Schedule B

Environmental Protection Plan

Table of Contents

Enbridge Gas New Brunswick
Environmental Protection Plan

1.0 Introduction

1.1 Environmental Policy

Enbridge Gas New Brunswick (EGNB) is committed to conducting all of its operations in an environmentally responsible manner and will promote employee and public awareness of environmental issues. EGNB delivers increased value to its customers, employees and shareholders through its commitment to environmental stewardship. EGNB will promote the use of natural gas as an environmentally preferred fuel. EGNB is committed to meeting the letter and spirit of environmental legislation, and will set measurable targets of environmental performance and report progress made on meeting those targets.

In addition to EGNB's Environmental Policy, an Environmental Code of Ethics has been developed. This Code acts as a set of guiding principles so that every employee can better contribute to achieving EGNB's commitment to environmental stewardship and protection. The Code of Ethics states that EGNB will:

- Integrate environmental considerations into decision making in order to identify, and, wherever practical, mitigate potentially negative environmental consequences of proposed actions.
- Implement, wherever practical, progressive industry standards, codes and practices, and governmental policies and guidelines for environmental protection in assessing, planning, constructing, and operating all projects and facilities.
- Base decisions on sound research and evidence balancing a variety of disciplines and viewpoints.
- Recognize the intrinsic value of nature and the need to manage our natural resources wisely. This includes the efficient use of energy, conservation, and the use of environmentally preferable energy alternatives. Waste management measures will be implemented for the reduction, reuse and recycling of materials.
- Communicate environmental responsibility and accountability obligations to all employees to promote employee understanding of environmental issues and sharing of values of environmental protection.
- Encourage understanding of the environmental aspects of our business activities through active dissemination of information to the public.

- Work in partnership with governments and other stakeholders in the development of environmental and energy policies.

Although considerable thought has been given to developing the environmental policies and procedures to be followed during construction, it is recognized that these may change as our understanding of the environmental impacts arising from natural gas distribution systems increases, as regulatory requirements change, and as best industry environmental practice evolves.

1.2 Purpose of the Environmental Protection Plan (EPP)

The purpose of the EPP is to provide direction on environmental protection measures to project personnel during the construction of EGNB's natural gas distribution system into and throughout the Province of New Brunswick (NB). The document highlights the environmental issues of concern, and identifies mitigation strategies to minimize those concerns.

This plan is not intended to replace EGNB's existing policies, programs and procedures, but is meant to supplement them. The EPP is meant to be a generic document that identifies construction activities and mitigation strategies common during the planning of natural gas distribution systems.

Site-specific environmental protection measures may be developed separately for environmentally sensitive areas, such as wetlands and major watercourse crossings, once approvals are given. The site specific EPPs will be included as part of the contract documents for projects where they are developed.

1.3 Organization of the EPP

The EPP is meant to be a user guide. This "stand alone document" is divided into the following sections:

1.0 Introduction
2.0 Organization and Responsibility
3.0 Distribution System Construction: Activities and Procedures
4.0 Environmental Considerations and Mitigation
5.0 Contingency Plans
6.0 Compliance Monitoring During Construction
7.0 Environmental Effects Monitoring (Post Construction)

This document is organized such that each topic is on a separate page, which will facilitate easy revision of individual sections to reflect changes in procedure and policy, knowledge gained through monitoring effort, and changes in technology that are beneficial to environmental protection. The revision number is located in the bottom right-hand corner of each page.

2.0 Organization and Responsibility

EGNB has integrated its environmental and health and safety systems into a comprehensive environment, health and safety (EHS) management system. The EHS management system has been established to deliver EHS programs in an effective manner, to provide ongoing feedback to senior corporate officers and EHS managers regarding all aspects of EHS conduct, and to identify areas where policy or procedural changes might be warranted. This EPP is one component of the EHS management system.

Within EGNB, the overall responsibility for environmental management lies with the Operations Manager.

An Environmental Coordinator, who reports to the Operations Manager will be responsible for:

- liaison with Regulatory Agencies (including field inspectors);
- obtaining required environmental permits and other approvals;
- developing, approving, and implementing all environmental plans and programs;
- compiling of environmental inspection records;
- ensuring that the EPP is kept current;
- coordinating revisions of the EPP;
- ensuring the plans are consistent with permit requirements and environmental regulations;
- providing day-to-day advice to the Construction Supervisor and all construction personnel regarding compliance with environmental legislation, regulations and industry standards;
- providing day-to-day advice to the Construction Supervisor and all construction personnel regarding adherence to environmental specifications and commitments made to landowners, regulatory agencies and in the environmental impact assessment report;
- filing reports with the Construction Supervisor which document the environmental conditions encountered, environmental concerns, and response and mitigation measures implemented;
- assisting in implementing environmental contingency plans, if required; and
- coordinate water and soil sampling, or field research on any special environmental conditions relating to the construction, if required.

The EPP will be administered in the field by a number of Inspectors who will report directly to the Environmental Coordinator. The Inspector is responsible for:

- confirming that the environmental protection measures are in place and functioning effectively;
- initiating corrective actions where necessary (see Section 6.0);
- issuing of stop work orders to initiate in-field action when required; and
- maintaining inspection records.

All personnel are responsible for identifying and reporting potential environmental concerns to the Environmental Coordinator, Pipeline Inspector, or Field Engineer. The Environmental Coordinator, Field Engineers and Pipeline Inspectors have the authority to respond to environmental matters/concerns (e.g., work shutdowns / priorities / movement and deployment of machinery and manpower).

3.0 Distribution System Construction: Activities and Procedures

The construction of a natural gas distribution system typically follows a series of distinct operations, regardless of the particular surroundings that the route may cross. The sequence of construction includes:

- Preparation of the road allowance and working area;
- Pipe Trenching;
- Stringing the pipe sections along the trench;
- Joining the pipe sections;
- Pipe installation;
- Backfilling and restoration;
- Distribution system testing and commissioning; and
- Follow-up activities such as monitoring and remediation.

Several work crews, each of which is responsible for performing a specific function to maximize construction progress, will generally complete distribution system construction. In urban areas, construction progress will be slower and will generally be completed by one or two smaller crews that are trained to perform numerous functions simultaneously. An inspector monitors each crew. The crossing of environmentally sensitive features such as wetlands and watercourses requires specific procedures and protocols as discussed further in Section 4.

