.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of blasting on land.

All blasting will be conducted in accordance with the *Prince Edward Island Occupational Health and Safety Act and Regulations.* All temporary magazines for explosive storage will have a *Temporary Magazine Licence* from the Department of Energy, Mines and Resources Canada.

The handling, transportation, storage and use of explosives and all other hazardous materials will be conducted in compliance with all applicable laws, regulations and orders of the Prince Edward Island Department of Environment, Labour and Justice, as well as the Department of Energy, Mines and Resources Canada. The following measures will be implemented to minimize the effect of the use of explosives and blasting:

(a) Explosives will be used in a manner that will minimize damage or defacement of landscape features, trees and other surrounding objects by controlling through the best methods possible, the scatter of blasted material beyond the limits of activity. Outside of cleared areas, inadvertently damaged trees will be cut, removed and salvaged if merchantable. Damage to the habitat outside of disturbed areas will be restored as required and as directed by the EMS.

(b) Blasting patterns and procedures which minimize shock or instantaneous peak noise levels will be used. Limits on the maximum amount of charge (in kilograms) per delay will be specified in any blasting plan or permit conditions.

(c) Time delay blasting cycles will be used to control the scatter of blasted material.

(d) Blasting will not occur in the vicinity of fuel storage facilities.

(e) Use of explosives will be restricted to authorized personnel who have been trained in their use.

(f) There will be separate magazines on site, a magazine for explosives and a smaller cap magazine for detonators.

(g) A detailed blasting report will be completed and forwarded to the EMS following completion of blasting activities.

(h) A pre-blast residential survey of nearby homes will be performed to inform residents of the blasting schedule. In all blasting plans, consideration will be given to minimize disruption to local residents.

(i) Seismographic equipment will be used to monitor all blasts.

(j) Details on blasts, delays, schedule, etc. will be provided in blasting plans and permits for all proposed blasting activities.

Water trucks are used to apply water on construction projects for dust control. Dust control practices shall be applied throughout all work areas as required.

Principal Environmental Concerns

Dust could enter aquatic systems and may affect nearby residents. Uncontrolled application of water could result in sediment-laden effects on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of using water for dust controls:

(a) Locations where water is to be applied, the amount of water to be applied, and the times at which it shall be applied, shall be determined by the Responsible Person. Application of water is not to be conducted in situations where surface water could freeze and create a potential traffic hazard.

(b) At least one mobile water application unit for applying water shall be available to the work site at all times. Water shall be applied by means of a pressure type distributor equipped with a spray system of nozzles that will ensure a uniform application of water. Minimal amounts of water required to control dust will be applied such that potential for surface runoff of sediment is minimized.

(c) The intake hose to the tank shall be equipped with a device satisfactory to the Responsible Person to prevent fish from being pumped into the tank.

(d) Sources of water shall contain sufficient flow such that the withdrawal rate will not noticeably reduce the flow in the watercourse. A watercourse that is a good source during most of the year may not have sufficient flow during the summer to permit any withdrawal, therefore, ponds shall be selected as a water source during a dry period, where practical.

(e) Rock and gravel may be moved by hand to obtain a pool for a suction pipe but a backhoe, bulldozer, or other earth moving equipment is not to be used in the watercourse/wetland, unless otherwise approved by the EMS.

(f) Water trucks shall not be driven into or through a watercourse/wetland, unless otherwise approved by the EMS.

(g) Water trucks will not be driven down to the edge of the watercourse/wetland, unless the area is firm, so that ruts will not form. Any disturbed ground or ground cover is to be covered with mulch or other erosion control material.

(h) Pumps and other equipment must not be repaired or refueled within 30 m of a watercourse/wetland or other environmentally sensitive area.

(i) Waste oil, or other petroleum products, is not to be used for dust control under any circumstances.

4.0 CONSTRUCTION IN AQUATIC ENVIRONMENTS

Work in aquatic environments requires a variety of specific construction practices. Potential environmental interactions related to these construction practices are identified in this section. Environmental protection procedures, generically designed to reduce potential for environmental effects, are included within each subsection.

General environmental protection procedures applicable to the various subsections of this **Section 4.0** are listed below:

(a) Work will comply with conditions outlined in the EMS's Approval-to-Proceed and any associated permits. A copy of the approval (and associated permits) for the project is to be kept on site at all times and the stipulations contained therein are to be adhered to by all project personnel.

(b) Construction activity in the aquatic environment will be conducted in strict compliance with the *Navigable Waters Protection Act*, the *Prince Edward Island Environmental Protection Act* and any associated Authorization for Works or Undertakings Affecting Fish Habitat, issued by DFO under the *Fisheries Act*.

(c) Once a Project Application is submitted, the EMS will obtain all additional approvals/permits as required under the aforementioned Acts, including any Watercourse or Wetland and/or Buffer Zone Activity Permits from DELJ.

(d) All vessels will be governed in accordance with *Garbage Pollution Prevention Regulations*, *Pollutant Substance Regulations* and *Oil Pollution Prevention Regulations* as exacted by the *Canada Shipping Act*.

(e) All project vessels will remain within the construction zone.

(f) Construction activity in the aquatic environment will be limited to that which is absolutely necessary to complete the work.

(g) At least half of the width of a watercourse shall remain unobstructed at all times to allow adequate fish passage.

(h) As outlined in **Section 7.1** of this EPP, sediment control measures will be implemented and monitored during work activities to prevent siltation of watercourses/wetlands or other environmentally sensitive areas.

(i) In the event of damage to a Type II silt fence and/or silt boom, the contingency plan outlined in **Section 7.1.4** of this EPP shall be followed.

(j) Chemical toilets will be provided for work areas. Project personnel will ensure that toilets are inspected on a daily basis. Sewage will be disposed of in an EMS approved sewage disposal facility on an as needed basis.

(k) Environmental protection procedures addressing the transport, storage, and handling of fuel and other hazardous materials is provided in **Section 8.1.**

(l) Should a fuel or hazardous material spill occur, steps pertaining to the Contingency Plans for Fuel and Hazardous Materials Spills in **Section 9.1** will be taken.

(m) Should aquatic mammals be attracted to aquatic construction noises, steps pertaining to the Contingency Plans for Wildlife Encounters in **Section 9.4** will be taken.

Activity-specific environmental protection procedures for work in aquatic environments are provided in the following subsections. Specific environmental protection measures and devices are presented in **Section 7**.

Vessels including boats, barges, tugs and drilling/pile driving vessels may be used onsite to place materials for construction.

Principal Environmental Concerns

Project vessel traffic may interfere with local fishers and other vessel traffic. There exists the potential that vessels involved with construction activities could run aground, collide with each other or with other vessels, or sink. Contamination of the aquatic environment could result if petroleum products or other hazardous materials are released during vessel accidents.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of vessel movement:

(a) All stationary hazards such as moored platforms or vessels will be clearly marked with buoys (according to *Canadian Coast Guard Regulations*).

(b) All project vessels will travel only within the Construction Zone and in routes determined by the Responsible Person through discussions with local fisher and stakeholder groups.

(c) To minimize interference with other marine traffic, appropriate "Notices to Mariners" will be issued by the Canadian Coast Guard regarding project vessel traffic information updates provided on marine radio. **The Responsible Person will coordinate these notices**.

(d) All crew members will be familiar with emergency procedures for both life threatening and potentially polluting situations (see **Section 9.0**).

(e) Vessels should be equipped with VHF radio, with the exception of small craft (*i.e.*, dory, raft, inflatable) utilized within the immediate construction area. All crew members will be properly trained in the use of VHF.

(f) Vessels will be equipped with adequate personal protection gear (*i.e.*, life jackets, personal flotation devices, etc.) in adherence to applicable *Canadian Coast Guard Regulations.*

Removal of sediment may be required during site preparation or as a primary work component for construction or channel maintenance in the aquatic environment.

Principal Environmental Concerns

The principal concern is for aquatic species due to direct mortality and/or habitat destruction. The main concern, as with any construction in an aquatic environment, is the release of fine materials into the water column which could have an effect on aquatic life and/or aquatic habitat. Noise associated with dredging and the use of heavy equipment is also a concern for wildlife, particularly seabirds and marine mammals. Dredging activities may obstruct the passage of migrating fish.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of dredging:

(a) Dredging will be conducted during approved timeframes determined by regulatory bodies including EMS, DELJ, and DFO, and as indicated on the EMS Approval to Proceed.

(b) Dredging of the overburden will be undertaken by a properly trained operator and will be conducted in a manner that minimizes the re-suspension of sediments in the water column.

(c) Should clam bucket or similar bucket style dredging be conducted, the following procedures will be implemented to dredge and unload dredged material into trucks, barges, scows or sidecast location:

-the bucket will descend to the bottom in a manner which reduces the potential re-suspension of sediments as the bucket contacts the bottom;
-to minimize the potential for washing of material from the bucket during ascent, the operator shall try to achieve full bucket capacity;
-the operator shall ensure that the bucket can seal properly when closed;
-the bucket will ascend at a controlled rate which reduces potential winnowing of sediment and will pause immediately above the surface of the water to allow excess water to decant out of the bucket before the material is unloaded;

-excavated sediments will be immediately transferred to transport trucks, barges or scows in a manner which minimizes the release of fine textured material into the water column;
-the operator shall ensure the bucket is located directly above the truck box, barge or scow, and as far down as possible, before releasing the material;
-the bucket is to be empty after material is unloaded, before continuing to dredge; and,
-leveling the bottom by dragging the bucket shall not be permitted, unless otherwise approved by EMS.

(d) Should cutter suction dredging be employed for marine sediment excavation, the following procedures will be implemented:

-the dredged material will be pumped from the dredge location through a flexible, closed pipe into a truck, barge or scow or directly to an EMS approved disposal location;
-the cutter head will only operate below 1 m off the bottom to minimize fish entrapment (*i.e.*, the cutter head will not be activated through the entire depth of the water column);
-the speed of the cutter head will be maintained so that the least amount of sediment re-suspension will occur, while still being able to effectively dredge the area;
-the pipe will be inspected routinely for any potential breaches in the sediment trap; and,
-should any leakage occur along the pipeline alignment, all dredging will cease until the breach is repaired.

(c) An environmental effects monitoring program may be required by EMS to monitor water quality (Total Suspended Solids) during marine construction activity to assess the extent of any plume originating from the dredging.

Removal and disposal of sediment may be required during site preparation for construction in the aquatic environment. Disposal activity may occur at disposal locations in the aquatic environment (*i.e.*, ocean disposal) or on land.

Principal Environmental Concerns

There is concern for aquatic species due to direct mortality and/or habitat destruction. The main concern, as with any construction in an aquatic environment, is the release of fine materials into the water column which could have an effect on aquatic life, aquatic habitat and/or other environmentally sensitive areas. Other concerns with disposal activities are the accidental release of fuels and hazardous materials, the discharge of sewage solid wastes and the potential for accidents between vessels. Noise associated with disposal and the use of heavy equipment is also a concern for wildlife, particularly seabirds and marine mammals. Disposal activities may obstruct the passage of migrating fish.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of disposal of dredged materials:

Ocean Disposal

(a) All activities will be performed in accordance with the *Ocean Dumping Regulations* pursuant to the *Canadian Environmental Protection Act* and the conditions of permit (which may require a dumping management plan to be coordinated by the EMS).

(b) An Ocean Disposal permit from Environment Canada will be obtained, through consultation with the EMS, if dredged material is to be ocean disposed.

(c) Ocean disposal area(s) boundaries will be clearly marked, to meet Canadian Coast Guard requirements, with appropriate buoys to ensure that dump scow operators and other vessels in the area can easily identify the disposal area location.

(d) Ocean disposal of dredged material will be conducted in a manner which ensures even distribution of dredge spoils and avoids "center-piling."

(e) To avoid re-suspension of sediments due to propellor wash, vessel traffic in the disposal area will be restricted to what is absolutely necessary.

(f) Transport vessels will use designated routes only, between the transport location and the EMS approved ocean disposal site.

(g) Unloading doors on the barge/scow will be sufficiently sealed to prevent the release of solid materials (mud/slurry) and will remain closed during transport to the EMS approved disposal site.

(h) No washing out of barges/scows will be permitted unless required for repairs. Specifically, barges/scows will be washed out once only at the completion of disposal activity (at the end of the project) and in the dredging area or the area designated for disposal, such that washed out sediment is contained within the dredging or disposal location.

(i) An environmental effects monitoring program may be required to monitor water quality (Total Suspended Solids) during marine construction activity to assess the extent of any plume originating from the disposal. This will be coordinated through the EMS.

Land Disposal

(j) Land disposal of dredged material will be at a site approved by DELJ, as coordinated through the EMS. A three-sided dyke structure will be constructed with sand bags, or similar methods, positioned at the dredge-to-truck transfer location such that trucks can back into the sand bag enclosure area for loading. This dyke structure will contain any material that may be spilled during dredge material transfer activities.

(k) Cleanup of the transfer location will be conducted by shoveling lost material into trucks between shifts or more frequently as required to minimize potential runoff of sediment into the water column adjacent to the transfer location. Washing of lost material back into the water or dredge area will not be permitted.

(l) Transport vehicles will use designated routes only, between the dredge-to-truck transfer location and the EMS approved disposal/landfill site.

(m) Transport truck box tail gates will provide containment (for example, lined with a filter fabric) to minimize the potential for release of solids material (mud/slurry) during transport to the EMS approved disposal site.

(n) Washing out of trucks will not be permitted within 30 m of a watercourse/wetland or other environmentally sensitive area, unless otherwise approved by EMS. Generally, trucks will be washed out once only at the completion of disposal activity and in the area designated for disposal such that washed out sediment is contained within the disposal location.

(o) The land disposal location will be designed to contain the sediment and fines in collection areas(s), and to allow for the release of sediment free water.

Drilling may be required for geotechnical investigations at proposed locations for structures or in preparation for pile driving in the aquatic environment.

Principal Environmental Concerns

The principal concern associated with drilling in the aquatic environment is accidental release of fuel and other hazardous materials, the discharge of solid wastes, siltation and vessel traffic. Noise associated with drilling and heavy equipment activity is also a concern for wildlife, particularly aquatic birds and mammals:

(a) Where practical, drilling will occur within an enclosed area (*i.e*., cofferdam) to contain drill cuttings.

(b) Recovered drill core material will be retrieved, placed in core boxes and taken to shore, therefore reducing the disposal of cuttings into the aquatic environment.

(c) If the drill cuttings become wet and form a slurry-like material, the slurry, depending on its consistency, is to be either collected by scoop shovel and removed to shore for disposal, or is to be pumped to temporary settling ponds.

(d) The drilling fluid will be primarily water from the surrounding watercourse. When required to enhance core recovery, an environmentally benign drilling product will be injected along with the drill cooling water on a continuous basis at a maximum rate of approximately 1.0 g/L. The use of the drilling fluid will be restricted to that which is necessary to enhance core recovery. The type/amount of drilling fluid and rate used will be under the strict approval of the EMS and will be recorded and logged as part of the drilling operation.

(e) Where applicable, aquatic drilling equipment will have muffled exhausts to minimize noise.

Pile driving may be required to increase the structural capacity of structures built in the aquatic environment. Steel sheet pile driving may be required in the construction of abutments and cofferdams.

Principal Environmental Concerns

The principal concern associated with pile driving activities in the aquatic environment is accidental release of fuel and other hazardous materials, the discharge of solid wastes, siltation and vessel traffic. Noise associated with pile driving and heavy equipment activity is also a concern for nearby residents and wildlife, particularly aquatic birds and mammals.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of pile driving in the aquatic environment:

(a) Where applicable, pile driving equipment will have muffled exhausts to minimize noise.

(b) Where practical, pile driving will occur within an enclosed area (*i.e.*, cofferdam).

(c) Pile driving work schedules will be as approved by the EMS.

(d) In the case of an accidental spill/release of fuel, the contingency plan will be followed as per **Section 9.1**.

Structures built in the aquatic environment will require the construction of foundations, piers, abutments and/or superstructures.

Principal Environmental Concerns

There is concern for aquatic species during construction of foundations, piers, abutments and superstructures due to direct mortality and/or habitat destruction. Liquid wastes from uncontrolled release of wash water which may contain hazardous materials such as cement, concrete additives and form oil may result in direct mortality of aquatic species and/or aquatic habitat destruction. Cement is alkaline and wash water from spoiled concrete or from the cleaning of the mixer trucks and pipe delivery systems can be expected to have high pH. Similarly, spoiled concrete or wash water would contain additives and agents, some of which are toxic to aquatic species. Aggregates, particularly the finer sand fractions, washed from spoiled concrete or discharged in water to the environment may result in direct mortality and/or habitat destruction. Construction activities in the aquatic environment may obstruct the passage of migrating fish.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of construction of foundations, piers, abutments and/or superstructures:

(a) Where practical, abutments will be at or shoreward of the normal wetted perimeter (*i.e.*, mean high water line) of the watercourse.

(b) Where practical, all construction activities in the aquatic environment will be conducted “in the dry” using cofferdams to separate construction activities from the water. Dewatering of the cofferdams will be conducted prior to any construction activities within the cofferdam. Water pumped from the cofferdams will be released into settling ponds to remove silt and reduce turbidity of the water prior to discharge back into the aquatic environment. Any debris produced by the construction activities will be contained within the cofferdam from where it can be collected and removed to a shore location for appropriate disposal.

(c) Wash water from the cleaning of concrete trucks will be discharged either at the concrete manufacturer's place of business (assuming that the plant is in close proximity to the work site) or alternatively, a concrete washout pit may be created within the construction zone at a location as approved by EMS. The concrete wash out pit should be constructed to an adequate size to accommodate the anticipated volume of wash water. Washout pits should be lined with filter fabric.

(d) Residual concrete, including concrete resulting from cleaning of concrete pumping systems/equipment and rejected concrete batches, will be disposed of at concrete washout pits, constructed in locations approved by the EMS. The washout pits will be operated and maintained in compliance with provincial standards, and emptied as required with the reuse or disposal of material in compliance with provincial standards or approvals. Construction of useful, secondary concrete products (such as anchor blocks, etc.) will be promoted. Any barren soil existing after removal must be stabilized with consultation from EMS.

(e) Concrete handling will be conducted under the WHMIS program, whereby only trained personnel handle the concrete and only in accordance with manufacturer's instructions and government regulations. All employees responsible for the handling of concrete will be appropriately trained.

Infilling and rock placement may be required during site preparation for construction in the aquatic environment.

Principal Environmental Concerns

The principal concern associated with infilling is the siltation of the aquatic environment resulting in habitat destruction and/or direct mortality to aquatic species. Other concerns associated with infilling activities are the displacement of fishing activity and accidental release of fuels and other hazardous materials. Noise associated with the use of heavy equipment is also a concern for wildlife, particularly seabirds and marine mammals.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of infilling in the aquatic environment:

(a) Infilling will proceed progressively in a controlled manner within only the area designated by the Responsible Person.

(b) Fill used for infilling (*i.e.*, borrow, select borrow, or premium borrow) shall meet the specifications as described in TIR's Contract Specifications for Borrow, Section 206. Typically, borrow will have a fines content of up to 20% passing 200 sieve and select borrow will have a fines content of up to 15% passing 200 sieve.

(c) Where armour rock is required to protect embankment structures from erosion, it will be placed over a geotextile filter blanket on the embankment side slope. Rip-rap placement will be conducted in accordance with **Section 7.1.10**.

(d) Where possible, armour rock will be placed progressively prior to the placement of the infill so as to prevent erosion.

(e) When infill material is placed prior to the placement of armour stone, the work will be conducted in short phases or sections of 100 m or less, with armour stone being used to face waterside, infill after. Once a 100 m section is complete (infill and armour stone), a new 100 m section can be started.

(f) In the case of an accidental spill/release of fuel, the contingency plan will be followed as per **Section 9.1.**

Blasting in the marine environment may be required for the removal of overburden during site preparation for a construction project in the aquatic environment.

Principal Environmental Concerns

The major concern associated with blasting activities in the aquatic environment is direct mortality to aquatic species and/or habitat destruction. Re-suspension of sediments in the water column may affect aquatic species due to siltation and altered water quality. Noise associated with blasting and heavy equipment activity is also a concern for wildlife, particularly aquatic birds and mammals. In addition, there is concern for accidental release of fuel and other hazardous materials, the discharge of sewage and other solid wastes, siltation and vessel traffic.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of blasting in the aquatic environment:

(a) All blasting will be restricted to authorized personnel who have been trained and certified in their use.

(b) A predictive analysis of the proposed blast will be conducted to assess the zone of influence of blasting activities.

(c) Blasting will be undertaken at the time of least biological activities or environmental sensitivity (*i.e.*, not during fish spawning or migration).

(d) A pre-blast survey will be conducted by using visual reconnaissance and hydrophones at selected locations outside the construction zone to ensure that there are no aquatic mammals present within 300 m of the proposed blast.

(e) Shock wave padding or bubble curtains will be installed to minimize the transmission of the blast through the water.

(f) All temporary magazines for explosive storage will have a Temporary Magazine License.

(g) If explosives are to be stored on site, explosives and blasting caps will be stored in separate magazines on site.

(h) Blasting activities will be done in a manner that ensures that the number and magnitude of explosives are limited to that which is absolutely necessary.

(i) Blasting will be scheduled to minimize disruption of vessel traffic.

5.0 ROAD MAINTENANCE

5.1 Summer

5.2 Winter

5.1 Summer (Road Maintenance)
5.1.1 Grading
5.1.2 Patching and Leveling
5.1.3 Ditch Maintenance and Shouldering
5.1.4 Surfacing
5.1.5 Shoreline Protection
5.1.6 Grass and Brush Cutting
5.1.7 Sweeping
5.1.8 Sign and Guardrail Maintenance and Traffic Painting
5.1.9 Dust Control (Chemical)

Grading is used to reshape unpaved roads to maintain a proper crown and remove ruts, potholes and washboard conditions. Grading helps to maintain proper drainage and keeps road surfaces stable.

Principal Environmental Concerns

Grading loosens the top of the exposed road, leaving more potential for erosion of the surface. If not conducted properly, grading can inhibit controlled drainage of runoff. Dust is generated during grading processes.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of leveling:

(a) When grading an unpaved road and a watercourse/wetland is encountered, every effort will be made to stop grading before the watercourse/wetland/buffer zone so that road surface disturbance within 30 m in the vicinity of the watercourse/wetland is minimized.

(b) Where possible, a berm (windrow) will not be left at the edge of the road. Grading unpaved roads often results in the creation of a windrow along the edge of the road by the grader blade. The windrow will be collected and re-used in construction or properly disposed of off site. In cases where this is not possible, diversions will be installed in the windrows at locations outside of 30 m of a watercourse/wetland or other environmentally sensitive areas, to allow surface water to drain into a ditch or vegetated area.

(c) If grass is encountered on an unpaved seasonal or heritage road, every effort will be made to leave such grassed areas intact when grading.

(d) Grading will normally be undertaken after periods of relatively wet weather to reduce dust generation, but not after heavy rains during high runoff conditions.

(e) DSHR's - EMS must be notified 48 hours in advance of any grading activity occurring on any one of the twelve designated scenic heritage roads listed below:

Kings County
Rte. 303 New Harmony Rd.
Rte. 325 County Line Rd.
Mellish Pond Rd. - RI 33012

Prince County
Hackeney Rd. - RI 11138
Walls Rd. - RI 41084
EMS must be notified of maintenance activities.

Queens County
Rte. 205 Klondyke Rd.
Rte. 227 Junction Rd.
Millman Rd. - RI 12030
Jacks Rd. RI 42069
Old Princetown Rd. - RI 12088
Warburton Rd. - RI 12089
Perry Rd. - RI 72116

Patching and leveling are undertaken to repair potholes, depressions, ruts, bumps and distorted surfaces on paved and surface-treated highways.

Principal Environmental Concerns

Prime coat, tack coat and asphaltic concrete mix are potentially hazardous materials in the aquatic environment and should be handled to prevent losses to the aquatic environment.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of patching and leveling:

(a) Asphaltic mixes will be transported to the work site in leak-resistant vehicles.

(b) When placing asphaltic mix, care shall be taken to avoid spillage of the mixture.

(c) When placing prime coat and tack coat, care shall be taken to avoid overspraying.

(d) The application of prime coat and tack coat shall not exceed beyond the limit of asphaltic concrete to be spread and compacted in a day.

(e) All prime coat spray nozzles are to be in good condition and capable of positive cut-off.

(f) Personnel will make reasonable efforts to minimize the volume of waste materials. Surplus materials will be used at other locations where possible or properly disposed of as per EMS instruction. Waste material will not be disposed of within 30 m of a watercourse/wetland or any identified environmentally sensitive area.

(g) Release agents used in truck boxes will be lightly coated. If liquid release agent is used, the trucks will be drained after each application and before each loading. Draining of liquid release agent will be conducted in approved locations, so as not to release liquids into surrounding watercourse/wetlands or identified environmentally sensitive areas.

(h) Asphalt emulsion pumps will be cleaned using a self-contained collection system only. All used fuel will be collected in closed containers and recycled or disposed of at an EMS approved facility.

(i) Shovels, rakes and hand tools requiring cleaning at the site will be cleaned in/over empty drums, in a manner that allows for the containment of fuels or cleaning products and inhibits their escape into the environment.

(j) Hazardous cleaning materials contained in empty drums shall be returned to the maintenance depot, and from there disposed of in a manner approved by EMS.

Ditching is undertaken to effect drainage of the roadbed and to correct deficiencies such as erosion, non-conformity in grade, line, or cross section of ditch, water ponding on road, and restrictive vegetative growth that impedes drainage of the roadbed.

Principal Environmental Concerns

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of ditch maintenance and shouldering:

(a) A 30 m buffer zone will be maintained between the end of ditching and all watercourses/wetlands, unless otherwise approved by the EMS.

(b) A check dam (**Section 7.1.1**) will be maintained at the end of the ditch (where the ditch meets the 30 m buffer zone). Additional erosion control structures (**Section 7.1**) will be installed further up the ditch as required.

(c) Natural drainage should be maintained whenever practical.

(d) Sediment deposited in the ditch will be removed when it reduces the capacity of the channel. Removed material and sediment shall be disposed of at a location 30 m outside of a watercourse/wetland or other environmentally sensitive area, and in such a location that it cannot wash into a watercourse/wetland.

(e) Suitable material shall be used when needed to fill in washouts and depressions on foreslopes or backslopes.

(f) To ensure stabilization, the ditch may be hay mulched, hand seeded, hydroseeded or lined with jute matting, or rock, depending on the erosion potential (see **Section 7.1**).

(g) Petroleum contaminated material encountered in the ditch shall be reported to the EMS and/or CCG, as per Section **9.1**.

For the purposes of this EPP, surfacing refers to the placement of aggregate on an unsealed road surface for stabilization or to restore grades, and to shape shoulders.

Principal Environmental Concerns

When handling and placing aggregate, there is potential for sedimentation of the aquatic environment and for dust impacts on air quality.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of surfacing:

(a) Any aggregate placement will be conducted in such a manner to ensure road surface drainage flows from the centre of the surface to the drainage control structures (*i.e.*, ditching), as appropriate.

(b) Any aggregate materials placed must be compacted to reduce moisture penetration.

(c) As required, dust will be controlled as discussed in **Section 3.12** and **Section 5.1.9**.

Shoreline protection measures are installed during road maintenance activities to protect watercourse banks from severe erosive action of water flow, wave action, and storm events, and to provide retaining wall support for an unstable bank.

Principal Environmental Concerns

The installation of shoreline protection measures has potential to disturb fines along the shoreline and cause sedimentation into the watercourse.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 3.0**, the following protection procedures will minimize the potential environmental effects of the installation of shoreline protection measures:

(a) Prior to the installation of shoreline protection measures, all necessary erosion prevention and control measures shall be in place (as per **Section 7.1**) to prevent silt, debris, etc. from washing into the watercourse/wetland.

(b) During installation of shoreline protection measures, erosion prevention control measures will not be disturbed, and will be monitored and repaired as necessary, so as to maintain their effectiveness.

(c) Shoreline protection materials shall include coarse materials free from fines.

(d) The new toe of slope cannot extend more than 1 m beyond the pre-existing toe of slope, unless otherwise authorized in the EMS Approval to Proceed.

(e) Pre and post construction surveys must be completed, to establish toe of slope, prior to and after the activity is completed.

Grass and brush cutting maintain safe sight distances, facilitate snow and ice removal, prevent drainage obstructions and improve roadside appearances.

Principal Environmental Concerns

Removal of vegetation can increase the potential for sedimentation into a watercourse/wetland by removing the sediment filter that vegetation provides. Disposal of the vegetation in or near a watercourse/wetland can cause obstructions which may inhibit flow, trap sediment and/or restrict fish passage.

Environmental Protection Procedures

(a) All vegetative growth shall be controlled through manual and mechanical means. Herbicides shall not be permitted unless conditionally approved by the EMS.

(b) Ideally, grasses should be mowed during the summer when the seeds have ripened. Mowing and other equipment should not proceed if the ground is soft, to prevent rutting, exposure of new ground, root damage and ponding of water.

(c) Slash shall not be permitted to enter any watercourse/wetland/buffer zone.

(d) Burning of slash will be permitted only in areas where it does not create a nuisance, fire or health hazard and does not restrict traffic vision and only conducted under the issue of a *Burning Permit* by PEIDAF, as co-ordinated through the EMS. Tires or waste oil will not be used to start or maintain fires.

Sweeping of road surfaces is undertaken to prevent the accumulation of dirt and debris.

Principal Environmental Concerns

Disposal of accumulated dirt and debris in or near a watercourse/wetland can cause sedimentation and/or obstructions which may inhibit watercourse flow, trap sediment and/or restrict fish passage.

Environmental Protection Procedures

(a) All native material collected shall be disposed of at a location a minimum of 30 m of a watercourse/wetland or other environmentally sensitive area, such that it does not wash into a watercourse/wetland.

(b) All solid waste debris shall be disposal of at an EMS approved location.

Road signs are erected and maintained as required to control and facilitate the safe movement of traffic. Guardrails are used at locations of roadside hazards. Periodically, road markings are applied to paved areas to facilitate safe movement of traffic.

Principal Environmental Concerns

Wood treatment chemicals, paints and solvents are potentially hazardous and should be handled to prevent losses to the environment.

Environmental Protection Procedures

(a) Treated wood ends shall be collected and disposed of at an approved solid waste facility. Treated wood ends shall never be burned.

(b) Care should be taken to minimize spillage of preservatives used in the treatment of cut ends of the wood posts. Preservatives will be handled according to **Section 8.1.**

(c) Traffic paint shall be stored in well ventilated and specifically designated areas. These storage areas shall be marked/labeled with appropriate hazard signs and all ignition sources prohibited.

(d) Small quantities of paint designated for disposal shall first be allowed to harden, then disposed of at an EMS approved waste disposal location.

(e) Spray equipment shall be cleaned at roadside, away from any watercourse/wetland/buffer zone or identified environmentally sensitive area, with a volatile solvent. The solvent will be collected and then added to other containers of traffic paint where it aids in the drying process.

(f) All materials will be handled and stored in accordance with WHMIS and by appropriately trained personnel.

(g) Work conducted adjacent to a watercourse/wetland must be conducted in accordance with the procedures outlined in **Section 7**.

For longer term maintenance on gravel and unpaved roads, chemicals such as liquid and flake calcium may be applied for dust control.

Principal Environmental Concerns

Chemicals can pose potential hazards to aquatic environments and should be handled to prevent losses to the aquatic environment.

Environmental Protection Procedures

(a) Chemicals should only be used to remedy extreme dusty conditions.

(b) Application shall be restricted to the driving surface only.

(c) Tankers used in the application of liquid chemicals shall not be washed out within 30 m of a watercourse/wetland or any identified environmentally sensitive area.

(d) Waste oil is not to be used for dust control under any circumstances.

5.2 Winter (Road Maintenance)
5.2.1 Snow Removal
5.2.2 Salting and Sanding

Highways, intersections, bridges, grade separations and TIR maintained parking lots are plowed or blown free of snow accumulation to maintain safe driving conditions for the traveling public.

Principal Environmental Concerns

Snow removed from highways contains salt and sand that can contribute to salinity and sedimentation if disposed of in, or near a watercourse/wetland.

Environmental Protection Procedures

(a) Snow shall not be dumped within 30 m of a watercourse/wetland or other environmentally sensitive area, except where required in the interest of public safety.

(b) Snow removal equipment will be adjusted to remove as much of the snow as possible. This will reduce the amount of salt needed to melt the snow and ice from the surface.

During freezing conditions, salt is applied to road surfaces as necessary to obtain ice-clear driving lanes or a bare centre strip. Sand is applied to road surfaces to provide traction on snow-packed or iced surfaces.

Principal Environmental Concerns

Excessive salt used on roads can cause saline runoff into watercourses/wetlands, groundwater resources and agricultural fields. Salt spray may damage vegetation adjacent to the road. Excessive sand used on roads can contribute to sediment-laden runoff into watercourses/wetlands and may cause blockages in road drainage structures.

Environmental Protection Procedures

(a) Spreaders will be kept in calibration.

(b) Spinners shall be adjusted to prevent overthrow (waste).

(c) The use of calcium chloride to clear ice from drainage structures should only be used as a last resort. Steaming shall be the first resort unless the situation or location makes it impractical or impossible to use.

(d) At the end of the season, when sweeping of road sand, the debris shall be disposed of such that it cannot wash into a watercourse/wetland and not within 30 m of a watercourse/wetland or other environmentally sensitive area.

(e) As necessary, diversion structures will be installed at locations identified as potentially problematic for ponding of salt water.

6.0 MAINTENANCE OF STRUCTURES IN AQUATIC ENVIRONMENTS

6.1 Superstructure Maintenance
6.2 Substructure Maintenance
6.3 Deck Drainage Maintenance
6.4 Application and Removal of Protective Coatings
6.5 Cleaning of Structures
6.6 Slope Protection
6.7 Snow Removal, Sanding and Deicing

Repair and replacement of damaged or deteriorated superstructure components are undertaken as required to ensure the structural integrity of the structure.

Principal Environmental Concerns

There is concern for aquatic species due to direct mortality and loss of aquatic habitat. The primary concern is the release of materials into the aquatic environment such as abrasives and protective coatings. These materials may contain heavy metals or petroleum compounds, which are potentially toxic to aquatic species.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of superstructure maintenance:

(a) All waste generated in the removal of damaged and deteriorated components shall be collected for proper disposal.

(b) All materials, where possible, should be reused. Non-salvageable materials shall be disposed of at a location approved by the EMS.

(c) Treated and untreated wood waste shall be disposed of at a location approved by the EMS.

(d) All necessary precautions shall be taken to prevent discharge or loss of any harmful material or substance into the watercourse, including but not limited to hydrocarbons, sand blast media, concrete (asphaltic and Portland cement), fresh concrete, treated timbers and preservatives.

(e) Where superstructure maintenance activities involve the use of cement or concrete, the environmental protection procedures described in **Section 4.6** will be implemented.

(f) All empty containers of paint, solvents and cleaners will be disposed of in an appropriate manner (see **Section 8.2**) at a location approved by the EMS.

For specific environmental protection procedures associated with the installation, maintenance and removal of arch, circular and box culverts, see **Section 7.2.**

Repair and replacement of damaged or deteriorated substructure components are undertaken as required to ensure the structural integrity of the structure.

Principal Environmental Concerns

There is concern for aquatic species due to direct mortality and loss of aquatic habitat. The primary concern is siltation and the release of materials into the aquatic environment such as abrasives and protective coatings. These materials may contain heavy metals or petroleum compounds, which are potentially toxic to aquatic species.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of substructure maintenance:

(a) All waste generated in the removal of damaged and deteriorated components shall be collected for proper disposal and may require a Waste Disposal Permit, to be obtained by EMS.

(b) All materials, where possible, should be reused. Non-salvageable materials shall be disposed of at a location approved by the EMS, and may require a Waste Disposal Permit.

(c) Unsalvageable treated timber piles and other waste timbers shall be disposed of at a solid waste disposal facility, under a Waste Disposal Permit.

(d) All necessary precautions shall be taken to prevent discharge or loss of any harmful material or substance into a watercourse/wetland, including but not limited to hydrocarbons, concrete (asphaltic or Portland cement), fresh concrete, treated timbers and preservatives.

(e) Where substructure maintenance activities involve the use of cement or concrete, the environmental protection procedures described in **Section 4.6** will be implemented.

(f) All empty containers of paint, solvents and cleaners will be disposed of in an appropriate manner (see **Section 8.2**).

For specific environmental protection procedures associated with the installation, maintenance and removal of arch, circular and box culverts see, **Section 7.2.**

Deck drains, weepholes, catch basins and drainage pipes are installed or repaired as necessary to prevent deterioration due to water and salt damage and to achieve drainage from deck surfaces for safety reasons. Discharge water is directed away from all structural components to the watercourse below, unless the structural design has incorporated another type of drainage system.

Principal Environmental Concerns

There is concern for aquatic species due to direct mortality and loss of aquatic habitat. The primary concern is the release of potentially hazardous materials into the aquatic environment.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of deck drainage maintenance:

(a) Drains are to be kept clear of obstructions. Obstructions removed from drains shall be disposed of at locations approved by the EMS and not into the adjacent watercourse/wetland.

(b) Drainage pipes are installed to transmit water from catch basins located at the end of the structure to the toe of the slope. Geotextile fabric and rip rap shall be used at these drainage outlets to prevent erosion.

(c) Where maintenance on the deck requires the application of potentially hazardous materials such as asphalt prime, asphalt, cement, deck sealant, paint or other protective coatings, the deck drains shall be plugged in the immediate vicinity of the work site such that materials cannot escape through the drains into the adjacent watercourse/wetland.

Deteriorated protective coatings are removed and new protective coatings are applied to structural components and clearance beams to protect steel components from corrosion and to improve appearance.

Principal Environmental Concerns

There is concern for aquatic species due to direct mortality and loss of aquatic habitat. The primary concern is the release of materials into the aquatic environment such as abrasives and protection coatings. These materials may contain heavy metals or petroleum compounds, which are potentially toxic to aquatic species.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of application and removal of protective coatings:

(a) A partial enclosure may be used to contain chippings and scrapings which may escape during the maintenance operations.

(b) A full enclosure will be used to contain dust, paint overspray and spent blasting media which may be released during the maintenance operations.

(c) For abrasive blasting below the deck, staging will be used to collect spent blasting media. Geotextile fabric will be placed over the staging to allow collection of the media for re-use or proper disposal at a location approved by the EMS.

(d) For abrasive blasting above the deck, staging will be mounted on sections of the deck. Impermeable tarps will be installed above the staging to keep the work area dry. Tarps will enclose the remainder of the work area and the deck will be used to collect spent blasting media for re-use or proper disposal. All deck drains should be blocked to contain blasting media and debris.

(e) Where the spent blasting media is known to contain lead or other materials that may be considered hazardous, laboratory testing shall be undertaken to determine the appropriate waste disposal options.