3.1 Preparation of the Road Allowance and Working Area

On large-scale projects, the initial site clearing may involve removing trees, brush, hedges and other obstacles from the confines of the road allowance. All utilities (e.g., hydroelectric lines) and underground facilities (e.g., storage tanks) are located to ensure proper measures are implemented to avoid damage. Asphaltic concrete and aggregates along the road allowance are stripped from over the pipe trench to allow for subsequent trench excavation. Where required, erosion and sediment control measures are established prior to clearing. In agricultural areas, clearing is followed by topsoil stripping and stockpiling to preserve soil productivity.

Most of the projects undertaken by EGNB are small diameter distribution systems installed in the highway or street road allowance. These projects do not require significant clearing or topsoil stripping. In established neighbourhoods, every effort is made to protect or avoid removing existing trees and hedges. Generally, existing lawns are cut, the necessary grass sod is removed during construction, and then replaced or reseeded. Large and uncommon tree species are identified prior to the clearing of the working area. Those trees are marked and protected by means that may include route changes, boring underneath the trees or their removal and replanting using specialized equipment.

For projects requiring an easement, the width of easement is usually restricted to the amount necessary for the pipe installation and maintenance activities. However, during construction, a temporary working area may also be required. EGNB attempts to carry out the work so that any working area required is minimized. Prior to the entry of the contractor's work force on any private property, an EGNB representative will contact the landowner to discuss specific concerns regarding the Project. The EGNB representative verifies property details on items such as water well locations, access requirements, and current or future land use. Discussions with landowners are recorded and the agreed upon measures are communicated to the contractor for implementation.

EGNB takes all necessary precautions to maintain the flow of water in watercourses during construction. Approvals from regulatory authorities are obtained and erosion and sediment control procedures are implemented prior to construction near major watercourses or other sensitive areas.

3.2 Pipe Trenching

Trenching for the natural gas distribution system generally will involve the excavation of a trench of sufficient depth and width by trenching machines, backhoe, and/or hand excavation. Where bedrock is encountered, mechanical methods such as rippers and hoe-rams are used. In some instances, blasting of bedrock may be required.

Canadian Standards Association (CSA) and EGNB requirements specify the minimum width and depth of cover specific to the respective pipe size (Table 2.1). The depth of EGNB trenches will typically range between 1.2 to 1.5 m below the ground surface. Additional depth may be required at locations such as highway, railroad, watercourse, ravines, and underground utility structures crossings.

TABLE 2.1 - Minimum Earth Excavation

Nominal Pipe Size (NPS)	Cover (metres)	Width (metres)
12	0.9	0.61
8	0.9	0.41
6	0.9	0.36
4	0.9	0.25
2	0.9	0.20

Note: The minimum cover for NPS 8 Polyethylene pipe shall be 0.75 m. Larger diameters to be specified by EGNB.

Excavated material is stockpiled away from the trenches for later reuse in backfilling. Suitable erosion and sediment control measures are employed to manage runoff from the stockpiles. On agricultural lands, the topsoil and the subsoil are separated to prevent mixing.

The amount of open trench within urban areas is kept to a minimum, in accordance with local government requirements. Where necessary in established neighbourhoods, every reasonable effort will be made to minimize disturbance by boring under driveways, hedges and trees.

Care is taken to make sure that the trench bottom is flat and free of rocks or sharp objects that could damage the pipe or its protective coating. When rock is encountered in the bottom of the trench, sand is used as pipe bedding.

3.3 Watercourse and Wetland Crossings

Watercourses and wetlands will be traversed using one of the following methods:

- Horizontal directional drilling (HDD) – HDD involves drilling or boring underneath the watercourse;
- Dry crossing: trenching in "the dry" by diverting/isolating the watercourse from the construction zone;
- Wet crossing: trenching through an open, running watercourse.

The preferred crossing method of watercourses and wetlands is HDD.

The width, depth, and flow of the watercourse, environmental sensitivities, cost, adjacent land use, and soil conditions will all influence the choice of crossing method. Prior to construction, the preferred method of crossing will be identified by EGNB for each watercourse crossing.

In the event that beaver dams are encountered along the route, the removal of the beaver dam will be done in accordance with the New Brunswick Department of Environment Watercourse and Wetland Alteration Provisional Permit.

3.4 Road and Railway Crossings

At railway crossings, EGNB will install the distribution system inside a pipe casing, if required by the authority having jurisdiction. Open cut road crossings may be required where ground conditions or other site-specific requirements make boring impracticable. In these situations, where practical, traffic flow will be maintained.

Traffic control measures will be required when constructing within urban areas. The contractor will install safety barricades, fences, road plates, temporary walkways, signs, and/or flashers, and use flagpersons around any excavation across or along a road allowance that is left overnight or for an extended period of time.

3.5 Pipe Installation

Natural gas distribution systems are constructed utilizing both plastic and steel pipe. Steel pipe is utilized for higher pressure and large diameter distribution systems. The individual steel sections are delivered to the site and then carefully laid out, end to end, along the working area. The sections are welded together by teams of welders, according to strict government standards. The welds along the distribution system are non-destructively tested using a variety of methods, which may include taking x-rays, to ensure their integrity before placement in the trench.

3.5.1 Lowering the Pipe

Generally, plastic pipe is unwound from its spool and lowered into the trench by hand. Steel pipe is lowered by machinery called side booms (a type of crane) which lift sections of the pipe up and move it over the open trench. The sections are then carefully lowered down into the trench.

3.6 Backfilling and Restoration

The term "backfilling" refers to all work required to replace the excavated material in the trench. EGNB makes every attempt to ensure that backfilling of the trench is completed as quickly as possible.

All backfilling is carried out in compliance with the requirements of the appropriate authorities. The material originally excavated is used as backfill unless unsuitable for that purpose. In these cases, approved granular material is used. At watercourse crossings, an approved clean granular material similar in size to the existing river bottom may be used. Any material that may be contaminated or require special disposal procedures is removed from the site and disposed of in compliance with applicable regulations.

The trench is backfilled in layers, with each layer being compacted to the required density before the next layer is placed. Where applicable, clean-up crews repair pavement, sidewalks and fences, pick-up debris, replace sod in landscaped areas and restore sensitive areas such as steep slopes, ditch banks and watercourse crossings. Revegetation of disturbed areas will be conducted as quickly as possible following disturbance to minimize soil erosion.