(f) Solvents used in the cleaning of painting equipment shall be collected in a closed container and recycled by an approved solvent recycler.

(g) All empty containers of paint, coatings, solvents and cleaners will be disposed of in an appropriate manner (see **Section 8.2**) at a location approved by the EMS.

(h) The nesting habits of migratory birds shall be taken into consideration. Prior to commencement of work, the structure shall be inspected for signs of nesting. Where possible, on sections of the structure where migratory birds are found to exist, activities which could destroy eggs or nestlings shall not be conducted during the period from mid-May to mid-July.

Cleaning is undertaken to prevent the accumulation of dirt and debris which may restrict normal movement on the structure and/or retain moisture or chemicals, leading to structural component deterioration.

Principal Environmental Concerns

The primary concern is the release of materials into the aquatic environment such as accumulated sand, salt and debris.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of structural cleaning:

(a) Where accumulations of dirt and debris are excessive, deck surfaces shall be scraped or swept prior to blowing with compressed air or flushing. All material scraped loose shall be collected for proper disposal in an EMS approved location, and not within 30 m of a watercourse/wetland or other environmentally sensitive area.

(b) The nesting habits of migratory birds shall be taken into consideration. Prior to commencement of work, the structure shall be inspected for signs of nesting. Where possible, activities which could destroy eggs or nestlings, shall not be conducted during the months of mid-May to mid-July inclusive, on sections of structures where migratory birds are found to exist.

Whereby slope protection adjacent to abutments and piers, on embankments, and in coastal areas is installed, repaired or replaced as required.

Principal Environmental Concerns

The principal concern is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality and aquatic ecosystems.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of slope protection:

(a) Work may be completed under an EMS Approval to Proceed. If necessary, a Watercourse Wetland and/or Buffer Zone Activity Permit shall be obtained from DELJ, through the EMS, prior to the commencement of work. A copy of the permit for the project is to be kept on site at all times and the stipulations within are to be adhered to by all project personnel.

(b) All necessary erosion prevention and control measures (see **Section 7.1**) shall be in place to prevent silt, debris, etc., from washing into the watercourse/wetland.

(c) Periodic checks will be made for undermining or erosion at locations where the rip rap meets the bank, and any voids will be filled with rip rap.

(d) Once in place, rip rap lining requires very little maintenance. However, any displacement of stone shall be repaired immediately.

(e) The new toe of slope shall not exceed more than 1 m beyond the pre-existing toe of slope, unless specifically authorized in the EMS Approval to Proceed, or the Watercourse, Wetland, and/or Buffer Zone Activity Permit.

(f) A pre-construction and a post-construction survey is required to determine any changes in pre-existing toe of slope.

Snow removal and application of sand and/or deicing agents (*i.e.*, salt) will be required during the winter months to maintain safe conditions for the traveling public. Salt is applied to traffic surfaces as necessary to obtain ice clear driving lanes or a bare center strip. Sand is applied to traffic surfaces to provide traction on snow-packed or iced surfaces.

Principal Environmental Concerns

Excessive salt used on road surfaces can cause saline runoff into watercourses/wetlands. Excessive sand used on road surfaces can contribute to sediment-laden runoff into watercourses/wetlands and may cause blockages in drainage structures.

Environmental Protection Procedures

In addition to the general environmental protection procedures described in **Section 4.0**, the following protection procedures will minimize the potential environmental effects of Snow Removal, Sanding and Deicing:

(a) The use of sand, salt and combinations thereof, will be minimized to that which is necessary to assure the safety of the traveling public.

(b) Snow removed from road surfaces will not be dumped within 30 m of a watercourse/wetland or other environmentally sensitive area, except where required in the interest of public safety.

(c) Snow removal equipment will be adjusted to remove as much of the snow as possible. This will reduce the amount of salt needed to melt the snow and ice from the surface.

(d) Salt spreaders will be kept in calibration.

(e) Spinners shall be adjusted to prevent overthrow (waste).

(f) The use of calcium chloride to clear ice from drainage structures should only be used as a last resort. Steaming shall be the first resort unless the situation or location makes it impractical or impossible to use.

The specific environmental protection measures described in this section are intended to be used in conjunction with many of the work practices described in **Section 3.0, 4.0, 5.0 and 6.0.**

7.0 SPECIFIC ENVIRONMENTAL PROTECTION MEASURES

7.1 Erosion Control
- 7.1.1 Check Dams
- 7.1.2 Sediment Traps and Sediment Collection Ponds
- 7.1.3 Silt Fences on Land (Type I Silt Fence and Straw Bale Barrier)
- 7.1.4 Silt Containment in Water (Type II Silt Fence and Silt Boom)
- 7.1.5 Seeding and Hydroseeding
- 7.1.6 Mulching
- 7.1.7 Erosion Control Mats (Jute Mat and Vegetative Erosion Control Blanket)
- 7.1.8 Sodding
- 7.1.9 Gabion Baskets
- 7.1.10 Rip Rap
- 7.1.11 Diversion Ditches (Temporary and Permanent)
- 7.1.11.1 Tap Drains
- 7.1.12 Removal of Non-Permanent Erosion Control Devices

7.2 Culverts (Arch, Circular and Box)

7.3 Miscellaneous Protection Measures
- 7.3.1 Noise Control
- 7.3.2 Lighting

Check dams are installed to control sediment-laden runoff and erosion of ditch or gully bottoms by slowing runoff velocities and collecting/trapping silt from sediment-laden runoff, thereby facilitating the establishment of stabilizing vegetation.

Check dams should be installed in ditch bottoms where the ditch gradient is too steep, or the channel area too large, for practical installation of structural linings such as erosion control blankets. Check dams are to be installed on a preliminary basis during construction and reinstalled after ditches are brought to final grade.

Check dams are typically a temporary erosion control measure, ultimately replaced by vegetation.

There are two main types of check dams used: rip rap check dams and straw bale check dams.

Rip Rap Check Dams

Rip rap check dams are typically the more stable of the two types, normally used where the ditch slope is greater than 2%. Care must be taken to ensure that the stone is all graded for effective trapping of the sediment. Typical construction is shown in Figures 7.1-1 and 7.1-2.

Straw Bale Check Dams

Straw bale check dams are often effectively used on a temporary basis, unless permanent vegetation can be established.

Straw bale check dams are more suitable for treating runoff from comparatively small drainage areas and ditches having relatively flat gradients (2% or less grade) and low velocities. Straw bale dams must be staked into the earth for stabilization and should be constructed of a single row of bales. Typical construction is shown in Figures 7.1.-3 and 7.1-4.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

Installation

Rip Rap Check Dams

(a) The check dam will be constructed with a parabolic shape in the vertical direction to allow accumulated water to flow over the centre of the dam.

(b) A sediment collection pit will be excavated on the upstream side of the check dam to provide additional sediment collection capacity.

(c) The check dam will be keyed in 150 mm into the slopes and ditch surface to prevent undermining.

(d) Geotextile fabric will be placed on the prepared area, starting at the toe of the slope of the sediment pit. Edges will be overlapped by 100 mm. The fabric will be rolled out in the direction of flow and extended underneath the apron. The aprons in these structures are not keyed into the soil.

(e) Rip rap will be placed to construct the check dam and the apron being careful not to cause damage to the fabric.

(f) The top of the check dam will be made at least 300 mm wide and the crest of the spillway is to be located 300 mm below the elevation at the ends of the dam. The height of the spillway shall be a minimum of 300 mm.

Straw Bale Check Dams

(g) Prepare 100 mm deep trench along entire footprint of checkdam.

(h) Straw bales will be placed tightly together and secured by driving two sturdy wooden stakes through each bale, deep enough to anchor them securely. The stakes will be driven into each bale toward the previously laid bale to force the bales together.

(i) Loose straw will be wedged between any cracks or openings.

(j) Rip rap will be placed between the ends of the bales and the ditch slope to an elevation that is 300 mm above the crest of the straw barrier spillway.

(k) The crest of the spillway on the check dam is to be located at a minimum of 300 mm below the elevation where the upper most bale and the ditch intersect.

(l) A sediment pit will be excavated upstream of the check dam.

Maintenance

(m) Check dams shall remain in a functional condition until the grass on seeded slopes is sufficiently established to be an effective deterrent to sediment runoff. Work-specific maintenance requires inspections after each rainfall, immediate repairs to structures found not functioning properly and removal of sediment deposits. Sediment deposits shall be removed before the level of sedimentation reaches a point within 100 mm of the crest of the overflow notch.

(n) When cleaning check dams, the sediment is to be removed from the upside of the dam only and disposed of a minimum of 30 m from any watercourse/wetland or any other identified environmentally sensitive areas and in locations where it will not re-enter the ditch or other watercourse/wetland.

(o) Where the ditch is steep, cleaning will begin at the bottom (lowest check dam in the ditch) and work up the slope.

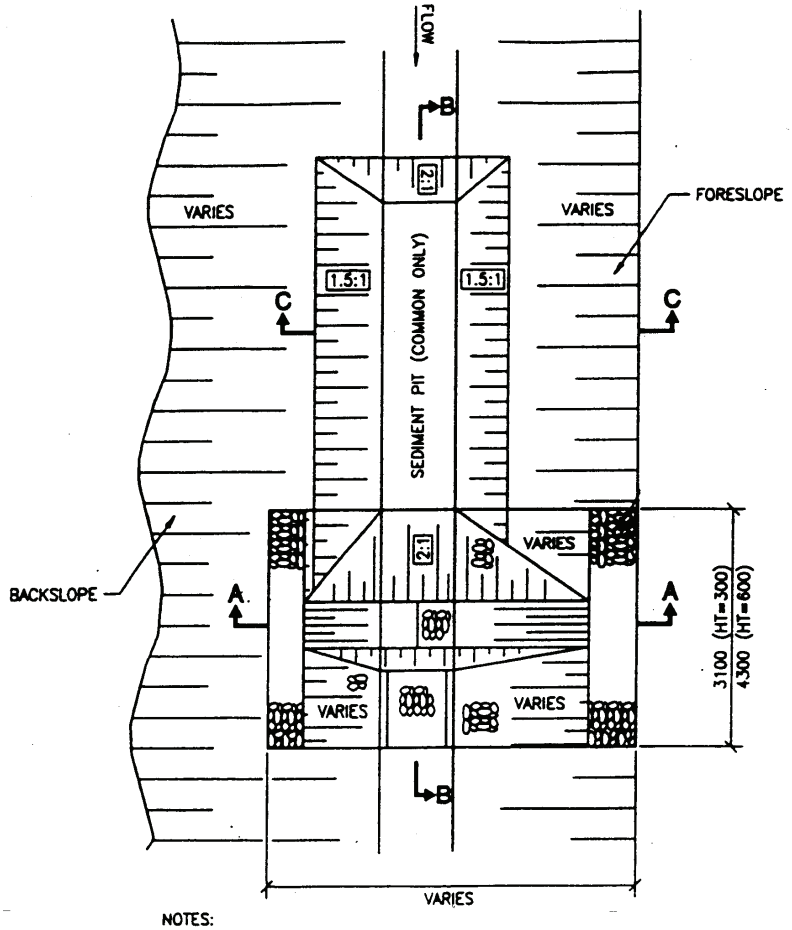


FIGURE 7.1-1 RIP RAP CHECK DAM

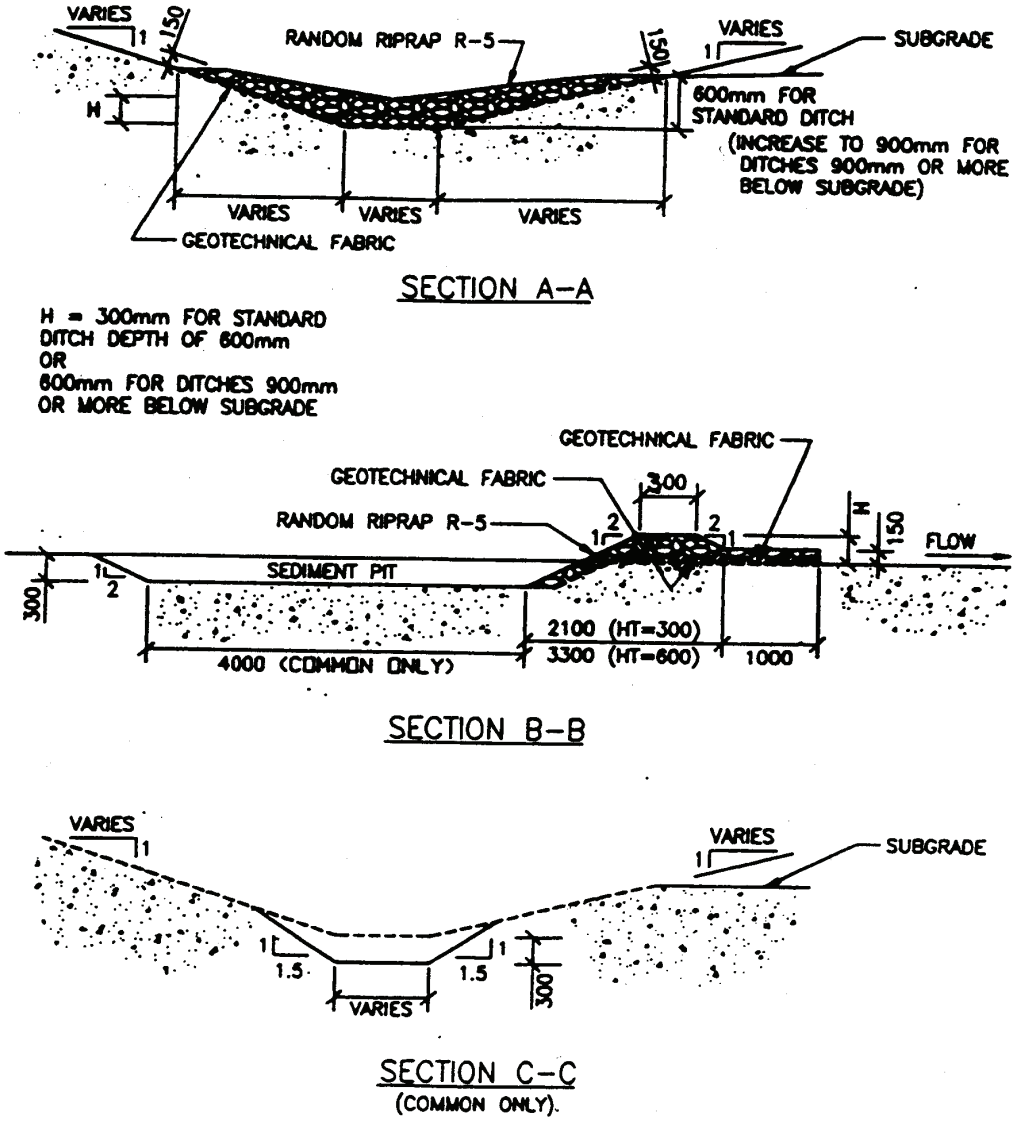
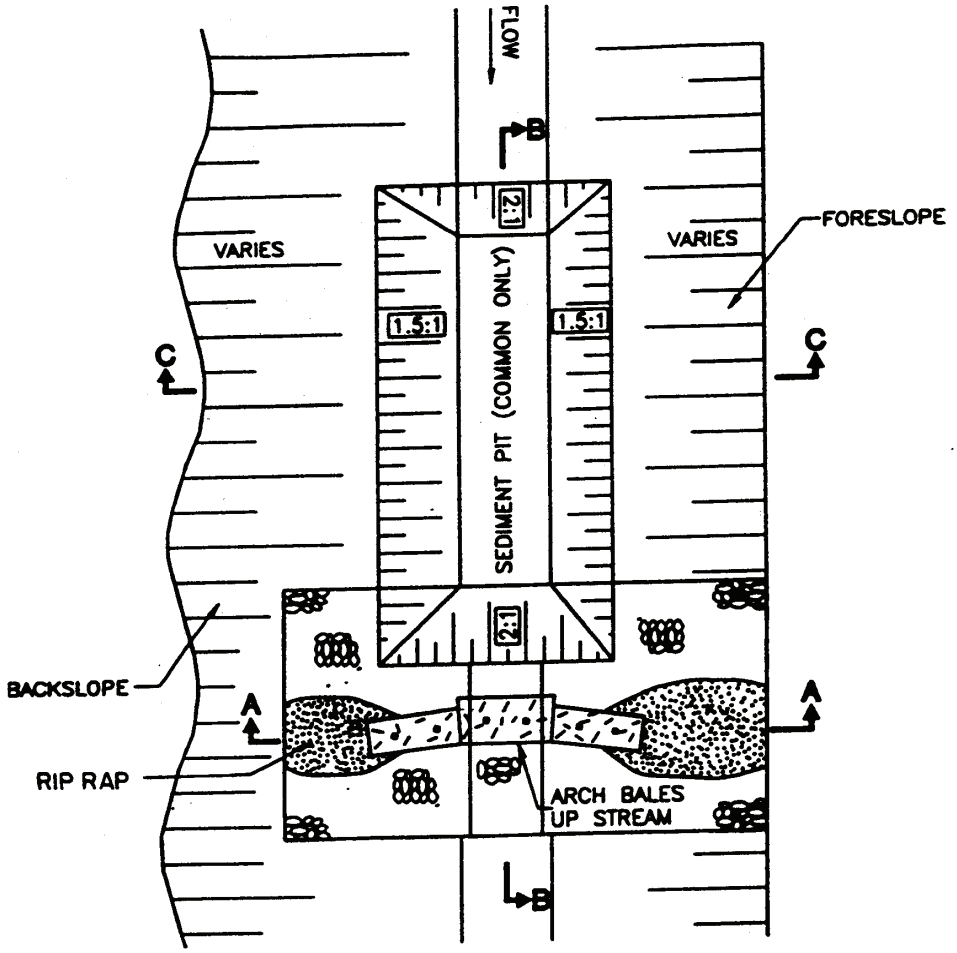


FIGURE 7.1-2.SECTION DETAILS FOR RIP RAP CHECK DAM



NOTES: 1. NUMBER OF 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.

FIGURE 7.1-3.STRAW BALE CHECK DAM

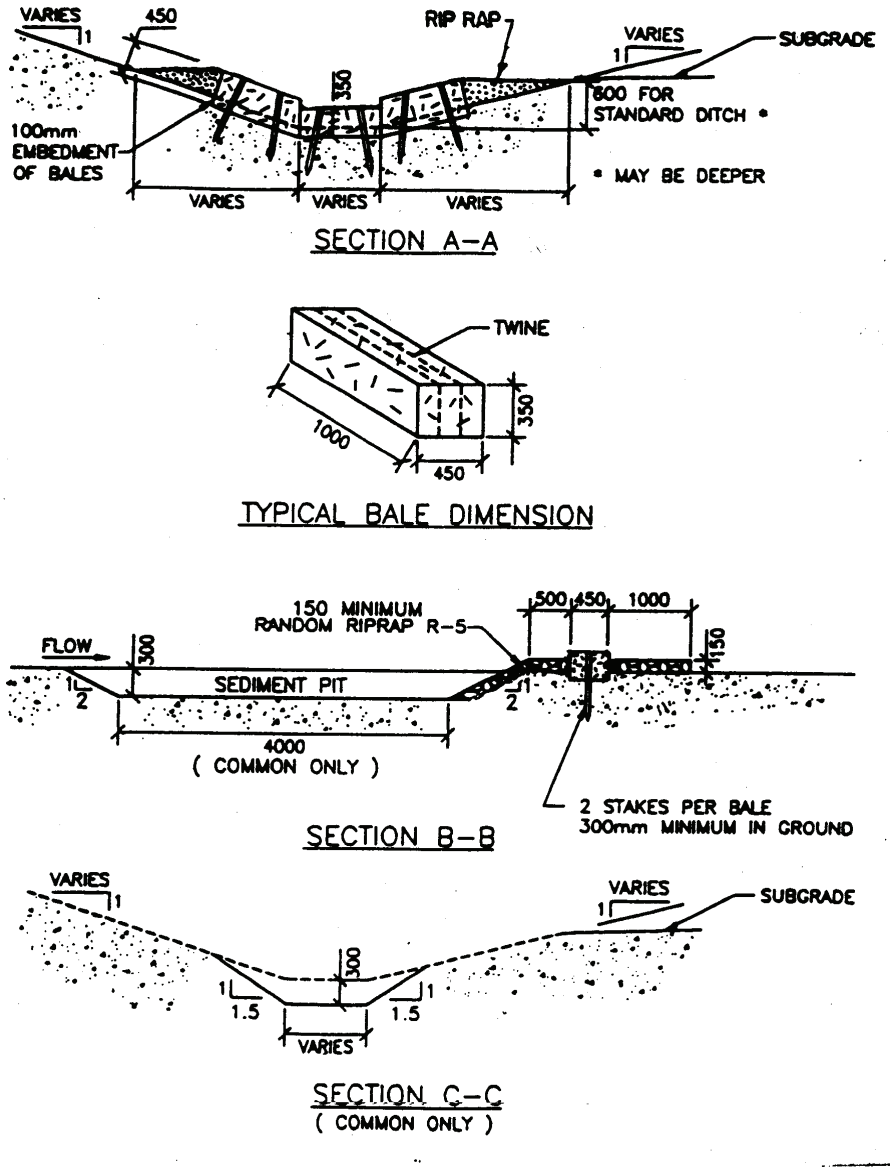


FIGURE 7.1-4.SECTION DETAILS FOR STRAW BALE CHECK DAMS

Sediment traps and sediment collection ponds are installed to intercept and retain sediment-laden runoff so that sediment may settle out, thereby reducing the amount of sediment leaving the disturbed area (see Figure 7.1-5). These traps protect drainage ways, properties, and watercourses/wetlands below the sediment trap or sediment collection pond from excessive sedimentation. They are generally used as a last resort to treat runoff that has become silt-laden. They do not solve erosion problems.

Sediment traps are typically utilized in larger construction projects and as part of the design plans. Sediment collection ponds are typically utilized in smaller maintenance projects and are likely to be located in or adjacent to highway ditches and consequently, are much smaller than sediment traps.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

Installation

Sediment Traps

(a) Sediment traps shall be constructed prior to initial grubbing and excavation of a work site and shall remain in use until the disturbed area is protected against erosion by permanent stabilization.

(b) The average length of the trap shall be at least twice the average width, in order to increase the amount of time available for settling of the sediment to occur.

(c) The trap shall be excavated to a maximum depth of 1 m to lessen the frequency for clean out, and shall be sized properly to handle the expected flows and with side slopes no steeper than 1:1 m. The maximum depth of the sediment trap from the bottom of the trap to the top of the spillway shall not exceed a depth of 1.3 m.

(d) An earthen embankment with a maximum height of 1 m shall be constructed with clean, excavated material at the low end of the trap. The area under the embankments shall be cleared, grubbed and stripped of any vegetation and roots before clean, excavated fill is placed and compacted in 150 mm layers.

(e) The top and outside slopes of the earthen embankments shall be hydro seeded and covered with jute mat immediately after installation.

(f) Immediately beyond the downstream end of the stone outlet, an apron area shall be excavated to a depth of approximately 300 mm (below the bottom of impoundment elevation) to receive the overflow water and to minimize associated erosion (see Figure 7.1-5).

(g) Following preparation of the impoundment embankments and the apron area, the stone outlet (spillway) area shall be prepared. The outlet shall be located at the downstream end of the trap, with its main spillway elevation approximately 300 mm below the top of the impoundment embankments. The spillway shall have a minimum width of 600 mm.

(h) Once the subgrade for the base and side slopes of the outlet as well as the apron are brought to grade, the geotextile fabric shall be placed on these prepared earthen surfaces. The edges of the fabric will overlap onto the earthen embankment areas at least 100 mm. At the upstream side of the outlet, the fabric shall be securely toed-in to the earthen base of the impoundment. At the downstream side of the outlet, the fabric shall extend into the apron area and be securely toed-in to its earthen base material.

(i) The rip rap for the spillway core will then be placed on the fabric, being careful not to damage the fabric. The top of the spillway will be 300 mm lower than the adjacent embankments, and the spillway core will extend across the full width of the outlet.

(j) The core rip rap shall be wrapped with geotextile fabric. At the upstream side of the outlet, the fabric shall again extend down to the impoundment base and be securely toed-in to the earthen base of the impoundment. The fabric will wrap overtop of the spillway rip rap core, down the downstream side of the core, and will extend into the apron and be securely toed-in to its earthen base material. This fabric will extend at least as far into the apron as the previously installed fabric so that runoff flows overtop of the fabric and undermining of the apron is avoided.

(k) Remaining rip rap will be placed on the side slopes of the outlet and on the upstream and downstream sides of the spillway (covering the fabric in these locations), and in the apron area (including overtop of the fabric in the apron) (see Figure 7.1-5).

(1) The sediment trap shall be located and designed for easy clean out by mechanized equipment.

Sediment Collection Ponds

(m) Where applicable, sediment collection ponds shall be constructed prior to initial grubbing and excavation of a work site and shall remain in use until the disturbed area is protected against erosion by permanent stabilization.

(n) The average length of the pond shall be at least twice the average width, in order to increase the amount of time available for settling of the sediment to occur.

(o) The pond shall be excavated to a maximum depth of 1.0 m to lessen the frequency for clean out, and shall be sized properly to handle the expected flows and with side slopes no steeper than 1:1.

(p) At the discretion of the Responsible Person and/or the EMS, immediately beyond the downstream end of the sediment collection pond outlet, a rip rap apron shall be installed to dissipate the energy of the overflow water and to minimize associated erosion.

(q) Following preparation of the impoundment embankments and the apron area, the stone outlet (spillway) area shall be prepared. The outlet shall be located at the downstream end of the trap, with its main spillway elevation approximately 300 mm below the top of the impoundment embankments. The spillway shall have a minimum width of 600 mm.

(r) The sediment collection pond shall be located and designed for easy clean out manually or by mechanized equipment.

Maintenance

(s) Sediment traps and sediment collection ponds shall be inspected regularly and after rainfalls of 5 mm or more. Any damaged areas will be repaired.

(t) These traps and ponds shall be cleaned out when the storage area is two thirds full of sediment. The sediment removed will be disposed of in a location where it cannot re-enter the trap or pond and not within 30 m of any watercourse/wetland.

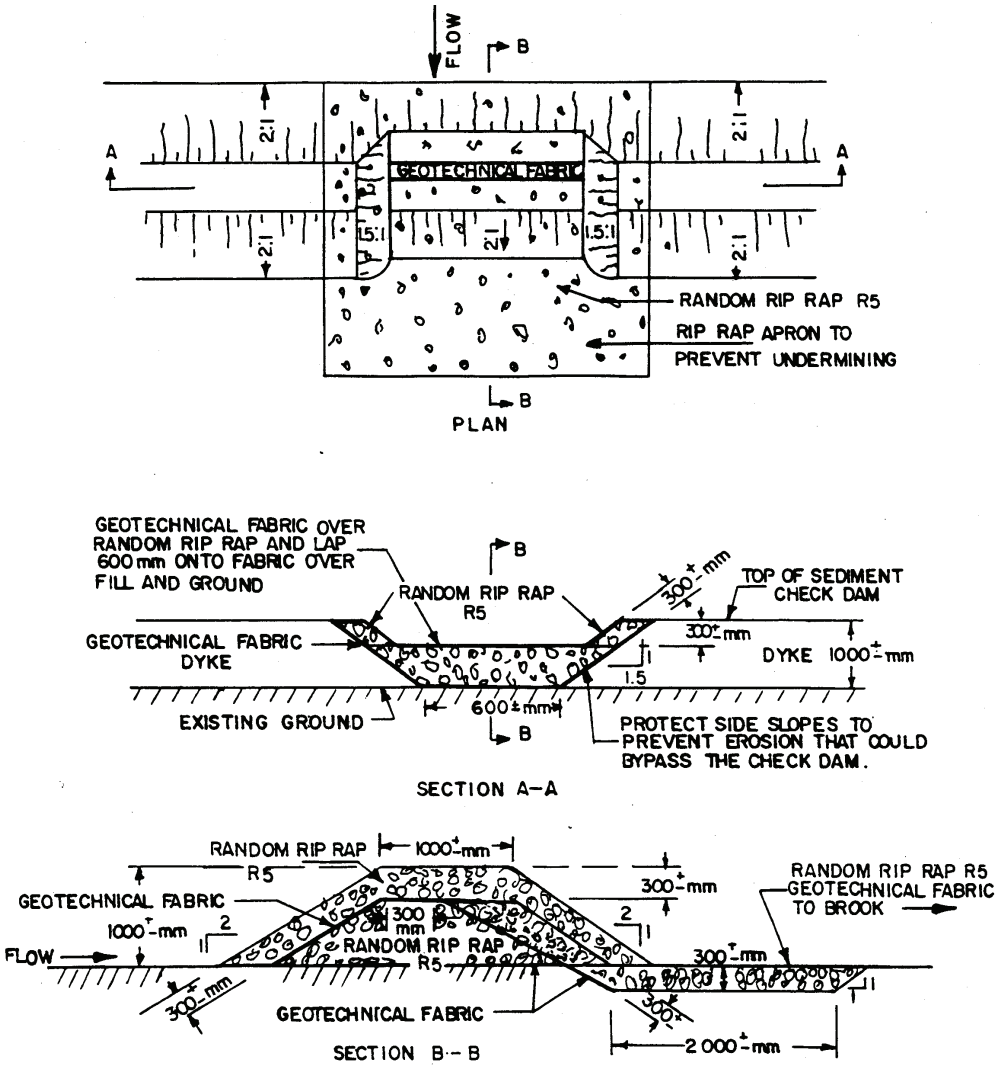


FIGURE 7.1-5 TEMPORARY SEDIMENT TRAP INSTALLATION

Type I silt fences (Figure 7.1-6) are used on land as a temporary sediment control measure in situations where sheet or overland flows are expected. Silt fencing is commonly used to surround a disturbed work site.

Straw bale barriers (Figure 7.1-7) can be used as perimeter containment for temporary materials stockpiles, as temporary silt containment berms around a work site, or as reinforcement for Type I silt fences.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

Installation

Type I Silt Fences

(a) The silt fence shall be installed just up-slope of the area to be protected in order to prevent silt from being directed onto an adjacent property or watercourse/wetland. The silt fence may be set back from the toe of the slope provided that sufficient area is available. This provides for more sediment storage area and locates the fence where runoff velocities are lower.

(b) A trench 100 mm in width and 100 mm in depth shall be excavated on the up-slope side of the fence, as shown in Figure 7.1-6, in order that the silt fence can be keyed into the substrate.

(c) Sturdy 50 mm square wooden stakes (1.5 m in height) shall be driven 400 mm into the ground and 2,000 mm apart along the downslope side of the trench.

(d) The filter fabric shall be in a continuous roll, cut to the length of the barrier to avoid joints. When joints are unavoidable, filter fabric will be spliced together on a support stake with a minimum 150 mm overlap. Filter fabric shall be attached to the stake on the upstream side extending the bottom 100 mm into the trench using 25 mm heavy duty wire staples.

(e) The excavated soil in the trench shall be backfilled and compacted over the filter fabric.

(f) Prefabricated silt fences may be used at the discretion of the EMS, and must be installed according to the manufacturer's instructions.

Straw Bale Barriers

(g) Straw bales will be placed on their sides, tightly together, so that the twine is not in contact with the ground.

(h) Straw bales will be secured by driving two sturdy wooden or steel stakes through each bale, deep enough into the substrate to anchor them securely. The first stake in each bale will be driven on an angle toward the previous bale to force the bales together. May be keyed in to a depth of 100 mm at Engineer's discretion.

(i) Loose straw will be wedged between any cracks or other openings. Loose straw will be scattered over the soil on the upslope side of the barrier.

(j) Straw bales may be used around the perimeter of a silt fence or may stand alone on the upflow side of the fence to reinforce the effectiveness of the silt fence.

Maintenance

(k) All silt fences and barriers will be inspected for breaches after each rainfall and at least daily during periods of prolonged rainfall.

(l) All silt fences/barriers or parts thereof that are damaged shall be repaired immediately to the satisfaction of the Responsible Person and/or the Environmental Officer.

(m) Trapped sediment shall be removed when it has accumulated to a level half the height of the fence/barrier and shall be disposed of at a location not within 30 m of a watercourse/wetland and in such a manner that it cannot enter a watercourse/wetland or other identified environmentally sensitive area.

(n) Straw bales will be replaced if they become clogged with sediment.

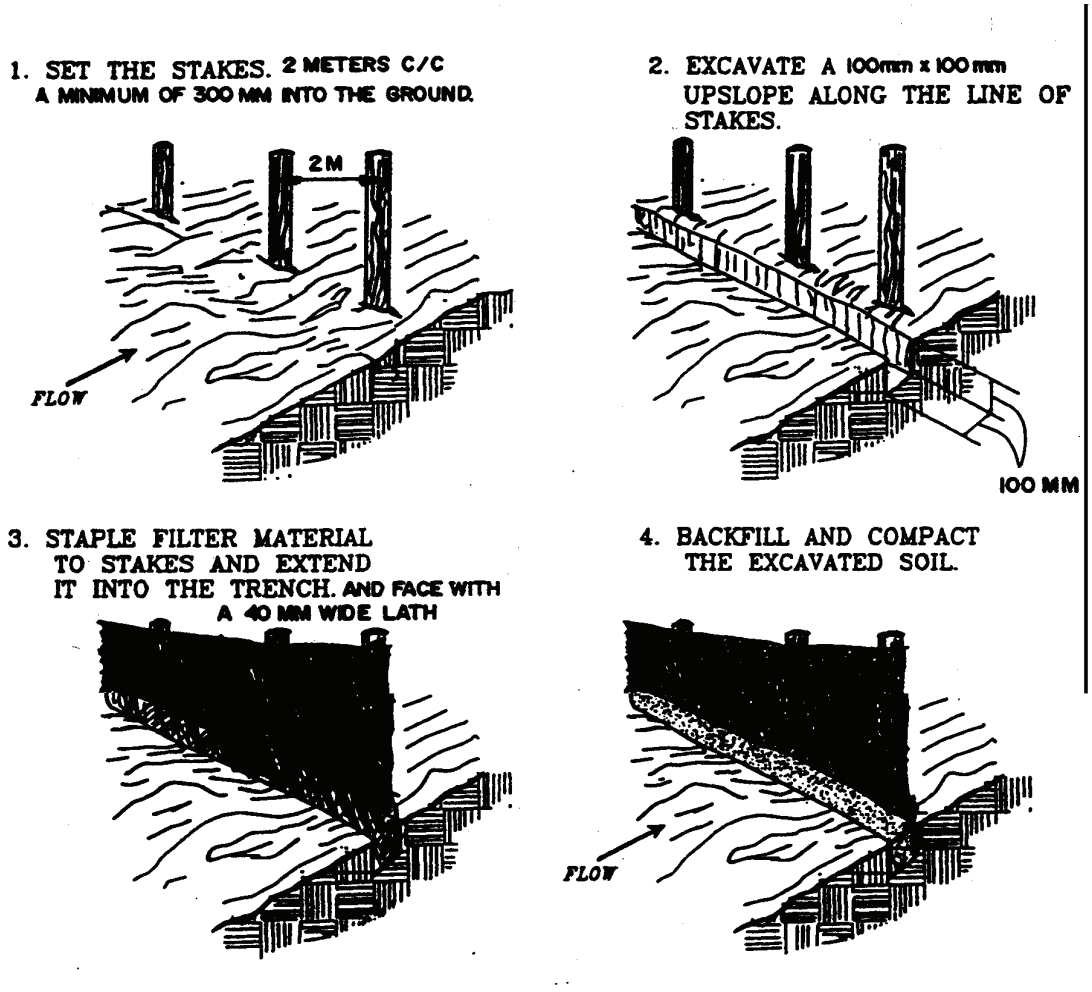


FIGURE 7.1-6 TYPE I SILT FENCE CONSTRUCTION

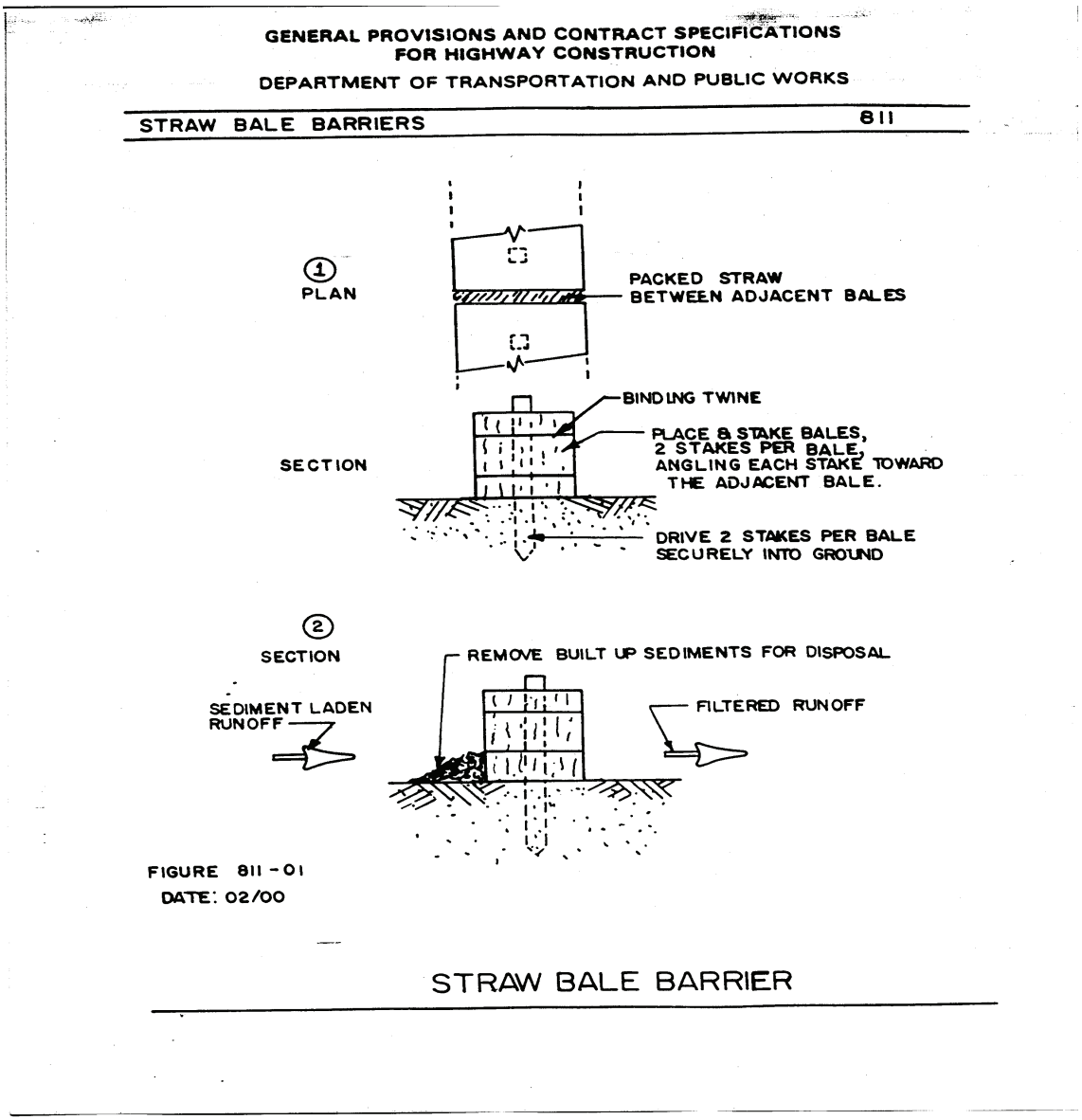


FIGURE 7.1–7 STRAW BALE BARRIER CONSTRUCTION

Type II silt fences used in aquatic environments are similar to the Type I silt fences used on land and they can be toed in (as per Figure 7.1-8) or alternatively tied down by an anchoring system such as rip rap and/or heavy chains to seal the fabric to the substrate. Silt booms (silt curtains) are anchored at the bottom but have a floating boom at the top to keep the containment structure above the water level. Silt booms are particularly used in dredging projects where sediment containment is vital to protect aquatic resources (Figure 7.1-9).