EGNB attempts to replace all fences, sod, hedges, shrubs and other garden materials that were removed from the trench line prior to ditching, taking care to restore them in their original location and condition. The ground surface on the working area through agricultural land may be prepared by harrowing so that there are no ruts or large clods of soil remaining.

Restoration activities at watercourse crossings may include hydroseeding, revegetation with shrub species (e.g., willow), and / or the use of rip-rap, jute matting or other erosion control material to stabilize disturbed areas and limit soil erosion until revegetation has been successful.

All post-construction activities are carried out by EGNB in consultation with the local municipal authorities, other public utilities, and the owners of private property.

3.7 Distribution System Cleaning, Testing and Commissioning

Before the new distribution system is placed into service, the lines may be cleaned with internal devices known as "pigs". After cleaning, the distribution system is tested to ensure its integrity for the intended service and maximum operating pressure, using either air or water.

The testing procedure using air involves pumping the line full of air to the required test pressure and checking for possible leaks. Upon completion of this test, the air is then bled off from the distribution system. Hydrostatic testing with water is most often carried out for large diameter, higher pressure steel distribution systems. Depending on the location of the distribution system, the water may be obtained from a local watercourse or from a municipal water supply.

When the distribution system is completely filled with water, additional pumping creates a high pressure within the system. A high pressure is maintained for a specified period of time to identify any leaks prior to putting the distribution system in service.

All hydrostatic and air testing will be completed in accordance with the CAN / CSA Z662-07. A Professional Engineer is responsible for the hydrostatic testing and ensures that testing is conducted in such a manner as to protect the safety of people and property in the vicinity of the distribution system.

All necessary permits will be obtained from government authorities for the withdrawal of water for hydrostatic testing purposes. Water is disposed of only at approved locations and in accordance with regulatory requirements.

4.0 Environmental Considerations and Mitigation

The following sections outline various environmental mitigation procedures that should be considered and implemented when constructing a natural gas distribution system.

Section 4.1 Clearing
Section 4.2 Topsoil Handling
Section 4.3 Excavation, Backfilling and Grading
Section 4.4 Clean Up and Restoration
Section 4.5 Vegetation
Section 4.6 Heritage Resources
Section 4.7 Urban Areas
Section 4.8 Fuel, Waste Oils and Hazardous Material Handling
Section 4.9 Preservation of Wildlife
Section 4.10 Erosion and Sediment Control
Section 4.11 Wetlands
Section 4.12 Watercourse Crossings
Section 4.13 Waste Management Plan

The strategies detailed below are general in nature. Additional environmental protection plans may be required for environmentally sensitive areas.

4.1 Clearing

- **Issues**

The first activities carried out in the field during the construction of a distribution system involve the staking of the system alignment and temporary workspace, followed by physical removal of the vegetation where necessary. Vegetation is cleared to remove obstructions that would restrict the safe installation of the distribution system during construction, or compromise the safe and reliable operation of the distribution system. Precautions taken during clearing will maintain soil productivity, speed clean-up operations and support the subsequent restoration efforts.

The environmental issues associated with clearing include maintenance of wildlife habitat, maintenance of wetlands, preservation of unique or specimen vegetation, avoidance of rare plants and maintenance of the integrity of steep slopes and riverbanks.

- **Mitigation Measures**

The following mitigation measures will be followed if clearing is required:

- Flag clearing boundaries prior to clearing operations.
- Minimize the construction area within the road allowance;
- Postpone disturbance within the 30 m buffer of watercourses and in and within 30m of wetlands until necessary.
- Remove trees, debris or soil inadvertently deposited within the watercourse bed and banks in a manner that minimizes disturbance. Do not fell, stand or yard trees across a watercourse.
- Implement erosion and sediment control measures as required.
- No grubbing in wetlands except at trench locations, if required prior to digging, for those wetlands not crossed by HDD.
- Reduce or halt clearing and grubbing activities during heavy precipitation events.

Minimizing the disturbance during clearing provides for efficient completion of construction, as well as effective restoration of the alignment once construction is complete.

4.2 Topsoil Handling

- **Issues**

Topsoil stripping typically involves the removal of a predetermined depth of topsoil from the trench, spoil storage and working areas, to ensure that soil productivity is restored when the topsoil is replaced. The impacts of natural gas distribution system construction on topsoils may include, but are not limited to, soil compaction from the movement of equipment along the construction area, accelerated erosion and soil loss from the clearing of vegetation and handling of soil, topsoil mixing with the less productive subsoil (horizon mixing) during topsoil stripping and trenching, and sedimentation. The effects associated with stripping topsoil can be mitigated in a number of ways.

- **Mitigation Measures**

The following mitigation measures will be considered when handling topsoil:

- Strip topsoil only from areas to be graded including spoil storage and working areas;
- Implement appropriate erosion and sediment control measures;
- Strip topsoil under dry conditions, where practical.
- Delay stripping of approach slopes, floodplains, wetlands and buffer and riverbanks until immediately prior to construction.
- Stockpile topsoil in an approved location that will ensure natural drainage patterns are not impaired.
- Use lightweight and wide-tracked equipment where soil compaction is an issue.
- Replace topsoil once the pipe has been laid and the trench backfilled.
- Respread topsoil at a uniform depth segregated from the subsoil.

The topsoil is replaced to its pre-construction depth over the entire area from which it was removed. Where soil conditions warrant, fertilizer may be applied to facilitate revegetation.

4.3 Excavation, Backfilling and Grading

- **Issues**

Unsuitable construction activities associated with the excavation, backfilling and grading of the pipe trench can have a significant impact on the success of restoration. Poor grading and backfilling procedures can result in decreased drainage pathways, increased erosion, slope instability, sedimentation, and blockage of streamflow. Minimizing soil handling and vegetation clearing, as well as controlling erosion, are all critical for limiting potential impacts.

- **Mitigation Measures**

The following mitigation measures should be considered where appropriate during excavation, backfilling and grading.

- Implement appropriate erosion and sediment control measures as required;
- Minimize the extent, volume and duration of excavation;
- Grade only the trench line and spoil containment areas;
- Grade the work site and crossing approaches only if warranted for safe operation of equipment;
- Minimize grading on steep slopes;
- Use berms, silt fences or straw bale filters to contain excavated instream spoil so that silty runoff does not re-enter watercourse or wetland;
- Dewater the trench onto stable (vegetated) surfaces in a manner that does not cause erosion of soils and sedimentation of watercourses/wetlands;
- Suspend instream work if excessive sedimentation is occurring and implement further protection measures to control sediment loading;
- Minimize the area of disturbance along the streambank or in a wetland;
- Ensure backfill placed in the trench is well compacted;
- Backfill with select backfill (e.g., 2 cm gravel or larger) where reintroduction of the existing backfill into the watercourse is likely to cause excessive sedimentation or if construction of a specific habitat is desired; and
- Carry out blasting activities in accordance with current regulations and guidelines.

4.4 Clean Up and Restoration

- **Issues**

Following the installation of the distribution system, post-construction cleanup commences. In areas of previous vegetation, cover crops (grass/legume mixtures) are planted in an attempt to establish a stable maintenance-free ground cover that will resist invasion by incompatible species. Cover crops also contribute to reduced maintenance costs. Additional objectives of cover crops include erosion control, maintenance of wildlife habitat, and aesthetic enhancement.

- **Mitigation Measures**

The following mitigation measures should be considered during clean up and restoration:

- Commence clean-up of all trench and work areas immediately following backfilling operations. Attempt to complete all phases of clean-up as quickly as possible.
- Regrade streambanks and approaches to preconstruction profile, or to a maximum slope of 3:1 unless otherwise approved by an engineer or permitting authority.
- Replace topsoil and any salvaged trees and shrubs.
- Revegetate streambanks and approach slopes with an appropriate seed mix.
- Develop specific procedures, in coordination with the appropriate provincial agency, to prevent the invasion or spread of undesirable nonnative vegetation.
- Do not fertilize in the immediate vicinity of a watercourse or wetland, where practical.

4.5 Vegetation

- **Issues**

EGNB strives to minimize the removal of vegetation associated with natural gas distribution system construction. During the clearing process, EGNB requires its contractors to preserve compatible vegetation that does not compromise EGNB standards of safety, reliability, environmental protection or cost effectiveness. Every reasonable effort is made by EGNB to preserve unique, rare or special vegetation species.

- **Mitigation Measures**

The following mitigation measures should be considered to minimize the potentially negative environmental effects on vegetation.

- Minimize the extent of clearing to only those portions of the alignment required for the trench, working and spoil storage areas.
- Limit the use of temporary workspace, wherever practical, to reduce the amount of tree clearing.
- Where practical, EGNB will bore, tunnel or hand-dig under trees or hedgerows which provide a natural vegetation screen.
- Utilize measures such as pruning, fencing, tying back of vegetation and barricading to protect trees within the work area which might have been designated for preservation. Working room widths are established and controlled so that the areas under the dripline of mature, specimen trees or other unique vegetation are either avoided or protected by minimizing construction activity.
- Retain tree branches, brush and undergrowth for use as “rollback” during the cleanup phase, chipped for use as erosion control or hauled away to disposal sites.
- In areas where rare plants are known to occur or where there is elevated potential for rare plants to occur, the proposed alignment and associated work areas should be surveyed to confirm presence/absence of rare plants.
- Rare plants relocation/compensation programs may be developed in instances where rare plants cannot be avoided.

4.6 Heritage Resources

- **Issues**

Where warranted, an archaeological assessment (survey) may be undertaken. This assessment is conducted to determine the presence of any archaeological resources (e.g. settlement, camp, midden) on the proposed distribution system route, and to identify the steps required for the management of these resources. Typically, these studies are undertaken in three stages.

- **Mitigation Approach**

In the planning process for the natural gas distribution system, EGNB undertakes a staged archaeological assessment of the study area. The following section defines a Staged Archaeological Assessment as per Archaeological Services of New Brunswick.

Stage I: Preliminary Assessment – carried out prior to assessment of the preferred route and may include:

- archival research using site data files to determine the presence of any known or suspected heritage resources which may be located in a predetermined study area;
- terrain analysis of the study area (i.e., predictive modeling) to identify low, medium and high potential areas for heritage resources; and
- preliminary field examination (walk-over, fly-over, etc.) of the study area to assist in the identification of heritage resources.

Stage II: Field Assessment – necessary if avoidance of heritage resources identified in the Stage I assessment cannot be avoided and may include:

- analysis of existing historical, architectural, aboriginal and archaeological features;
- controlled surface collection;
- test excavation of areas of high archaeological potential;
- delineation of site boundaries; and
- data analysis and reporting of the findings in the Stage I and II assessment including recommendations for mitigation.

Stage III: Mitigation – implementation of recommended mitigation, which may include:

- avoidance through a route change;
- monitoring during construction; and
- controlled archaeological excavation to salvage resources that cannot be avoided.

Where heritage resources are encountered, the appropriate level of archaeological investigation is conducted. Should cultural remains of any significance be affected by the proposed distribution system, mitigation plans will be required prior to construction.

In the event that sites or artifacts are discovered during construction, the Contingency Plan outlined in Section 5 will be implemented.

4.7 Urban Areas

- **Issues**

EGNB locates, constructs and maintains natural gas distribution systems predominantly within urban areas. Significant features of urban areas include residential, commercial and industrial land uses. Open spaces are often encountered as well. These areas are designated as passive and active recreational lands and are typically scattered throughout urban areas.

The urban setting presents a different set of challenges than rural settings. Minimization of inconvenience to the public, traffic and pedestrian congestion, extensive underground utilities and restricted workspace are a few of the factors to be considered in urban areas. These factors, combined with other construction constraints, require detailed pre-construction planning.

- **Mitigation Measures**

The following mitigation measures are used to minimize disturbance to local residences in urban areas.

- Provide adjacent residents with an appropriate notice indicating when construction is scheduled to occur in their immediate area;
- Minimize construction time where in close proximity to residences and limit to the daylight hours where practical;
- Apply appropriate dust controls when necessary (e.g., water sprays and calcium carbonate);
- Provide adjacent residents with an EGNB name to contact for any complaints which may arise during construction; and
- Provide access across the trench line when required.

Public safety is always a consideration with any construction project, especially when undertaken in a congested urban setting. Standard safety precautions implemented on each project include temporary fencing, covering excavations, removal of construction debris, traffic control, and limiting the amount of open trench. Security guards are sometimes posted at the job site if deemed appropriate. These measures are implemented to ensure the safety of the public and minimize disturbances.

4.8 Fuel, Waste Oils and Hazardous Material Handling

- **Issues**

Potentially hazardous material utilized on a distribution system construction project such as fuel oils and lubricants, require environmentally safe handling measures. Transportation, storage and handling recommendations are provided by the manufacturers and/or suppliers of each product. In addition, provincial regulations govern the use and disposal of these products and their wastes. All fuel handling and storage facilities must comply with provincial regulations.