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

Installation

Type II Silt Fences

(a) Type II silt fences shall be configured in accordance with Figure 7.1-8.

(b) All timber used shall be of a local species and non-treated. Post lengths may vary and will be a minimum width of 150 mm square.

(c) All fabric and fasteners shall be of such quality so as to have no detrimental effects on the environment.

(d) Posts shall be driven along the required alignment to a point where support for the fence is attained and will be cut off 500 mm above high high water (HHW). Fabric will be keyed into the sediment bed at a minimum depth of 200 mm.

(e) Using wooden laths, geotextile filter fabric will be installed with overlap at the seams. Overlap seam connections will be tight.

Decommissioning

If posts and fabric cannot be completely removed, then they will be cut off a minimum 76 mm (3") below the mudline.

Silt Booms

(f) Silt booms shall be configured in accordance with Figure 7.1-9.

(g) Chain, wire rope or rip rap (R-5) shall be placed along the bottom toe of the filter fabric in a manner that holds the fabric down to prevent sediment-laden water from seeping out under the bottom of the curtain.

(h) Typical flotation for silt booms should be a minimum 100 mm diameter and will have sufficient buoyancy to provide continuous support and a minimum of 500 mm freeboard.

(i) Silt curtain load lines attached to the flotation material will be 8 mm steel cable or 19 mm nylon or polypropylene rope.

(j) The silt curtain of the boom will have a sleeve sewn along the entire top edge so as to contain the flotation and the load line within the sleeve. A sleeve is also sewn along the bottom edge so as to contain the ballast. The ballast will hold the fabric down and prevent sediment-laden water from seeping out under the bottom of the curtain. The ballast should be 8 or 10 mm steel chain.

(k) The silt boom should be placed a minimum of 5 m beyond the work area. The silt curtain depth should be 450 mm deeper than the high water depth.

(l) Anchors (kedge anchors, concrete blocks, danforth anchors) may be used to provide positive positioning to ensure the silt curtain will not be dislocated.

Maintenance

(m) The silt curtain and/or boom shall be maintained in a like new condition. Repairs will be made to damages that may occur as a result of ultraviolet action, ice action, wave action or any other disturbance. These repairs will be made immediately as required or as instructed by the Responsible Person and/or the Environmental Officer.

(n) A sufficient amount of replacement geotextile filter fabric and flotation material will be maintained on site for emergency repairs to the silt containment structure.

(o) Silt booms should be treated to eliminate the transport of invasive species.

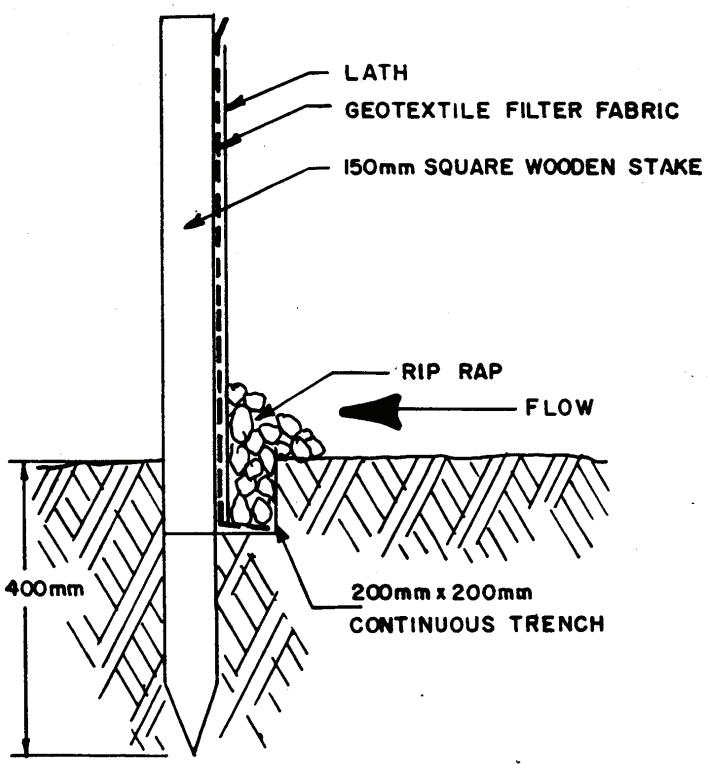


FIGURE 7.1-8 TYPE II SILT FENCE

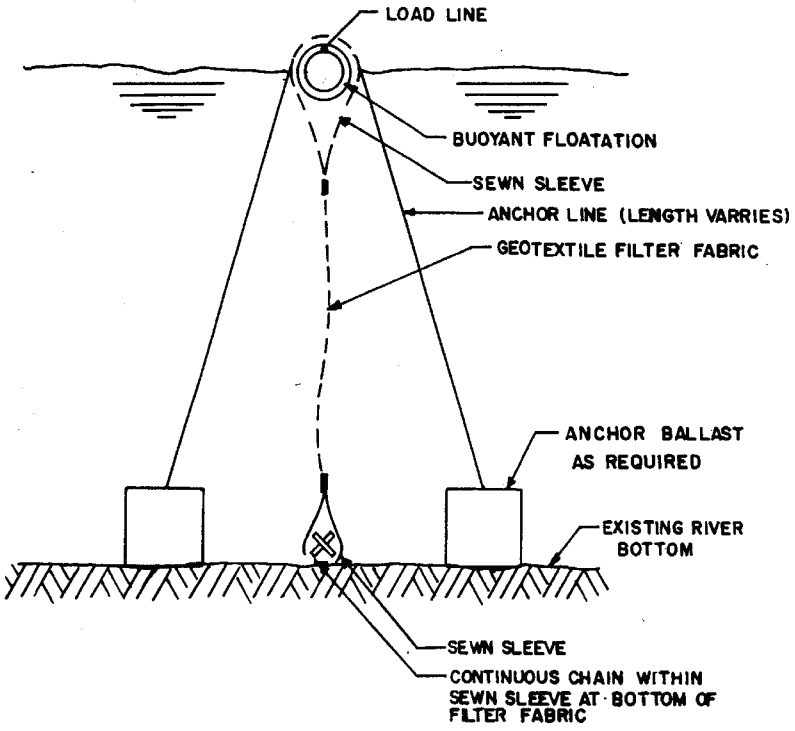


FIGURE 7.1-9.SILT BOOM

Seeding and hydroseeding are conducted to establish a vegetative cover on disturbed and exposed soils. Vegetation provides soil stabilization and is the primary means to filter sediment-laden runoff in road ditches and development areas.

Seeding refers to the application of a seeded mixture to initiate the growth of grass. Hydroseeding is the hydraulic method of applying a mixture of seed, fertilizer, mulch, binder and water on foreslopes, backslopes, ditches and other areas designated, to produce a uniform cover of grasses.

Environmental Protection Procedures

Application

Seeding

(a) After the areas to be seeded have been brought to grade and the topsoil returned, it is recommended that the areas be harrowed to bring the top 100 mm to a loose friable condition. This area shall be left with a true uniform smooth surface. Any stones greater than 50 mm shall be removed and disposed of.

(b) Seeding shall be carried out within 48 hours of completing surface preparation, or as soon as possible after completing surface preparation, as directed by the Responsible Person.

(c) Seeding shall not be permitted on hardened or crusted soil. Areas to be seeded shall be dressed as above or otherwise left in a loosened condition free of ruts, ridges or deleterious materials such as sticks, roots or large rocks.

(d) In steep areas, such as road side slopes, the seed must be covered with mulch (see **Section 7.1.6**) or an erosion control mat (see **Section 7.1.7**) so that the seed remains in place during its germination period.

(e) Depending on conditions and the size of the project, the Responsible Person may require that seeding be done in stages as the work progresses.

(f) Unless otherwise directed by the EMS, seeding will be conducted between May 1 and September 30 to allow for germination and growth of the seed. Sowing will be conducted during calm weather using suitable equipment.

Hydroseeding

(g) After the areas to be hydroseeded have been brought to grade and the topsoil returned, it is recommended that they be harrowed to bring the top 50 mm to a loose friable condition. This area shall be left with a true uniform smooth surface. Any stones greater than 50 mm shall be removed and disposed of.

(h) Hydroseeding shall be carried out as soon as possible after completing surface preparation.

(i) Hydroseeding shall not be permitted on hardened or crusted soil. Areas to be hydroseeded shall be dressed as above or otherwise left in a loosened condition free of ruts, ridges or deleterious materials such as sticks, roots or large rocks.

(j) Depending on conditions and the size of the project, the Responsible Person may require that hydroseeding be done in stages as the work progresses.

(k) The hydroseeding shall be done with an approved machine operated by a competent crew. The materials shall be mixed with water in the tank of the machines and kept agitated to ensure a uniform mix and suspension at all times during the operation. The equipment must be designed and operated to uniformly distribute seed, fertilizer and mulch on the designated areas at the rates specified.

(l) The rate of application shall be 22.5 kℓ of mixture per hectare.

(m) Seeded shoulders shall be rolled to the satisfaction of the Responsible Person.

(n) Hydroseeding shall not be carried out prior to May 1 or after September 30 without written approval from EMS.

(o) Hydroseeding shall not be performed under windy conditions or during periods of rainfall, in standing water, or under adverse conditions.

(p) Within 30 m of a watercourse, the following schedule will apply:

- if hydroseeding prior to June 1 or after September 30, the hydroseed shall be completely covered with an erosion control material within 48 hours. This material shall be either: (a) mulching (see **Section 7.1.6**) covered with jute mate; or (b) erosion control blanket (see **Section 7.1.7**).
- if, due to lateness of the season, hydroseeding is not possible, the exposed area shall be completely covered for "over-wintering" with an erosion control material being either: (a) mulching (see **Section 7.1.6**) covered with jute mate; or (b) erosion control blanket (see **Section 7.1.7**). Then, early in the next growing season, the erosion control material shall be removed, the area shall be harrowed, smoothed and stones removed as described above, and then hydroseeded.

Maintenance

(q) The areas shall be inspected regularly and after rainfalls of 5 mm or more accumulation, the areas will be re-seeded, as required, until the area has stabilized.

(r) Areas of poor growth which exceed 50% of the total area seeded shall be re-seeded. The success of the seeding will be judged on its growth at the end of the growth season.

(s) Additional fertilizer may be applied to facilitate thicker growth.

(t) Sediment control structures will not be removed until the seeded area has been properly stabilized. During their removal, disturbed areas will be leveled and seeded.

Mulch is typically hay or straw, free of weeds and undesirable materials, that is applied on slopes or other exposed ground areas as a temporary erosion control measure. The mulch reduces the impact of rain and the velocity of overland flow by allowing runoff more time to infiltrate the soil and filtering sediment contained in runoff water. Therefore, mulching is a means to reduce the effects of runoff on watercourses/wetlands and other environmentally sensitive areas.

Unless otherwise approved by the EMS, areas requiring full re-vegetation (*i.e*. ditches) shall be hay mulched as hay mulch has been found to facilitate seed germination better than straw mulch. Straw mulch is generally used as a temporary erosion control measure or for overwintering.

Environmental Protection Procedures

Application

(a) Hay or straw mulch shall be applied promptly on the exposed ground surface as soon as practical after the ground has been worked and reshaped to the satisfaction of the Responsible Person.

(b) Prior to mulching, the required grading and surface roughening shall be completed.

(c) Large rocks and other debris that may prohibit uniform coverage shall be removed.

(d) Mulch shall be reasonably free of noxious weeds and other undesirable materials.

(e) The mulch shall not be so wet, decayed or compacted that it inhibits even and uniform spreading.

(f) The length of straw or hay shall be chopped to 200-300 mm to avoid being blown around.

(g) Mulch shall be spread by mechanical means, such as a bale buster, unless the job is small enough to hand spread the mulch. Lumps and thick clumps of mulch shall be thinned.

(h) Mulch applied between June 1 and September 30 may or may not require a binder or jute mat, at the discretion of the Responsible Person or Environmental Officer. All mulching conducted before June 1 or after September 30 shall require a binder or jute mat.

(i) Mulch (without binder) shall be applied at a rate of approximately 9,000 kg per hectare, plus or minus 10%, depending on the type of ground and slope steepness.

(j) When binder is used, it shall be added at the rate of application recommended by the binder manufacturer. Mulching with a binder shall be conducted by spraying uniformly over the designated areas at a rate of 2,200 kg per hectare, plus or minus 15%, depending on the type of ground and slope steepness.

Maintenance

(k) Mulched areas shall be inspected regularly and after rain of 5 mm or more accumulation, repaired as required until the area has stabilized.

(l) The mulch shall be maintained by repairing all damaged mulch and by re-mulching bare spots resulting from the shifting of mulch by wind, water or other means. This shall include application of additional mulch as required.

Erosion control mats serve two functions: control of erosion and washing away of seed during the establishment period of vegetation; and, standard erosion control for overland flows and ditches/gullies. These mats include jute mats and vegetative mats (erosion control blankets) which are available in rolls to cover large areas. They act as mulch to hold moisture in and allow grass to grow through. In this way, they eventually help to establish a permanent vegetative cover.

Erosion control mats are used where runoff or flow velocities are relatively low, on steep sloped banks where sheet erosion hazard is high and germination is likely to be low, and where moving water is likely to wash out new vegetation (*i.e.*, in drainage ditches and grassed waterways) (see Figures 7.1-10 and 7.1-11). The mats provide a reliable cover for overwinter protection for new ditches or newly topsoiled slopes. During the establishment period of protective vegetation, flow velocities should not exceed 1.2 m/s.

Generally, vegetative erosion control blankets are preferred over jute mat.

The following table illustrates the typical *"rule-of-thumb"* side slope protection applications for various erosion control mats. Many situations are unique and the type of erosion control mat utilized will be at the discretion of the Responsible Person and/or the EMS.

Erosion Control Mats
- Typical Side Slope Application -

Erosion Control Mat Type	General Criteria	Side Slope Protection
Jute Mat	-moderate slopes -cover for mulch	$\leq$ 4H:IV
Straw Blanket	-moderate to steep slopes -low flow channels	4H:IV - 2H:IV
Straw-Coconut Blanket	-severe slopes -medium flow channels	2H:IV - IH:IV
Coconut Blanket	-extreme embankment slopes -high flow channels	> IH:IV

Erosion Control Mats - Typical Channel Bottom Applications -			
Erosion Control Mat Type	General Criteria	Channel Bottom Gradient	Channel Flow (m/s)
Jute Mat	-moderate slope -cover for mulch	<1%	low flow (0.5 m/s)
Straw Blanket	-moderate to steep slopes -low flow channels	≤ 1.5%	Low flow (0.75 m/s)
Straw-Coconut Blanket	-severe slopes -medium flow channels	≤ 2.5%	Medium flow (1 m/s)
Coconut Blanket	-extreme embankment slopes -high flow channels	≤ 2.5%	High flow (3 m/s)

The following table can be used as a "rule-of-thumb" guide for estimating average flow velocities for various channel gradients. The flow velocities are based on intermittent channel flow for an earth-lined channel.

Average Channel Flow Velocities - Various Channel Gradients -									
	0.5%	1%	1.5%	2%	2.5%	5%	7%	10%	25%
Flow Velocity	0.4 m/s	0.6 m/s	0.75 m/s	0.9 m/s	1.0 m/s	1.4 m/s	1.6 m/s	1.9 m/s	3.0 m/s

Note: Flow velocities were calculated using the Velocity Equation ($V = (k)(s^{0.5})$, where k = velocity factor and s = slope of the flow path) with a velocity factor for an earth-lined waterway (k = 20), as provided in the Washington State Department of Transportation Highway Runoff Manual (1995). The Velocity Equation is used to estimate average flow velocities at bankfull conditions. The size of the drainage area and the frequency or intensity of precipitation are not reflected in the flow velocity estimates.

Jute Mat

The jute mat shall be constructed of a cloth of uniform plain weave of undyed and unbleached single jute yarn, with a roll width of 1.22 m plus or minus 25 mm and weighing an average of 600 grams per linear meter with a tolerance of plus or minus 5%. The yarn shall be of a loosely twisted construction having an average twist of not less than 1.6 turns per 25 mm and shall not vary in thickness by more than ½ its normal diameter.

Jute mat can be used on low to moderate embankment slopes and low flow channels as a cover for seed, however a vegetative erosion control blanket is preferred. Jute mat is useful as a cover material for mulched areas.

Vegetative Mat (Erosion Control Blanket)

For moderate to steep embankment slopes and low flow channels where protection is required for a short period before vegetation is established, a **straw blanket** is recommended. Depending on the erosion conditions, the straw blanket will be sewn together by either a single biodegradable net on top or by a straw filter matrix between two biodegradable nets.

For severe embankment slopes and medium flow channels requiring long-term protection before vegetation is established, a **straw-coconut fibre blanket** is recommended. This blanket shall include ultraviolet stabilized netting and a high quality straw, either single or double matrix, supplemented with coconut fibre or an excelsior blanket of curled wood excelsior of 80%, 150 mm or longer fibre, covered on top with a biodegradable plastic mesh.

For extreme embankment slopes and high velocity flow channels, and for applications requiring semi-permanent to permanent protection and vegetal reinforcement, a **coconut blanket** is recommended. This blanket shall include a 100% coconut filter matrix between two heavy-duty, ultra violet stabilized nets or curled wood excelsior blanket of 80%, 150 mm or longer fibre and with each side covered with black, extra heavy-duty extruded plastic mesh netting.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 7.0**:

Installation

Installation procedures are illustrated in Figures 7.1-10 and 7.1-11.

(a) Staples for anchoring the mat to the soil shall be No. 11 gauge wire or heavier. The length shall be a minimum of 150 mm. A larger staple with a length of up to 300 mm shall be used on loose, sandy or unstable soils.

(b) After the site has been shaped and graded to the approved design, a uniformly even seedbed shall be prepared, relatively free from gullies, large roots, rocks greater than 40 mm in diameter, and other debris/obstructions that will prevent uniform contact of the protective covering with the soil surface.

(c) The mat material will not be stretched but allowed to lay loosely on the soil. Firm, continuous contact must be obtained between the material and the mulch and/or soil.

(d) In ditches or channels, the erosion control mat shall be laid out in the direction of flow. On steep slopes, the mat shall be laid out with its length extending from the top to the bottom of the slope. The mat will be placed starting from the top of the ditch or slope and unrolled down grade.

(e) At the up slope end of the site, a 150 mm deep trench will be constructed and the upper edge of the matting will be stapled into the trench using staple spacing of 300 mm. The trench will be backfilled and firmly compacted (*i.e.*, anchor slot).