- **Mitigation Measures**

The following mitigation measures for the handling of fuel, waste oils and hazardous material are general in nature and should be considered regardless of construction activities.

- Do not refuel, lubricate or change oil if any mobile construction equipment within 30 m of a watercourse, body of water, wetland or any identified sensitive habit (i.e. National Wildlife Area).
- Collect and dispose of all waste oils, lubricants and filters etc., from equipment servicing in an appropriate manner at an approved location.
- Maintain construction equipment in good repair to avoid leakage of hydraulic, fuel, cooling and lubrication systems. EGNB prohibits tampering with emission control devices of equipment.
- Minimize the operation of any equipment within the wetted perimeter of any body of water and/or wetland and under no circumstances should equipment remain overnight in these areas.
- Store all fuels, lubricants, and other hazardous materials outside the established buffer zones (30 m from watercourses, sensitive habits and wetlands) in designated areas with an impervious liner and berms to provide spill containment for 120% of the total stored volume. Spill kits will be made available on-site.
- Inspect fuel and service vehicles daily to ensure the integrity of the fuel storage tanks. Portable fuel storage tanks should be locked when not in use and containment measures implemented.
- Do not discharge waste water from construction activities, such as concrete mixing or vehicle washing into any body of water and/or wetland.

- Restrict the length of time heavy construction equipment is left idling to reduce the emissions of greenhouse gases (carbon dioxide, carbon monoxide and nitrous oxides),
- Maintain the work area in a neat, orderly state at all times. Litter is not permitted to accumulate or be strewn about the road allowance.
- Collect and stockpile for disposal daily packaging containers such as drums, spools and skids, and lightweight packaging material such as plastic wrapping or adhesive backings.
- In accordance with sound waste management practices, collect as many materials as possible (including plastic pipe) for recycling.

EGNB requires compliance with the following measures by contractors prior to commencement of the construction project:

- all containers, hoses, and nozzles are free of leaks;
- all fuel nozzles are equipped with automatic shut-offs;
- fuel dispensing operators must be trained and stationed at both ends of the hose during fuelling unless both ends are visible and readily accessible by one operator;
- fuel remaining in the hose is returned to the storage facility; and
- spills notification phone numbers are readily accessible.

In the event there is a spill of fuel, waste oils or other hazardous materials, the Contingency Plan outlined in Section 5 will be implemented.

If, during trenching operations, excavated material is determined to be contaminated, utilize environmentally safe handling measures. The Contingency Plan outlined in Section 5 will be implemented following determination of the level of contamination.

4.9 Preservation of Wildlife

- **Issues**

Wildlife populations and habitat are sometimes encountered along EGNB distribution systems. During the route selection, one of EGNB's objectives is to minimize impacts to environmentally sensitive areas which may be of importance to wildlife. Such areas may include breeding grounds, nesting sites, deer wintering yards, unique or rare areas of flora and/or fauna, woodlots, wildlife corridors, parks, wetland systems or other areas designated for preservation. These areas may be designated to be of regional, provincial or national significance and are avoided during route selection where practical. In situations where total avoidance is not practical, site specific measures are established for inclusion in the applicable project design.

Wildlife is temporarily disturbed, to some degree, by the noise and activity associated with the construction process. The resulting impact is relatively localized and short term in nature. Most wildlife common to urban settings will move from the immediate area of construction and return when construction ends, even on a daily basis. However, this may not be true of nesting birds, animals that den, or other animals, depending on individual breeding cycles.

- **Mitigation Measures**

The following mitigation measures are general in nature and should be considered regardless of construction activities.

- Schedule construction to occur during periods of lowest sensitivity to wildlife.
- Abide by all relevant timing constraints for fish, ungulate, avian, etc., as identified by the regulatory agencies.
- Ensure that all material placed within the wetted perimeter of a watercourse or wetland is nontoxic to wildlife (including migratory birds).
- Consider using vegetable based hydraulic oils in hydraulic systems working near or in watercourses, wetlands and NWAs.
- Do not use the area outside the working area for vehicle movement or for storage of construction equipment or materials.
- Establish buffers and minimize construction activities during main breeding season of migratory birds.

- Do not harass wildlife.
- Open pipeline trenches will be monitored during construction to ensure no wood turtles become trapped or are buried in the trenches. Wood turtles found in small brooks or creeks in inland areas will be released on the downstream side of the RoW. Any sightings of wood turtles will be reported to a specialist at the New Brunswick Museum in Saint John.

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Avoiding the Spread of Invasive Species

- Remove and dispose of on land at an approved disposal facility, any aquatic plants uprooted or cut during excavation. It is important that these plants not be deposited in another body of water.
- Determine the presence of aquatic or riparian noxious weeds which construction equipment could carry forward from an infested to a clean area.
- Hose down and thoroughly wash potentially infested equipment and purge and clean all pumps before proceeding from one area to the next if noxious weeds or other pest species are known to be present in the area.
- Locate sources of clean gravel, cobble and riprap, if needed, prior to construction and place onsite for stabilization and restoration.

If wildlife site-specific mitigation measures are required, they will be developed through discussions with the appropriate regulatory authorities.

4.10 Erosion and Sediment Control

- **Issues**

The generation of sediment cannot usually be avoided during the construction of a natural gas distribution system, particularly at watercourse crossings. Erosion and sediment control measures are considered a primary means of sediment control and are incorporated into all watercourse and wetland crossings during the planning stage.

A key component in the planning, design and construction of natural gas distribution system is the use of an erosion and sediment control plan (Plan) for watercourse and wetland crossings and other sensitive habitat. The Plan, which includes a description of what on-site activities will take place and the mitigation measures to be used to control sediment at each step of a construction project, is prepared prior to construction. The object of the Plan is to identify potential problems or hazards and mitigation measures for erosion and sediment control and to be flexible to allow for changes and improvements during construction.

There are a number of accepted approaches to erosion and sediment control from which to select when developing an erosion and sediment control plan. The most commonly used methods for distribution systems are:

- Preserve existing vegetation;
- Minimize grading;
- Silt fences;
- Straw bales;
- Sediment trap; and
- Temporary diversion berms.

Additional details on these methods are presented in the following Table 4.1.