(f) Where the erosion mat lengths are laid side by side on the down slope, the sides will be overlapped by a minimum of 100 mm, and the overlapped materials will be stapled down the centre of the overlap every 450 mm, making sure the mat material is smooth and in firm contact with the soil.

(g) Where map lengths are installed with no overlap, staple spacing along their outside edges may be 600 mm.

(h) Where two mat lengths must be joined end-to-end, the down slope mat will be stapled into an anchor slot trench which shall be backfilled and compacted as outlined above. The up slope mat shall be laid overtop of the finished anchor slot, overlapping the slot and the exposed down slope mat by 300 mm. The overlap will then be stapled at 300 mm spacing on centre.

(i) On slopes or ditches more than 30 m long, there shall be an erosion check slot installed at 15 m intervals. Check slots are trenches 100 mm deep by 100 mm wide. During the mat lay out process, the mat shall be installed in the trench and stapled at 300 mm spacing along the down slope side of the trench. The mat shall continue to be laid (on the down slope side of the ditch or slope). The trench will be backfilled and the soil compacted firmly. It may be beneficial to determine the need for erosion check slots, and construct the trenches accordingly, before laying the erosion control mat.

(j) All staples shall be flush with the ground and secured as per the manufacturer's specifications. Additional staples may be required to secure the erosion control mat in depressions.

(k) The erosion control mat shall be well anchored so that it does not slip or wash out.

(l) If a berm or dyke is located at the top of the slope, the erosion control mat shall be extended over the berm and anchored behind the berm.

(m) At a point where the erosion control mat is discontinued or where the mat meets a structure, the material will be folded under 100 mm and stapled at a minimum interval of every 300 mm across the width of the mat.

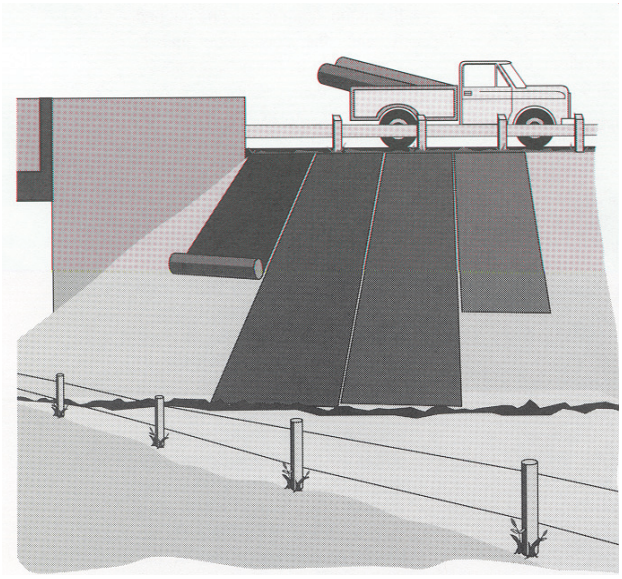
(n) If the manufacturer's installation requirements are more stringent than those identified above, then the manufacturer's requirements shall be followed.

Maintenance

(o) The mat will be inspected regularly and after rainfalls of 5 mm or more accumulation, will be repaired as required, until the area has stabilized.

(p) Any matting that washes out will be repaired and re-seeded.

(q) In the second year, fertilizer may be applied again to facilitate growth.



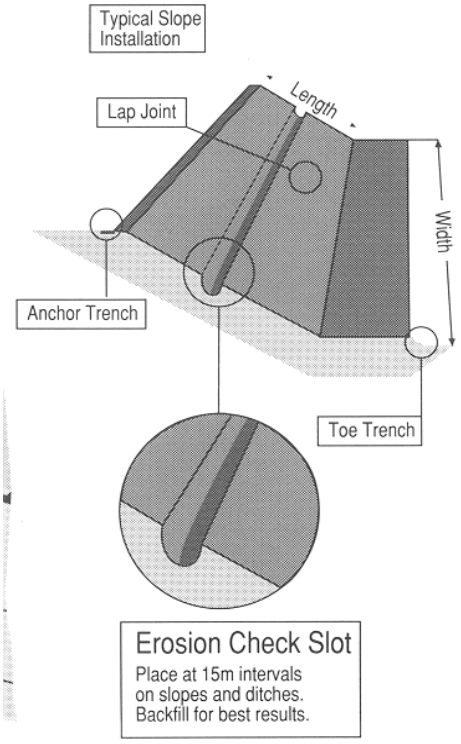
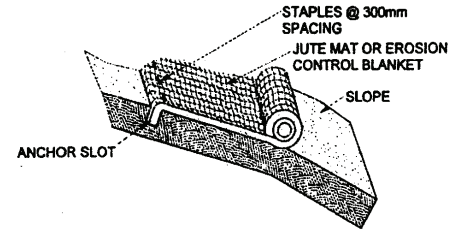
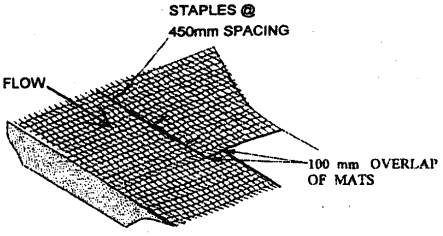


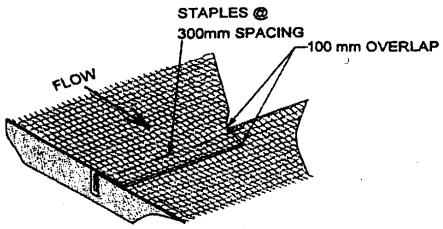
FIGURE 7.1-10 APPLICATION OF EROSION CONTROL MATS



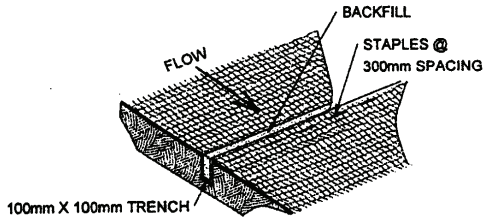
Anchor Slot: Place the up slope/gradient end in a 150 mm deep trench. Backfill and firmly compact trench. Staple at 300 mm spacing along trench. Staple 600 mm apart on outside edges.



Vertical Overlap: Overlap edges by at least 100 mm and staple every 450 mm on centre.



Joining Lengths of Mat: Install down-slope mat in an anchor slot as described above. Overlap up-slope mat 100 mm on top of the down-slope mat and staple at 300 mm spacings on centre.



Erosion Check Slots: On slopes and ditches more than 30 metres long, there should be an erosion check slot installed at 15 metre intervals. Check slots are trenches 100 mm deep by 100 mm wide. Install matting, backfill and compact soil. Place staples at 300 mm spacing on down-slope side along the trench.

NOTE: Follow supplier installation requirements if more stringent than those identified above.

FIGURE 7.1-11. INSTALLATION DETAILS FOR JUTE MATS AND EROSION CONTROL BLANKETS

Sodding is used to produce a uniform cover of grasses so that exposed soil in a construction area is covered, while being re-vegetated at the same time.

Environmental Protection Procedures

Installation

(a) Sod shall be laid within 36 hours of being lifted.

(b) During wet weather, sod shall be allowed to sufficiently dry to prevent tearing during lifting and handling.

(c) During dry weather, sod shall be wetted as necessary to ensure its vitality and prevent the dropping of root soil in its handling.

(d) Only sod with a good cover of living or growing grass, including that which is seasonally dormant during the cold or dry seasons, and that which is capable of renewing growth after the dormant period, shall be used.

(e) Fertilizer shall be 6-12-12 grade, uniform in composition, free flowing and suitable for application with approved equipment. It shall be supplied in unopened waterproof bags that are fully labeled. At least 50% of the fertilizer's components shall be derived from organic sources.

(f) Lime shall be ground agricultural or dolomitic limestone, containing not less than 85% total carbonates. It shall be ground so that 100% will pass a 10-mesh screen and 50% will pass a 100-mesh screen. Lime may be substituted for ground agricultural limestone at the discretion of the Responsible Person.

(g) 100 mm of topsoil shall be applied to areas to be sodded. Topsoil will be spread with adequate moisture in uniform layers during dry weather over approved dry, unfrozen subgrade, where sodding is indicated. Stones, roots, grass, weeds, construction materials, debris and foreign, non-organic objects shall be removed from the topsoil. The topsoil will be rolled with a 45 kg roller, 900 mm wide, to compact and retain the surface.

(h) Sod shall be laid during the growing season. Sodding shall not occur during dry summer periods, at freezing temperatures, or over frozen soil.

(i) Sod shall be laid in rows, perpendicular to the slope, smooth and even with adjoining areas, and with staggered joints. Sections shall be closely butted without overlapping or leaving gaps between sections. Irregular or thin sections shall be cut out with a sharp knife.

(j) Light rolling will be conducted to ensure close contact between sod and soil.

(k) Sod shall be watered immediately after laying (with potable water) to obtain moisture penetration.

(l) Adequate protection of sodded areas against erosion and mechanical damage will be provided.

Maintenance

(m) All sodded areas shall be watered throughout the growing season of the year in which sodding was completed.

(n) Any damaged areas will be repaired to the satisfaction of the Responsible Person.

(o) During the growing season, sodded areas shall be mowed an average of three times per month.

(p) Grass will be cut to a height of 40 mm. Equipment that is in good working order with sharp cutting blades will be used.

(q) Grass clippings will be removed from sodded areas and disposed of in an area a minimum of 30 m away from a watercourse/wetland or other identified environmentally sensitive area.

(r) If broadleaf weeds start to develop, weed killer will be applied in accordance with manufacturer's instructions and an approval from EMS. Chemicals will be handled and stored in accordance with **Section 8.1.**

Gabion baskets are used to protect banks from the severe erosion action of water flow or as a retaining wall of support for an unstable soil bank.

Gabion baskets are most useful where:

- there are extremely steep bank slopes (*i.e.*, the flattest possible bank slope is steeper than the recommended slope);
- slumping is being caused by either seepage or water flow undercutting; and,
- stone of sufficient size is not available for an adequate loose rip rap lining.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

Installation

(a) Silt containment measures shall be installed as per **Section 7.1.4** before any instream or streambank work commences.

(b) Site preparation shall include clearing the area of debris, grading or excavating the site as the plan requires and the installation of any seepage drains or filter fabric required.

(c) The empty gabion baskets, with their lids open, shall be set in place and tied together with connecting wire.

(d) The baskets will be filled with stone that is slightly larger than the mesh opening.

(e) The baskets will be filled by hand to avoid deforming the baskets when dumping stone in.

(f) If the basket is deeper than 300 mm, it will be filled to a 300 mm depth and then tied with connecting wires to opposite sides of each corner to prevent deformation. This will continue at 300 mm intervals until the basket if full.

(g) The lids will be closed and tied down when full.

(h) Where gabions are used for stream bank protection, the basket will be tied back into stable ground.

(i) Any open spaces between the gabion baskets and the bank will be backfilled. The backfill and any other unprotected areas will be covered with either a vegetative lining or a rip rap lining.

(j) The upstream and downstream ends of a gabion basket will be blended into the existing bank with the use of rock rip rap and/or vegetation at the ends of the gabion lining.

Maintenance

(k) Periodic checks will be made for undermining or erosion at locations where the gabion basket meets the bank, and any voids will be filled with rip rap.

(l) Any broken basket wire should be repaired immediately by wiring across the break.

Rip rap is most commonly used as bank protection where vegetation alone is inadequate to prevent erosion. It is applicable where erosion is caused by surface runoff or subsurface seepage on watercourse/banks and bends with erodible soils, and, in areas where submergence lasts continuously for more than a few days.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

Installation

(a) Silt containment measures shall be installed as per **Section 7.1.4** before any instream or streambank work commences.

(b) Site preparation shall include clearing the area of debris, grading the banks to the recommended slope, digging out the toe trench and the installation of any seepage drains required.

(c) A layer of filter fabric or filter stone should be placed before the rip rap stone. If filter fabric is used, stone will not be dropped from such a height that it will damage the filter fabric.

(d) The ends of the rip rap section will be blended into the upstream and downstream banks so the ends do not protrude into the watercourse to cause eddying and further erosion, no more than 1 m beyond existing toe of slope.

(e) If installed under winter conditions, a vegetative lining will be used on any areas that were graded but not rip rapped.

Maintenance

(f) Periodic checks will be made for undermining or erosion at locations where the rip rap meets the bank, and any voids will be filled with rip rap.

(g) Once in place, rip rap lining requires very little maintenance. However, any displacement of stone shall be repaired immediately.

Diversion ditches are used for drainage control by diverting a concentrated flow to sheet flow, and by out-letting this flow into vegetated areas. It is good practice to install a sediment pond at the end of a diversion ditch.

In general, there are two types of diversion ditches, temporary and permanent. Temporary diversion ditches are installed as an interim measure to facilitate some phase of construction. They usually have a life expectancy of one year or less. Permanent diversion ditches are installed as an integral part of an overall runoff water control system and will remain for protection of property.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

Installation

(a) The diversion ditch outlet shall be installed first and will be located at the downslope end of the diversion ditch. The diversion ditch outlet shall be of sufficient size to adequately handle flows and shall be positioned to dissipate flow in the direction of the designated vegetated dispersion area.

(b) All obstructive debris will be removed from the outlet and the diversion channel.

(c) The ditch shall be vegetated and/or protected with rock, asphalt or concrete. If a temporary diversion ditch is being constructed, it may be adequate to line the ditch with polyethylene and construct a number of check dams within it.

(d) Until the turf in the diversion ditch becomes established it will be necessary to:

- divert runoff via an alternate route;
- line the channel with a temporary protective lining and mulch the shoulders of the diversion ditch; or,
- lay sod over the channel. It is recommended that sod be overlapped slightly to increase retardence and erosion resistance on steep slopes. It may be necessary to stake the sod to avoid washout.

(e) Where high flow volumes may overflow the diversion ditch, it may be necessary to contain the flow within the diversion ditch channel by constructing a berm on the downslope side.

Maintenance

(f) Any bare or eroded areas will be re-vegetated.

(g) Accumulated sediments will be removed and disposed of not within 30 m of a watercourse/wetland and such that they cannot wash into a watercourse/wetland or other environmentally sensitive area.

Tap drains are used to carry drainage from the right of way to an eventual area of dissipation. Tap drains may carry season flow or year round drainage.

Tap drains are typically built on private property and an agreement (facilitated by the Properties Section) must be reached with the landowner prior to work being completed.

Environmental Protection Procedures

Installation

(a) The tap drain shall be surveyed to confirm its boundaries, as well as to ensure proper grade for drainage.

(b) The tap drain shall be of sufficient size to adequately handle flows and shall be positioned to dissipate flow in the direction of the designated vegetated area of dissipation.

(c) The tap drain's bottom and side slopes shall be temporarily stabilized with hay/mulch to reduce erosion within the tap drain.

(d) The tap drain shall be permanently vegetated with seed, hydroseed or sod. EMS will provide advice on appropriate permanent vegetation, dependent on site conditions.

Removal of erosion control structures previously installed as a protection measure during construction are removed when deemed unnecessary or ineffective by the EMS. The procedure for removal shall be as directed by the Responsible Person and/or the EMS.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

(a) When deemed by the Responsible Person and the EMS to be no longer required, erosion control devices should be removed by the use of an excavator or other acceptable methods as approved by the EMS, so that all erosion control materials and any retained sediments are excavated with minimal disturbance of the underlying ditches or slopes.

(b) Removed materials and sediment shall be disposed of a minimum distance of 30 m from a watercourse/wetland and such that it cannot wash into a watercourse/wetland or other identified environmentally sensitive area.

(c) Upon removal of the erosion control structure materials and retained sediment, the affected ditches and slopes shall be shaped to match into adjacent final ditch and slope grades and immediately stabilized and/or seeded as approved by the Responsible Person and/or the EMS.

This section includes the installation, maintenance and removal of culverts. Installation and removal procedures are carried out during the construction and decommissioning processes. Culverts, property access, offtakes, catch basins, drop inlets and road-bed sub-drains are cleaned and repaired as required to ensure their proper operation.

Environmental Concerns

Improperly installed culverts can contribute to erosion and siltation of aquatic habitats, and may restrict fish passage. Diverted watercourses can have adverse effects on terrestrial habitats. Improper placement, maintenance and decommissioning of culverts in aquatic systems can restrict fish passage.

Environmental Protection Procedures

In addition to the Environmental Protection Procedures described in **Section 3.0**, the following protection measures will be implemented as appropriate:

(a) A pre-installation stream survey is required. This survey must be completed with a representative of the EMS Section on-site. This survey will determine if DELJ/DFO guidelines for watercourse culvert installation can be met.

(b) Prior to construction, erosion control structures shall be installed as required and as described in **Section 7.1**.

(c) Excavation will begin at the downstream end of the pipe/diversion channel.

(d) Construction activities will be separated from the flow of the watercourse. This may be achieved by diverting the watercourse around the construction site using plastic-lined diversion channels and must be designed in consultation with the EMS and DFO.

(e) Where the maximum desirable slope of the floor (0.5%) cannot be met, interior fish baffles shall be attached to the floor of the structure, as designed in consultation with the EMS and/or DFO.

(f) Flow velocities shall not prevent passage of fish through the watercourse. In cases of high flow velocities, large rocks (300 mm to 600 mm) will be placed intermittently in the channel to provide rest areas for fish.

(g) Rock aprons shall be constructed downstream of the outlets of all culverts to prevent scour of the watercourse bed. This rock should be approximately 150 mm in diameter.

(h) Surveyor must be on site during culvert installation.

(i) DELJ/DFO guidelines for watercourse culvert installation must be followed.

(j) The velocity of the water exiting the culvert may be reduced by use of baffles (energy dissipaters) in the culvert or concrete baffles, mixed rip rap or stilling pools at the outlet end of the culvert. These baffles shall be designed in consultation with the EMS and DFO, such that they do not impede the passage of fish.

(k) As required, the inlet and outlet end of culverts require slope protection and stabilization. Slope stabilization is discussed in **Section 6.6.**

(l) In no cases shall a vertical drop be permitted at the outlet end of a culvert.

(m) Culverts carrying watercourse flow will be installed on a uniform slope, with the inlet and outlet positioned 0.2 D below the natural sediment bed (as per DELJ/DFO guidelines).

(o) The design of new watercourse beds and banks will be conducted in consultation with the EMS and DFO. The inlet and outlet of the culvert and any new watercourse channels are stabilized against erosion by the use of rip rap, gabions, geotextile fabric, seeding, mulching, or a combination of these measures. If new watercouse beds are lined, it will be with appropriate clean granular material such as rip rap and gravel or recycled crushed glass.

(p) Undesirable material such as branches that block the flow of water through structures shall be removed for proper disposal so as to prevent it from re-entering the watercourse.

Noise may be produced mainly as a result of mechanized equipment activities.

Principal Environmental Concerns

Noise levels may be a nuisance to nearby residents as well as disturb birds or other wildlife in the area.

Environmental Protection Procedures

(a) All equipment will be muffled with appropriate manufacturer designed mufflers. All maintenance will be current to ensure that noise levels are reduced to minimum operation levels.

(b) Where nuisance to local residents is an issue, scheduling of specific activities may be directed by the Responsible Person and/or the EMS.

(c) Radios and communication devices will be controlled to prevent nuisance to local residents and the general public.

Lights may be associated with equipment operation requirements and general lighting of work areas.

Principal Environmental Concerns

Excessive light emissions may cause a public disturbance in the vicinity of the project area, particularly during regular public off-work hours.

Environmental Protection Procedures

(a) Lights will be positioned such that the direction of light is opposite to that of nearby residential areas.

(b) Where nuisance to local residents is an issue, scheduling of specific activities may be directed by the Responsible Person and/or EMS.

(c) Area lighting shall be positioned and directed so as not to cause glare to approaching traffic.

8.0 ENVIRONMENTAL PROTECTION MEASURES FOR MATERIALS, EQUIPMENT AND FACILITIES

8.1 Petroleum, Oils, Lubricants and Other Hazardous Materials
8.2 Aggregate
8.3 Solid Waste Disposal
8.4 Sewage Disposal
8.5 Maintenance of TIR Sites and Depots
8.6 Sand/Salt Storage Sites
8.7 Excavation Pits
8.8 Asphalt Plants

A variety of potentially hazardous materials will be in use or storage during work conducted by or for TIR. Potentially hazardous materials routinely used include: Petroleum fuel, oils, lubricants, hydraulic fluids, acetylene, paints and solvents.

The procedures and requirements of the Workplace Hazardous Materials Information System (WHMIS) program will be in place to protect employees and are generally applicable to the protection of the environment.

These WHMIS procedures and requirements reinforce the proper handling, storage, and control of hazardous or toxic materials thereby reducing the potential for accidental release and consequent potential environmental effects.

An appropriately sized Emergency Spill Kit shall be on site as per the terms/conditions of the EMS Approval to Proceed.

TIR's Spill Response Protocol will be followed if any spill occurs on site.

Principal Environmental Concerns

The major concern regarding the use of these substances is their uncontrolled release to the environment through spillage, and subsequent adverse effects on terrestrial, aquatic and marine habitat and species, soil, groundwater quality and human health and safety.

Environmental Protection Procedures

The implementation of a WHMIS program is directly applicable to the use of hazardous materials during work activities. The following protection procedures will minimize the potential environmental effects of the use of hazardous materials:

(a) Hazardous materials will be used only by personnel who are trained and qualified in the handling of these materials and only in accordance with manufacturers' instructions and government regulations. The WHMIS program will be implemented throughout the job site in accordance with Prince Edward Island *Occupational Health and Safety Act and Regulations*. All employees involved with hazardous materials will be appropriately trained.

(b) All hazardous material will be properly labelled in compliance with WHMIS requirements.

Storage of Potentially Hazardous Materials

(c) A complete inventory of all Petroleum, Oils and Lubricants (POLs) stored on a site will be maintained up-to-date at all times, as coordinated by the Responsible Person.

(d) The transport of fuel will be conducted in Compliance with the *Transportation of Dangerous Goods Act*. Deliveries of potentially hazardous materials to a site will be conducted by qualified companies.

(e) Fuel storage will be undertaken in compliance with applicable provincial and federal regulations, codes and guidelines. Gasoline, diesel or other fuels will be stored on level terrain as approved under permits, as applicable. It is expected that only a small quantity of fuel may be required and stored on any specific site.

(f) No storage of hazardous materials will occur within 30 m of a watercourse/wetland or other identified environmentally sensitive area.

(g) Suitable fire fighting equipment will be located near hazardous materials storage areas.

(h) Smoking will not be permitted within 10 m of any hazardous materials storage facility.

(i) Oils and lubricants are to be stored on level terrain in locations approved by EMS.

Equipment Fueling/Servicing

(j) When refueling equipment, operators shall:

-use leak free containers and reinforced rip and puncture proof hoses and nozzles;
-be in attendance for the duration of the operation; and
-seal all storage container outlets except the outlet currently in use.

(k) Fueling and lubrication of equipment shall occur in an equipment staging area and will therefore minimize the possibility of contamination to soil or water.

(l) Regular inspections will be made of hydraulic and fuel systems on machinery, and leaks (*i.e.*, rupture of hydraulic hose, leaks from radiators or fuel tanks, etc.) will be repaired immediately.

(m) Servicing of equipment will not occur within 30 m of a watercourse/wetland or other identified environmentally sensitive area.

(n) Fueling attendants shall be trained in the requirements under the Fuel and Hazardous Material Spills Contingency Plan in **Section 9.1.**

Hazardous Materials Waste Disposal

(o) Waste oils and lubricants will be stored separately in a tank or closed container.

(p) All used oil, petroleum products and other hazardous materials, will be removed and disposed of in an acceptable manner in accordance with government regulations and requirements. Waste oil will be collected separately and offered for recycling or stored for collection by an approved special waste collection and disposal company. A waste disposal permit may be required.

(q) Greasy or oil rags or materials subject to spontaneous combustion will be deposited and kept in an appropriate receptacle. This material will be removed from the work site on a regular basis and will be disposed of in an approved waste disposal facility.

Aggregate may be required for various construction and road maintenance activities.

Principal Environmental Concerns

Environmental concerns associated with aggregate handling include the potential for sedimentation of aquatic systems and for dust effects on air quality.

Environmental Protection Procedures

The following protection procedures will minimize the potential environmental effects of aggregate handling:

(a) Aggregate shall not be stored within 30 m of a watercourse/wetland or other environmentally sensitive area.

(b) All sand, aggregate, soil, or other materials in place or in stockpiles must be kept adequately wetted, confined, covered or contained to prevent materials from being blown or washed away.

(c) Aggregates shall be stored and handled to minimize loss and to allow containment and recovery in the event of an aggregate spill.

(d) Only fill materials acceptable by the Responsible Person are to be used.

(e) Sand and soil stockpiles shall be bermed, sloped and seeded when abandoned to minimize runoff. If stockpiles are not needed immediately after abandonment, then appropriate temporary erosion and sediment control devices shall be installed and regularly maintained as per **Section 7.0.** Aggregates containing sand sized and small fractions will be handled in such a way so as to prevent their erosion and loss to any watercourse/wetland or other environmentally sensitive area.

(f) Dust from aggregate handling will be controlled with water as required as per **Section 3.12**.

Solid waste may be generated from work activities conducted by or for TIR. Waste streams can be classified as domestic waste, paper, cardboard, wood, scrap steel and metals.

Principal Environmental Concerns

Solid waste, if not properly controlled and disposed of, can be unsightly and cause human safety and health concerns.

Environmental Protection Procedures

The following protection procedures will minimize the potential environmental effects of solid waste disposal:

(a) Domestic waste will be gathered daily and stored in closed steel containers until disposed of in an EMS approved waste disposal site.

(b) Food waste will be stored in a manner that ensures wildlife will not be attracted.

(c) The paper, cardboard, wood, scrap steel and metals will be collected separately and offered for recycling where facilities are available. Any surplus of the recycling activity will be disposed of at an EMS approved waste disposal site.

Work area facilities for personnel will have sewage collection systems that will comprise temporary toilet and washing facilities or hookups to permanent facilities.

Principal Environmental Concerns

In most cases, it is not feasible to install permanent sewage treatment facilities at work sites. Employees will require toilet and washing facilities. The release of untreated sewage is a concern to human health, drinking water quality, and freshwater and marine ecosystems.

Environmental Protection Procedures

The following protection procedures will minimize the potential environmental effects of sewage disposal:

(a) Temporary or permanent procedures will minimize the potential environmental effects of sewage disposal.

Temporary Sewage Disposal

(b) During the initial stages of site development and where it is not feasible to install sewage treatment facilities, portable and/or temporary toilets and washcars will be developed with holding tanks.

(c) The holding tanks will be pumped and disposed of at an EMS approved disposal facility, as required.

Permanent Sewage Disposal

(d) Where sewage facilities are required, developments will proceed in accordance with the *Prince Edward Island Environmental Protection Act* for a temporary or permanent sewage collection and treatment system (if required).

Service and minor repairs to equipment are performed at maintenance depots by mechanics or field crews. Waste oil and used solvents are picked up under contract with approved private companies for recycling or disposal. TIR sites and site drains are cleaned and repaired as necessary.

Principal Environmental Concerns

Waste oil and solvents have the potential to contaminate watercourses/wetlands and other environmentally sensitive areas.

Environmental Protection Procedures

The following protection procedures will minimize the potential environmental effects of maintenance of equipment:

(a) An appropriately sized spill kit will be kept on site. TIR's Environmental Emergency Response Protocol will be followed in the event of a spill.

(b) Routine washing with water should take place, where possible, at those sites equipped with oil-water separators.

(c) At sites without separators, care shall be taken to minimize the potential for petroleum contamination by locating wash areas away from watercourses/wetlands and minimizing the quantity of wash water.

(d) Washing of specialized equipment (*i.e.*, paint trucks, engines, etc.) should only take place at facilities that are properly equipped to treat the contaminated wastewater.

(e) Oil, antifreeze, and other hazardous materials will be prevented from entering floor drains.

(f) Dirt and debris from pits and pit drains shall be disposed of at an approved solid waste disposal facility.

(g) All maintenance depots will maintain a supply of absorbent materials to pick up spills and personnel will be familiar with the contingency plan in **Section 9.0.**

(h) No more than 500 L of waste oil shall be stored in individual temporary storage containers. All containers, drums, pails, etc., shall be closed and provided with a drip pan.

(i) Liquid levels and water levels in underground waste oil tanks shall be dipped and levels recorded weekly.

(j) Oil water separators shall be dipped and levels recorded weekly, or any time a spill is known or suspected.

Sand and salt storage sites exist throughout PEI as a means of safely storing bulk winter road maintenance materials.

Principal Environmental Concerns

Potential concerns include contamination of surface and groundwater, as well as destruction of nearby terrestrial habitat.

Environmental Protection Procedures

The following protection procedures will minimize the potential environmental effects of sand/salt storage sites:

(a) Sand/salt storage sites shall not be located within 30 m of a watercourse/wetland or other environmentally sensitive area.

(b) Only one season's supply of winter maintenance materials shall be stored at any one site.

(c) All salt shall be stored in a covered structure designed for that purpose (salt dome or salt shed). Sand shall be stored in domes where possible.

(d) Where sand is stored outside, the sand pile will sit on an asphalt pad.

(e) Salt storage sites must sit on an asphalt pad and be surrounded by an impermeable berm. The site must be properly maintained with all salt kept inside the dome. A permanent salt storage site should not be located within 500 m of a water well (residential or commercial). The doorway must slope away from the dome to prevent runoff from entering the structure.

(f) To prevent leaching of salt chemicals into the groundwater, where possible, a polyethylene barrier will be placed between the subgrade and the gravel borrow interface of the asphalt pad.

(g) Loading of salt into TIR vehicles shall take place inside the storage structure or as close to the entrance as possible. To minimize spillage, loader buckets shall be partially full during loading. Any salt spills in the yard should be immediately re-stockpiled in the storage structure.

(h) Material unsuitable for sanding because of frost penetration (large pieces) should not be stored off the pad. The pad should be kept tidy at all times.

(i) Site drainage should be directed away from storage locations. Ditching around the site or from the site shall be constructed so as to divert sediment free runoff (see **Section 3.3**), preferably to a salt water marsh, river or stream. Site preparation must be conducted to prevent runoff onto the site.

(j) Storage sites shall be designed and constructed for a 20 year life span. Temporary storage sites are not recommended, but when they are being considered, they must be reviewed and approved by the EMS. Proper design shall include:

- adequate surface area for stock piling of material;
- a loading area for trucks and storage of large frozen pieces;
- a pad constructed with an 8 inch to 12 inch granular base and a 4 inch asphalt surface; and,
- a polyethylene barrier between the interface of the subgrade and the gravel to prevent infiltration of chemicals into the groundwater.

Borrow material may be required for road construction and site development. The permitting, and operation of excavation pits is the responsibility of the Department of Environment, Labour and Justice (DELJ).

Principal Environmental Concerns

The primary concerns associated with the development of excavation pits include the sedimentation of watercourses/wetlands, or other environmentally sensitive areas, the loss of terrestrial habitat, noise, dust, and the proximity to residences.

Environmental Protection Procedures

Application for an Excavation Pit Permit shall be obtained by the landowner, or the contractor on behalf of the landowner and shall be issued under authority of the *PEI Environmental Protection Act Excavation Pits Regulations*.

Asphalt plants produce materials used in TIR road construction and maintenance projects. The permitting, and operation of asphalt plants is the responsibility of the Department of Environment, Labour and Justice (DELJ).

Principal Environmental Concerns

The principal concern associated with asphalt plants is the effect on surrounding air quality due to emissions, and potential accidental release of hazardous materials to the environment (*i.e.*, potential groundwater effects).

Environmental Protection Procedures

(a) TIR requires all asphalt plant operators to submit copies of their valid *Air Quality Permits* (issued by DELJ) prior to, or along with their bid documents, in order to be eligible for government contracts.

(b) Failing to submit the permit would result in the denial of tender for government work.

(c) If DELJ advises TIR in writing that an operator fails to meet one or more of the associated terms and conditions of the valid *Air Quality Permit* issued by DELJ, then the bidder will be removed from contract award consideration until such time as the inadequacy is dealt with.

(d) All materials will be handled and stored in accordance with WHMIS and the instructions and procedures contained in **Section 9.1.**

9.0 MISCELLANEOUS

9.1 Fuel and Hazardous Materials Spills
9.2 Uncontrolled Release of Fines
9.3 Heritage Resources
9.4 Wildlife Encounters
9.5 Fish Relocation
9.6 Fires
9.7 Impact on Right of Way by Others

This Fuel and Hazardous Material Spills section presents a detailed response system to deal with environmental accidents such as the uncontrolled release of petroleum, oils or lubricants (POLs), or other hazardous materials.

Principal Environmental Concerns

The day-to-day operations of TIR equipment, machinery and vehicles, as well as the transfer of fuel from storage containers to these, have the potential for fuel spills. Other hazardous material products associated with TIR operations include hydraulic fluids, lubricating oil, solvents, anti-freeze, paint, and small quantities of laboratory reagents. Fuels and other hazardous materials can be damaging to vegetation, soil, surface water, groundwater, human health, wildlife, and aquatic organisms.

Environmental Protection Procedures

The following procedures shall be implemented to minimize the potential environmental effects in the event of a fuel or hazardous material spill:

Personnel Training

(a) The EMS offers an environmental education and orientation session to all TIR employees. This EMS session is mandatory for all permanent TIR staff who are, in turn, responsible to educate all temporary TIR staff on the environmental requirements and policies associated with their work with TIR. This EPP is a most useful tool for such environmental education.

(b) All field supervisory personnel, including foremen and utility workers, as well as all mechanical personnel are trained in and have received a certification in the WHMIS program. These WHMIS certified personnel are then responsible to provide WHMIS briefing/orientation sessions to their staff as appropriate.

Prevention

(c) The Responsible Person will ensure that work equipment is inspected on a daily basis. This inspection will identify problems such as equipment wear and tear, and leaks or damage to the equipment. Fueling of vehicles will be restricted to: (a) areas where sumps and/or grading will be established to contain and direct the containment should an incident occur or (b) a nearby service station.

(d) An emergency spill response kit will be available in any laboratory and hazardous materials storage area. As well, an emergency spill response kit will be located onsite at any large construction project taking place in an environmentally sensitive area. An industrial size spill response kit with ability to absorb and control up to 90 litres of liquid will be located and maintained for use at each of the TIR County garages/depots. The contents of these kits will include a 45 gallon drum with removeable cover, absorbent/containment booms, absorbent pads, blankets and particulate, and disposal bags and ties. TIR service trucks and mobile heavy equipment shall be equipped with appropriately sized spill kits containing a limited supply of absorbent pads and absorbent particulate, so that response materials are present throughout construction and maintenance projects across the Province. As well, a complete list of available emergency spill response equipment will be maintained up-to-date by TIR Maintenance Division, with a copy of the same provided to the EMS semi-annually.

Response-Action Plan

A quick reference guide for spill response is provided in Figure 9.1-1. However, in the event of a fuel or hazardous material spill, the following procedures will apply:

(e) The individual who discovers the spill should respond immediately. Immediate response procedures depend on the severity of the spill but, generally, this individual should take available measures to stop the spill, contain the spill to minimize potential damage, and to clean up the spill. Then, as conditions dictate, this individual should call for assistance for stopping, containing and/or cleaning up the spill.

(f) All spills, regardless of size, will be reported verbally to the Responsible Person immediately upon implementation of (a) above. The Responsible Person will have the full authority to take appropriate action without unnecessary delay. Small equipment leaks and drips do not have to be reported, but they must be prevented by using drip pans or cleaned up with rags or other appropriate means.

The Responsible Person will have a copy of the EPP which outlines the response action, and will halt work in the immediate area and report the spill as follows:

- If (a) the spill is greater than 5 litres or, (b) any spill, regardless of size, that has the potential to effect a sensitive environment, must be reported to the Canadian Coast Guard immediately via 1-800-565-1633. This CCG Emergency Response number operates 24-hours a day, 365 days a year.

- If the spill is less than 5 litres and does not have the potential to effect a sensitive environment, report to the EMS via (902) 368-5221 by the next working day.

For all spills that are called in to the Canadian Coast Guard, a TIR Environmental Incident Report Form (see Figures 9.1-1) will be completed by the Responsible Person to log the spill and the response actions. A copy of the completed Form will be forwarded to the EMS, and a copy retained by the Responsible Person.

As required, the Canadian Coast Guard is to be contacted regardless of the time of day or day of the week. The following information is typically requested by the Canadian Coast Guard:

- name of person reporting the spill and their phone number;
- time of spill;
- time of detection of spill;
- type of product spilled;
- amount of product spilled;
- location of spill;
- source of spill;
- type of accident - collision, rupture, overflow;
- owner of product and phone number;
- if the spill is still occurring;
- if the spill is contained, and if not, where it is flowing;
- cleanup efforts already underway;
- wind velocity and direction;
- temperature;
- proximity to water bodies, wells, water intakes, and buildings; and,
- snow cover and depth, terrain, and soil conditions.

(g) Any spill necessitates immediate onsite response. Therefore, spill response equipment will be stored onsite or at an appropriate alternative, with personnel trained in emergency response available during every shift. The Responsible Person will assume the overall responsibility of coordinating a clean-up and maintaining this contingency current and up-to-date. In organizing a clean-up of a spill in the aquatic environment or other environmentally sensitive area, the Responsible Person, in consultation with the Canadian Coast Guard, will assess site conditions and the environmental effects of various containment and cleanup procedures including the following:

- immediately mobilize containment and clean-up equipment and personnel;
- deploy a floating boom or approved alternative as required;
- assess potential for fuel recovery versus burning;
- deploy on-site personnel to build containment dykes and commence dumping containment in drums or, if drainage system is involved, leakage will be isolated by digging a sump, deploying a pollution boom around area, or a combination of both;
- apply absorbent material for final clean-up;
- dispose of all contaminated soil, debris, cleaning materials, and absorbents in compliance with Provincial legislation and through acquisition of a DELJ *Disposal Permit* (for Permit Call DELJ at (902) 368-5059, DELJ after hours at Pager #1-557-2832);
- non-petroleum based hazardous materials need to be dealt with on a one-by-one basis for handling and disposal. The Responsible Person is to contact the EMS to make the necessary arrangements for such materials;
- locate, map, and stake boundaries of contaminated beach and landfill for future treatment and monitoring;
- assess and appropriately treat any areas disturbed by cleanup activities; and,
- review causes of spill with personnel and take all necessary precautions to prevent reoccurrence.

For spills less than 5 litres and not in an aquatic environment, the Responsible Person shall take the appropriate actions to contain and clean up the spill, and also report the spill and cleanup to the EMS by the next working day.

(h) The use of chemical dispersant to treat oil slicks will occur only under the authorization of the EMS and Environment Canada.

(i) In the event of an apparent fish kill within the project area, the Responsible Person will notify the Canadian Coast Guard and the DELJ through the Environmental Emergencies 24-hour Report Line at 1-800-565-1633. The Responsible Person will have the full authority to take appropriate action without unnecessary delay.