TABLE 4.1 – SURFACE EROSION CONTROL

(Reproduced from CPWCC, 1999)

Technique	Description	Advantages	Disadvantages	Comments
I. CONSTRUCTION PHASE				
Preserve existing vegetation	• maintain vegetation where practical • minimize grubbing and maintain root mat	• inexpensive • permits infiltration by water • native vegetation maintained • minimal surface disturbance	• possible congestion of construction traffic • may create unsafe working conditions • may impair erosion control in some conditions	• applicable for slopes, streambanks and floodplains • aids reclamation practices • good in areas with erodible soils, sensitive vegetation • standard procedure to minimize disturbance
Minimize grading	• reduce cut and fills for minor depressions/gradient changes	• inexpensive • reduces surface disturbance	• may create unsafe working conditions • may impair erosion control in some conditions	• applicable for gentle slopes, small hummocks and rolling topography • standard procedure to minimize disturbance
Silt fences	• geotextile fences, partially buried, placed along slopes perpendicular to the fall line used to slow/block sediment transport along a slope • often at the base of slopes adjacent to watercourses • secured with steel rods or wooden posts	• prevents saturated spoil/ slopewash from entering a watercourse • minimizes erosion	• possible obstacle to construction traffic • may washout/fail if not properly installed	• temporary measure used on slopes with erodible soils to minimize sediment release into watercourses prior to revegetation
Straw bales	• bales used to slow/block sediment transport along a slope • secured with steel rods or wooden posts	• prevents saturated spoil/ slopewash from entering a watercourse • minimizes erosion	• possible obstacle to construction traffic • may washout/fail if not properly installed	• temporary measure used on slopes with erodible soils to minimize sediment release into watercourses prior to revegetation
Sediment Trap	• excavate minor depression(s) to allow sediment to settle	• does not require specialized equipment • prevents large volumes of sediment from being washed away • may be used in conjunction with silt fencing/straw bales	• may obstruct construction traffic • spoil from sediment trap requires additional slope area • may create a bigger mess	• used for isolated areas prior to final clean-up • not common

Technique	Description	Advantages	Disadvantages	Comments
Temporary diversion berms	• low subsoil berm across entire road allowance used to divert surface water flow off the road allowance	• inexpensive • effective at diverting surface water flow • can be readily installed and repaired	• due to low profile of berm(s), over topping/ washout can occur during major precipitation event • must be repaired on a daily basis	• applicable for approach slopes • permanent berms will replace temporary berms during rough clean-up • common practice

- **Mitigation Measures**

The mitigation measures for erosion and sediment control during the construction of the distribution system may include the following:

- Install erosion and sediment control structures (Table 4.1), as required;
- Inspect and maintain erosion and sediment control measures;
- Regulate drainage from construction areas to prevent erosion and sedimentation;
- Ensure ditches do not drain directly into a watercourse or wetland without proper sediment control devices;
- Schedule grading and construction to minimize soil exposure;
- Retain existing vegetation whenever practical;
- Divert runoff away from denuded areas;
- Vegetate and mulch denuded areas except in wetlands, which should be left to revegetate naturally on the trench line, unless there is a high probability of affecting water quality by sedimentation such as in areas near watercourses that are directly within wetlands;
- Minimize length and steepness of slopes;
- Prepare drainage ways and outlets to handle concentrated or increased runoff;
- Install temporary berms on approach slopes to watercourse and/or wetland immediately following clearing and grading;
- Install temporary silt fences (geotextiles or hay/straw bales) near the base of slopes if heavy rains or surface erosion could result in siltation of the watercourse and/or wetland;
- Install temporary silt fences (geotextiles or hay/straw bales) in locations where run-off from the road allowance may flow into a watercourse and/or wetland.

Site specific erosion and sediment control plans are normally prepared for major watercourses, wetlands and other environmentally sensitive areas.

4.11 Wetlands

- **Issues**

Distribution systems are generally constructed within existing road allowance. Where routes traverse wetland areas, existing road allowances usually provide adequate access. When traversing wetland areas where no road allowance exists, EGNB may construct a granular access road to facilitate efficient movement of construction traffic and minimize disturbance to the natural area. Typical access roads are constructed with geotextile fabric and oversize rock that are removed after construction. Wetland areas are typically designated as a "restricted traffic zone", limiting access to necessary construction traffic only. A Watercourse and Wetland Alteration Permit will be required prior to construction within 30 m of a wetland.

- **Mitigation Measures**

Definition of appropriate mitigation measures is largely dependent on habitat-specific construction techniques (e.g., open water vs. dry soils construction methods). However, several generally applicable mitigation measures for wetland crossings include:

- Minimize the construction period in wetlands;
- Minimize construction area width, where practical;
- Avoid ground disturbance within 30m buffer by locating bore pits, containment and/or dewatering of drill muds and waters outside of 30m buffer;
- Install sediment and erosion control around all bore entry and exit points;
- Minimize ground and vegetative disturbance by locating staging areas outside of the wetland, at least 30 m from the edge of wetland;
- Minimize equipment in wetland to only that required for construction activity;
- Adhere to conditions of applicable watercourse and wetland alteration permits;
- Construction following storm events which have resulted in high water levels should be conducted only as approved by qualified Inspectors; similarly, construction during storm events should be postponed if excessive runoff erosion is likely, or working conditions become unsafe;
- Maintain vegetative diversity by following applicable mitigation plans to protect plant species of special status, if present;
- Mitigate direct physical disturbance, where practical, by cutting trees close to ground level and leaving existing root systems intact where practical;
- Follow applicable Site Specific Environmental Protection Plan;

- All machinery will be cleaned prior to entering a wetland or watercourse or its 30m buffer to prevent the spread of invasive species;
- During site restoration, mitigate effect on vegetation by not applying fertilizer, lime or mulch to wetland as part of revegetation plan; and
- Restore original contours and cross drainage patterns.

When a wetland has been directly disturbed, EGNB will work with its environmental consultant and the NBDENV to implement an Environmental Effects Monitoring Plan (EEMP) to ensure that wetland function has not been altered or lost. The EEMP will include at least one year of monitoring post-construction unless additional follow-up monitoring is required.

Upon completion of construction, wetlands are returned to their original state. To encourage revegetation, EGNB attempts to use only native species for revegetation.