P.E.I. DEPARTMENT OF TRANSPORTATION & INFRASTRUCTURE RENEWAL
Environmental Management Section (EMS)
- SPILL RESPONSE PROCEDURE -
Update 2011

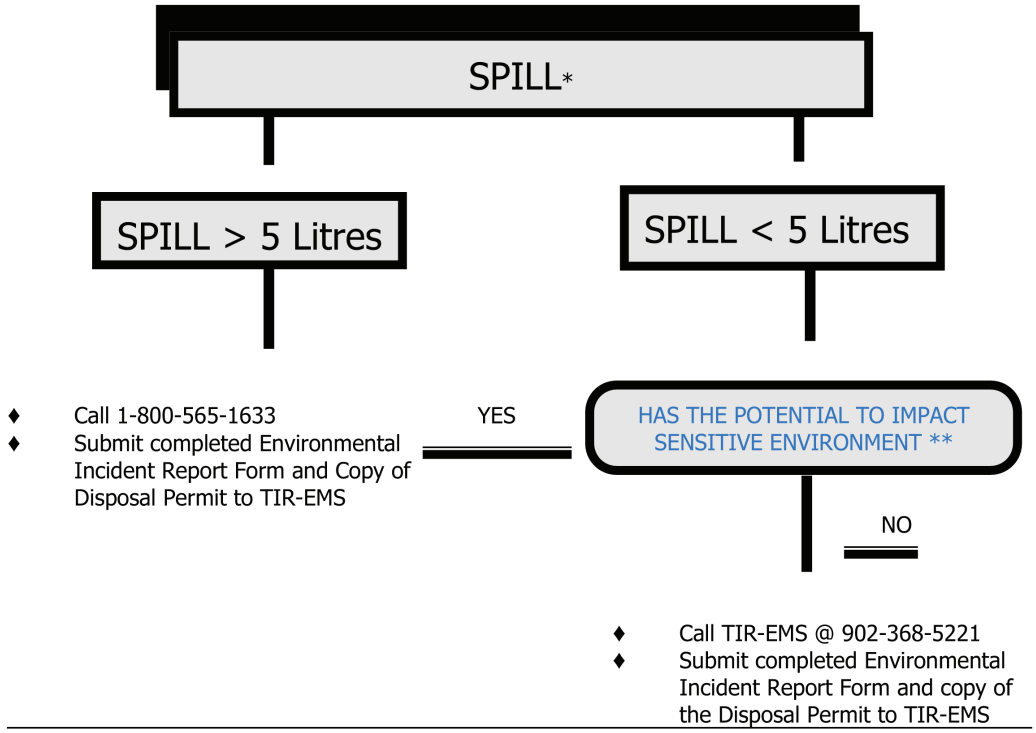
"THREE STEPS TO A COMPLETE RESPONSE PROCEDURE"

RESPOND ⇨ REQUEST ⇨ REPORT

STEP 1 RESPOND immediately to contain the spill, clean up the spill, minimize the damage.

STEP 2 REQUEST additional TIR assistance if required to clean up the spill.

STEP 3 REPORT the spill following the Guide Below.



* includes all diesel, gas, hydraulic fluid, antifreeze, etc
** sensitive environment
- ⇨ watercourse or wetland
- ⇨ sanitary or storm water sewer system
- ⇨ paved road (safety risk)
- ⇨ private property
- ⇨ groundwater well
- ⇨ pesticide

FIGURE 9.1.-1. REFERENCE GUIDE FOR SPILL RESPONSE

Prince Edward Island
CANADA
Transportation and Infrastructure Renewal

Environmental Incident Report Form

Date: _____

Time: _____

PEI TIR Employee Name:

Notification to TIR Environmental Management Section (902-368-5221) ☐ **yes**

Notification to Canadian Coast Guard (CCG) Environmental Emergency Response Phone Line (1-800-565-1633): ☐ **yes**

Location of Incident (Route #, community name): _____

Description of Incident (i.e., spill, accident): _____
Product Type (i.e., gasoline, diesel): _____
Quantity (approximately): _____
Environmental Concerns (i.e., proximity to a watercourse, storm sewer, etc): _____

Final Disposal Method (i.e., Wellington, Superior Sanitation):

Distribution:
Original – Environmental Management Section
3rd Floor Jones Bldg.
PO Box 2000
Charlottetown, PE
C1A 7N8
902-368-5095 phone
902-368-5395 fax
Copies - County Dispatcher

FIGURE 9.1-2. ENVIRONMENTAL INCIDENT REPORT FORM

Damage to or malfunction of erosion control measures could contribute to uncontrolled release of fines.

Principal Environmental Concerns

Uncontrolled release of fines could have potential effects on water quality, aquatic ecosystems and other environmentally sensitive areas.

Environmental Protection Procedures

The following procedures shall be implemented to minimize the potential environmental effects in the event of uncontrolled release of fines:

(a) The individual first noticing the release will immediately report the incident to the Responsible Person and take necessary measures to repair or correct the problem so as to contain the fines.

(b) The Responsible Person has full authority to make decisions regarding the immediate course of action.

The Responsible Person will notify the EMS of the situation and obtain advice from the EMS on the preferred longer term course of action.

(c) If the release has affected or has the potential to affect a sensitive area, the EMS will contact and consult with the appropriate regulatory authorities (*i.e.*, Fisheries and Oceans Canada, DELJ) as required for notification or remedial planning.

Archaeological sites such as structures, tools, graves, shipwrecks or other features, may be discovered or disturbed during project construction or maintenance activities.

Principal Environmental Concerns

These features represent a valuable cultural resource, and uncontrolled disturbance could result in loss of or damage to these resources and the information represented by them.

Environmental Protection Procedures

The following procedures shall be implemented to minimize the potential environmental or cultural effects in the event of the discovery of heritage resources:

Response procedures to be followed by TIR are provided below under "Response-Action Plan", however, the general protection procedures recommended for discovery or encounter of heritage resources, in order of normal preference, are:

- re-routing or relocation of the activity to avoid heritage areas (*i.e.*, areas with known heritage resources and areas with high potential for heritage resources);
- long-term archaeological excavation where the site is not in immediate danger and the project can proceed around archaeological work; and,
- emergency or salvage excavation, when the site must be quickly recorded and excavated.

Personnel Training

(a) The Responsible Person will inform personnel of the potential for heritage resources and their responsibility to report any suspected findings to the Responsible Person.

(b) Reporting procedures for the discovery of heritage resources, and their importance, will be part of the education program for project employees.

Prevention

(c) All known areas containing historic resources should be avoided where possible.

Response-Action Plan

In the event of the discovery of an archaeological artifact or site, the following procedures will apply:

(d) All heritage resources, including archaeological objects and sites of archaeological or historical interest or significance discovered on the site will be deemed to be the property of the Crown and must not be disturbed. All reasonable precautions will be taken to prevent employees or other persons from removing any artifacts or damaging sites, as personnel may be held liable by prosecution for all contraventions.

(e) All work will cease in the immediate area of the discovery until such time the responsible person having consulted with **Ms. Helen Kristmanson**, Department of Health & Wellness (Director of Aboriginal Affairs & Archeology) at (902) 368-5378, advised those involved as to the disposition of the discovery and authorizes a resumption of the work.

(f) Archaeological materials encountered should be reported to the Responsible Person along with the following information:

- nature of activity resulting in the discovery;
- nature of the material discovered;
- the precise location of the find; and
- names of persons witnessing the discovery.

Principal Environmental Concerns

Inadequate food or garbage storage and waste disposal sites may attract animals thus endangering the safety of personnel as well as the wildlife.

Wildlife could be disrupted, confused, or injured if proper avoidance precautions are not carried out.

Environmental Protection Procedures

Personnel Training

(a) Personnel will be advised of the appropriate procedures to use in the event of a wildlife encounter.

(b) Personnel will be instructed in the correct and sanitary method of garbage disposal in designated disposal locations. This will minimize wildlife encounters.

Prevention

The following waste disposal recommendations will minimize the attraction of wildlife:

(c) Keep work area clean of food scraps and garbage.

(d) Transport waste to an approved landfill on a regular basis.

Response-Action Plan

(e) All personnel will report the presence of wildlife to the Responsible Person.

(f) When wildlife sightings are reported to the Responsible Person, the Responsible Person will initiate any reasonable action to reduce the chance of disruption or injury. Should disruption or injury to the wildlife occur, the Responsible Person will contact the local Conservation Officer through the Provincial Conservation Office at (902)368-5000 to initiate an appropriate action plan.

(g) In the case of wildlife encounters in sensitive areas, and for consultation on appropriate action to be taken for any encounter, the Responsible Person will contact the local Provincial Conservation Officer at (902) 368-5000. However, in general:

- no attempt to harass wildlife will be made by any person at the work site; and,
- equipment and vehicles will yield the right-of-way to wildlife.

(h) If dead animals are encountered, they will be removed and disposed of, as soon as possible, in consultation with the location Provincial Conservation Officer (or, in the case of a pet, the PEI Humane Society).

(i) In the case of encounters with injured or diseased wildlife at the work site, the site supervisor will contact the local Provincial Conservation Officer (or, in the case of a pet, the PEI Humane Society). No attempt will be made to harass the animal, and no person at the work site will come into direct contact with the animal.

Fish (including finfish, shellfish, crustaceans and other marine animals) relocation operations will be coordinated through the EMS and will be undertaken in consultation with DFO (Habitat Management Division) and DAF - Forests, Fish and Wildlife, to prevent destruction of fish in situations where construction-related activities place fish in imminent danger of injury or death.

This also applies to the removal of species in aquatic habitat areas that may be dredged/infilled /disrupted due to construction activities.

Principal Environmental Concerns

Destruction of fish habitat could deplete stocks of fish species.

Environmental Protection Procedures

The following procedures shall be implemented to minimize the potential environmental effects in the event of fish relocation:

(a) The area within watercourses/wetlands potentially affected by the activities shall be identified and delineated in the field prior to commencing fish relocation operations.

(b) Methods employed for fish removal shall be dictated by conditions of the watercourse/wetland and shall be in accordance with stipulations of permits issued for fish relocation operations.

(c) Fish shall be relocated by qualified individuals.

Principal Environmental Concerns

Project activities, as well as equipment and activities at the TIR county garages and depots, have the potential to cause fires. Fires, of course, always have the potential to spread and always have the potential to endanger both humans and wildlife, and to destroy habitat, residences and equipment.

Environmental Protection Procedures

The following procedures shall be implemented to minimize the potential for causing a fire and the potential environmental effects in the event of a fire. Note that the following includes procedures for TIR buildings and facilities, and field operations.

Personnel Training

Selected TIR personnel including mechanics, heavy equipment operators and work supervisors receive regular training in fire prevention, response (including use of fire fighting equipment) and control through the office of the Provincial Fire Marshall.

On larger project construction sites, and in TIR buildings and facilities, the locations of fire fighting equipment will be clearly posted onsite.

Prevention and Response-Action Plan

TIR Buildings and Facilities:

- including county garages and depots, laboratories, etc., follow fire prevention and response procedures and policies outlined in the TIR Safety Manual. These include a No Smoking Policy while inside government buildings, requirements for fire fighting equipment, personnel training, and other aspects of prevent and response.

Field Operations:

- follow prevention and response procedures described below.

Prevention:

The following procedures constitute preventative measures:

(a) A *Burning Permit* will be obtained from the Provincial Department of Agriculture and Forestry in advance of all planned open air-fires.

(b) All precautions necessary will be taken to prevent fire hazards when working at the site.

(c) All flammable waste will be removed from worksites, heavy equipment, and vehicles on a regular basis.

(d) There will be no smoking within 10 m of areas where flammable products are stored or used. Suitable areas for disposal of smoking material will be clearly posted.

Response-Action Plan

The following procedures should be followed in the event of a non-forest fire (i.e., localized fires, such as equipment and warehouses):

(e) Onsite personnel will take immediate steps to extinguish the fire using extinguishers or fire hoses.

(f) If the fire is unable to be contained, contact the nearest Fire Department for assistance.

In the event of a forest fire:

(g) The fire must be reported immediately to the PEI Department of Agriculture and Forestry (Forests, Fish and Wildlife) at 1-800-273-5053. The following information will be provided:
- name and phone number of the person reporting the fire;
- time of detection of the fire;
- size of the fire; and,
- location of the fire.

In case of related emergencies, the nearest detachment of the RCMP will be notified immediately.

Use of TIR's ROW by Others (*i.e.*, utilities, municipalities, developers, landowners, operators) or material deposition into TIR's ROW is prevalent throughout Prince Edward Island.

Principal Environmental Concerns

The principal environmental concern associated with ROW use by others is that activities may disturb or introduce hazardous materials or sediment to watercourses/wetlands or other environmentally sensitive areas.

Environmental Protection Procedures

The following procedures shall be implemented to minimize the potential environmental effects on TIR's ROW by others:

(a) Any person or entity conducting work within TIR's ROW must follow the requirements of TIR's Environmental Permitting Process. This includes the proponent's completion and submission of an EMS Project Registration/Application Form for EMS Approval prior to the work proceeding. The EMS' issuance of an Approval-to-Proceed indicates TIR's permission for the proponent to complete the work subject to any conditions detailed in the approval.

(b) Work conducted by Others will be conducted in accordance with the environmental protection procedures outlined in the EPP.

(c) Where materials or substances present in, or directed into, the TIR ROW as a result of activities by others present an environmental threat, the individual sighting the problem will advise TIR's Responsible Person. The Responsible Person will contact the EMS and these two parties will then take necessary actions to address the problem. The EMS will coordinate input from regulatory agencies if required, and the owner of the material or substance will be consulted if appropriate.

This section lists key organizations and/or individuals that may be contacted during environmental emergency situations ("Emergency Contacts"), or to assist with routine environmental issues ("Provincial Government Contacts").

- Emergency Contacts -			
Agency	**Contact**	**Area**	**Phone Number**
Fire Departments		**All**	**911**
Alberton Volunteer Fire Dept.	Kenny Ramsay	Alberton	(902) 853-2863
Belfast Rural Comm. Fire Dept.	Wade MacKenzie	Pinette	(902) 659-2172
Borden-Carleton Volun. Fire Dept.	Paul Murphy	Borden-Carleton	(902) 855-2380
Cardigan Volunteer Fire Dept..	Dwayne MacIntyre	Cardigan	(902) 583-2735
Central Kings Fire Dept.	Arthur MacKay	Central Kings	(902) 583-2350
Charlottetown Volunteer Fire Dept.	Randy MacDonald	Charlottetown	(902) 629-4083
	Noel Palmer	Sherwood	(902) 629-4080
Charlottetown Airport Fire Dept.	Greg McGuire	Charlottetown	(902) 368-4869
Crapaud Volunteer Fire Dept.	Raymond MacDonald	Crapaud	(902) 658-2716
Crossroads Community Fire Dept.	Ron Young	Crossroads	(902) 569-3473
Eastern Kings Fire Dept.	Vaughan Robertson	South Lake	(902) 357-2192
Georgetown Volunteer Fire Dept.	Mark Gotell	Georgetown	(902) 652-2108
Kensington Volunteer Fire Dept.	Alan Sudsbury	Kensington	(902) 836-3088
Kinkora Fire Dept.	Ron Farris	Kinkora	(902) 887-3115
Lennox Island Fire Dept.	Hubert Sark	Lennox Island	(902) 831-2493
Miminegash Volunteer Fire Dept.	Wayne Gallant	Miminegash	(902) 882-4298
Miscouche Volunteer Fire Dept.	Jason Woodbury	Miscouche	(902) 439-0442
Montague Volunteer Fire Dept.	Harry Annear	Montague	(902) 838-2732
Morell Volunteer Fire Dept.	Edward Anderson	Morell	(902) 961-2863
Mt. Stewart Volunteer Fire Dept.	Eddy Doyle	Mt. Stewart	(902) 676-2851
Murray Harbour Volunteer Fire Dept.	Steven MacKay	Murray Harbour	(902) 962-2806
Murray River Volunteer Fire Dept.	Troy Ferguson	Murray River	(902) 962-2506
New Glasgow Fire Dept.	Robert Gallant	New Glasgow	(902) 964-3105
New London Volunteer Fire Dept.	Allen Cole	New London	(902) 886-2737
North River Volunteer Fire Dept.	Kirby Wakelin	Cornwall	(902) 566-2550
North Rustico Volunteer Fire Dept.	Mike Mouradian	North Rustico	(902) 963-2296
North Shore Volunteer Fire Dept.	Bob Morrison	Covehead	(902) 672-3370
O'Leary Volunteer Fire Dept.	Ron Phillips	O'Leary	(902) 859-3542

- Emergency Contacts -			
Agency	**Contact**	**Area**	**Phone Number**
Fire Departments (continued)			
Souris Volunteer Fire Dept.	Colin LaVie	Souris	(902) 687-2937
Summerside Volunteer Fire Dept. I	Jim Peters	Summerside	(902) 432-1224
Summerside Volunteer Fire Dept. II	Jim Blacquiere	St. Eleanors	(902) 432-4434
St. Peter's Volunteer Fire Dept.	Dave Rossiter	St. Peters	(902) 961-2193
Tignish Fire Dept.	Harley Perry	Tignish	(902) 882-3166
Tyne Valley Fireman's Club	Lowell Palmer	Tyne Valley	(902) 831-3039
Vernon River Fire Dept.	Fred McInnis	Vernon River	(902) 651-2697
Victoria Volunteer Fire Dept.	Dale MacDonald	Victoria	(902) 658-2193
Wellington Volunteer Fire Dept.	Chris Arsenault	Wellington	(902) 854-3193
West Point Rural Community Fire Dept.	Harvey Stewart	West Point	(902) 859-3599
Forest Fire Emergencies		**All**	**911** 1-800-237-5053
Emergency Ambulatory Services		**All**	**911**
Hospitals with 24 hr Emergency Services			
Queen Elizabeth Hospital		Charlottetown	(902) 894-2200 emergency
King's County Hospital		Montague	(902) 838-0777 emergency
Prince County Hospital		Summerside	(902) 438-4310 emergency
Royal Canadian Mounted Police		**All**	**911**
Charlottetown		Charlottetown	(902) 566-7112
Montague		Montague	(902) 838-9300
Summerside		Summerside	(902) 436-9300
Alberton		Alberton	(902) 853-9300
Souris		Souris	(902) 687-9300

- Emergency Contacts -			
Agency	**Contact**	**Area**	**Phone Number**
Fuel Spills and Miscellaneous Emergencies			
Environmental Emergencies (Oil and Hazardous Materials Spills)	Canadian Coast Guard	Maritimes	1-800-565-1633
Other Emergency Contacts			
PEI Emergency Measures Organization (Land Based Operations)		Summerside Charlottetown	(902) 888-8050 main (902) 894-0385 after hours
Poison Control		Maritimes	1-877-894-0385

- Provincial Government Contacts -			
Agency	**Contact**	**Area**	**Phone Number**
Transportation and Infrastructure Renewal Environmental Management Section	Brian Thompson Shelley Cole-Arbing	Province-wide	(902) 368-5185 (902) 368-5095
Maintenance Division (County Superintendents)	Mike Berrigan Gordie Lund Gerard Morrison	Prince County Queens County Kings County	(902) 888-8282 (902) 368-5172 (902) 652-8971
Environment, Labour and Justice *Disposal Permits* for Spill Materials Wildlife Encounter	Debbie Johnston Conservation Officers	Province-wide	(902) 368-5059 (902) 368-5000
Health and Wellness Aboriginal Affairs Secretariat	Helen Kristmanson	Province-wide	(902) 368-5378