4.12 Watercourse Crossings

- **Issues**

Watercourse crossings require environmental planning prior to construction to protect downstream water users, fish and their related habitat from sedimentation, as well as the hydraulic characteristics of each watercourse. With the cooperation and assistance of regulatory agencies and natural gas distribution system contractors, methods for constructing distribution systems across environmentally sensitive areas have evolved. A number of mitigation measures have been developed to minimize the effects of watercourse and wetland crossings. The watercourse crossing technique is selected based on stream sensitivity and engineering constraints. A site specific erosion and sedimentation control plan will be developed for significant watercourse crossings.

All required watercourse crossing permits are obtained by EGNB and supplied to the contractor. The contractor becomes familiar with all of these requirements and restrictions, and conducts the work in accordance with such requirements.

Erosion and sediment control plans are used in the planning, design and construction of distribution system watercourse crossings. These plans consist of generally accepted "best practices" and site specific plans for high risk situations. At watercourse crossings, erosion control measures to protect water quality should be installed prior to removal of low vegetative cover on the stream banks. Vegetation removal should be delayed until just prior to instream activity.

Options other than horizontal directional drilling include boring for small watercourses or on larger watercourses "in stream crossings" with specific mitigation measures implemented. These measures are designed to reduce the silt input to the watercourse, maintain adequate stream flow, stabilize the trench excavation across the waterway, and ensure that the vegetation removed from the slope approaching the watercourses is kept to a minimum. For wet crossings, a site specific sediment control plan is to be prepared by EGNB and approved by the New Brunswick Department of the Environment (NBENV) before construction.

- **Mitigation Measures**

The following mitigation measures should be considered for watercourse crossings:

- Schedule construction activities during periods of least sensitivity to fish species;
- Minimize the total number of crossings in route selection;
- Minimize the period of in-stream activity;
- Stockpile trench spoil in discrete piles beyond watercourse banks;
- Backfill the watercourse trench with granular material;
- Retain vegetation buffer strips;
- Avoid side-digging to obtain minimum cover;
- Consult with provincial fisheries biologists, wildlife biologists and regional Fisheries and Oceans Canada (DFO) representatives in addition to other regulatory agencies early in the planning phase should blasting in or near streams be considered;
- Follow provincial and federal guidelines during blasting in or near watercourses.

The restoration of the watercourse channel includes removal of all temporary structures, reshaping the stream to its original configuration and slope using clean stone, and the removal of all construction materials and debris. The banks of the watercourse are restored to the original grade and stabilized upon completion of construction to prevent further erosion.

Additional details on watercourse crossings including mitigation measures are provided in Table 4.2 (reproduced from Canadian Pipeline Watercourse Crossing Committee (CPWCC).1999. Watercourse Crossings).

Table 4.2 Pipeline Watercourse Crossing Construction Techniques

			Environmental Considerations		Construction / Engineering Considerations		
Category	**Method**	**Description**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	**Appropriate Use**
OPEN TRENCHED	i) Plow	• plow-in pipeline without pretrenching • feed or drag pipeline into furrow behind plow	• rapid construction / installation • minimizes period of instream activity • minimizes total sediment release • short period of sediment release • maintains streamflow • maintains fish passage • minimal temporary workspace required	• grading of banks required • potential sediment release during grading of banks • sediment release during instream work	• reduces instream activity • eliminates backfilling phase • low cost if equipment onsite • rapid construction / installation	• specialized equipment • need access ramps to creek • problematic in boulders and bedrock • depth of cover is limited	• unconsolidated substrate watercourses • shallow lakes or watercourses with little or no flow (≤1m) • when pipeline on uplands is also being plowed-in • common for small diameter lines (≤168.3 mm O.D.) • where instream work is permitted but sediment release is to be minimized
	ii) Bucket/Wheel Trencher	• trench through watercourse with bucket / wheel trencher	• rapid construction / installation • minimizes period of instream activity • short period of sediment release	• potentially high sediment release • spoil pile may block flow • trench is prone to sloughing • requires extensive grading of banks • may block fish passage	• no special equipment • not limited by width of watercourse • low cost • rapid construction / installation	• limited by water depth (>1m) • trench is prone to sloughing • trench may not be wide enough • equipment has trouble on steep banks • difficulty with rocky substrate or bedrock • trench depth may be inadequate	• dry intermittent watercourses with fine-textured substrate where wheel ditcher is being used on uplands • possibly for low flow, low sensitivity streams with low banks • common for dry creeks • where sediment release is not a concern
	Iii) Hoe	• trench through watercourse with hoe from banks or instream	• rapid construction / installation • minimizes period of instream activity • maintains streamflow • maintains fish passage • relatively short duration of sediment release (≤24 hours)	• potentially high sediment release during excavation and backfilling • instream stockpiling of spoil on wide watercourses	• no need for specialized equipment • rapid construction / installation • low cost • compatible with granular substrates and some rock	• limited to less than 20 m unless hoe works instream • limited by water depth unless hoe works off barge • may require several hoes working together to facilitate excavation	• shallow (<1.5m) watercourse with unconsolidated granular substrate • most common method of watercourse trenching • where sediment release is not a concern • watercourses with low percentage of lines
	iv) Yo-Yo Dragline	• trench through watercourse with yo-yo bucket from either bank	• equipment not in watercourse • spoil on banks • maintains streamflow • maintains fish passage	• potentially high sediment release • slow construction / installation • long duration of sediment release • safety concern with cables strung across watercourse • may require grading of banks leading to sediment release • large area required for equipment	• permits many passes over trench • cleans sloughed material from trench • good for unconsolidated substrate • permits deeper trench	• moderately expensive • inaccurate control on trench width and alignment • slow construction / installation • specialized equipment • trench susceptible to sloughing • need large working space for equipment set up • cables restrict navigational use of watercourse • incompatible with boulders or consolidated bottom material	• wide and deep watercourses with soft substrate and limited navigational concerns • common on larger rivers • where sediment release is not a concern • watercourses with minimal bank height • often used to clean out trench initiated with hoes

			Environmental Considerations		Construction / Engineering Considerations		
Category	**Method**	**Description**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	**Appropriate Use**
OPEN TRENCHED (cont'd)	v) Dredging	• dredge trench through watercourse with suction and pump slurry to banks or tanks on barges	• minimal sediment release during trenching • maintains streamflow • maintains fish passage • no instream spoil storage • relies on natural sediment transport for backfill	• settling ponds required for slurry • disposal of settled water • possible mortality or injury to fish	• allows deep water trenching • technique for transporting to shore • no instream spoil storage	• expensive • specialized equipment • settling pond must be constructed • difficult in large granular substrate or bedrock • trench depth may be inadequate	• deep, wide rivers/lakes with fine unconsolidated substrate • where sediment release is a concern
ISOLATED	i) Flume	• block flow upstream of crossing and divert through pipe(s) laid in streambed perpendicular to pipeline • dam downstream side of crossing area to prevent backflow • flume should be properly sized to accommodate flow • super flume is a high capacity variation constructed out of 2m x 3m x 32m steel box sections • may be augmented with pump bypass	• limited sediment release • maintains streamflow • may allow fish passage • not likely to result in HADD downstream of the crossing • allows for flushing of substrates	• minor sediment release during dam construction, removal and as water flushes over area of construction • slow construction / installation prolongs sediment release • fish salvage may be required from dried up reach • short-term barrier fish passage is water velocity in culvert is too high	• relatively dry or no flow working conditions • ample time for pipeline construction • may be adapted for nonideal conditions • compatible with consolidated substrates • may incorporate bridge • may reduce ditch sloughing and ditch width	• difficult to trench and lay pipe, especially large diameter pipe, under flume pipe • difficult to install properly • flow limited by flume size 2-3 m^3/s using multiple flume pipes or super-flume >20m^3/s • moderately expensive • crossing may not stay dry in coarse, permeable substrate • too short a flume may not be sufficient for unstable trench • flume pipe can be crushed or blocked during pipeline construction • requires relatively long, straight channel to install flume	• small watercourse with defined banks and defined channel with solid, fine-textured straight substrate • where sediment release and fish passage are of concern • works best in nonpermeable substrate • common usage is for flows <1 m^3/s
	ii) Dam and Pump	• dam flow upstream and downstream of crossing and pump water around via hose(s)	• limited sediment release • maintains streamflow • not likely to result in HADD downstream of the crossing	• minor sediment release during dam construction, dam removal and as water flushes over area of construction • slow construction / installation resulting in extended period instream and prolonged sediment release • fish salvage may be required from dried up reach • short-term barrier to fish movement	• relatively dry working conditions • ample time for pipeline construction • may be adapted for nonideal conditions • hose can be routed around area of construction • multiple pumps can be used • compatible with consolidated substrates • can be used in watercourses with meandering channel	• size of watercourse limited to pump capacity • specialized equipment and materials • slow construction / installation • moderately expensive • hose(s) may impede construction traffic • seepage may occur in coarse permeable substrate • susceptible to mechanical failure • requires stand-by pump(s) • may reduce ditch sloughing and ditch width	• small watercourse with low flow, defined banks and channel with no requirement for fish passage • where sediment release is of concern • works best in non-permeable substrate • common usage is for flows <1m^3/s (max. capacity of 1 pump ≅0.3 m^3/s)

			Environmental Considerations		Construction / Engineering Considerations		
Category	**Method**	**Description**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	**Appropriate Use**
ISOLATED	iii) High Volume Pump Bypass	• install high volume pump(s) bypass in pool upstream of crossing and pump watercourse dry, discharging downstream of crossing • construct work area sump downstream of ditch to permit "washing" of work area • pump silt-laden water from sump onto well vegetated area • partial bypass in high flow situations may be used to reduce instream water velocity	• limited sediment release • maintains streamflow • normal streamflow can be restored instantly • no sediment release as a result of dam construction • not likely to result in HADD downstream of the crossing	• minor sediment release as water flushes over area after construction • dries up short reach of streambed • short-term barrier to fish movement • fish salvage may be required from dried up areas • sump areas are required	• no dams are required • flow can be regulated if necessary • hose(s) can be routed around area of construction • multiple pumps can be used • compatibility with consolidated substrates	• sump(s) may need to be excavated • specialized equipment and materials required • moderately expensive • hose(s) may impede construction traffic • required stand-by pump(s) • susceptible to mechanical failure	• small to moderate watercourses with low to moderate flow (1 m^3/s) and no requirement for fish passage (max. pump capacity ≅0.3 m^3/s • partial bypass in high flow situations may be used to reduce instream water velocity
	iv) Coffer Dam	• install dam approximately 2/3 into watercourse surrounding work area • pump area dry or work in "still" waters • remove dam and repeat on other side of watercourse • materials such as regular sandbags, sheet piling, oversized (1 m^3) sandbags, rock fill / median barriers, poly water structures or a combination of the above can be used	• maintains stream flow • maintains fish passage • not likely to result in HADD downstream of the crossing	• limited to moderate sediment release based on amount of instream work • may dry up long reach of watercourse • fish salvage required from dried-up reach • increased water velocity and potential scouring • possible increased erosion on opposite bank • potential washout of dam • slow construction / installation • extensive instream activity with heavy equipment may be required to install dams • requires large right-of-way and terrain disturbance	• relatively dry or no flow working environment • ample time for pipeline construction • compatible with consolidated substrates	• source of dam materials (i.e. sandbags, rock fill, poly, etc.) • pumping may be required • expensive • specialized materials • difficult to make tie-in • slow construction / installation • potential washout of dam • safety concerns	• moderate to large watercourses too large for flume or pump techniques • where sediment release and fish passage are of concern • braided stream channels • watercourses with low banks • where an extended instream period is required

			Environmental Considerations		Construction / Engineering Considerations		
Category	**Method**	**Description**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	**Appropriate Use**
ISOLATED (Cont'd)	v) Channel Diversion	• divert streamflow into abandoned channel or construct new channel • use rock fill, sheet piling or poly water structures to divert flow • channel may be lined or have a flexible stream diversion conduit installed	• maintains streamflow • maintains fish passage • not likely to result in HADD downstream of the crossing	• unless lined, very high sediment release when new channel is flushed through • dries up long reach of watercourse • fish salvage required from dried-up reach • slow construction / installation • potential washout of diversion dam • damage to streambank and adjacent lands	• relatively dry working area • ample time for pipeline construction • compatible with consolidated substrates	• expensive • source of dam (i.e. sandbags, rock fill, poly, etc.) material needed • may require channel liner or conduit • may require extensive preparation and channel grading / restoration • specialized materials required • slow construction / installation • potential washout of diversion dam	• watercourse too large to flume or pump • best used when new channel is clear of fine substrate and will cause little sediment release • braided stream channels • where sediment release and fish passage are of concern
TRENCHLESS	i) Boring	• bore under watercourse from bellhole on one side to bellhole on other with or without casing • wet boring with pilot hole and reaming bit can also be performed	• no sediment release • no disturbance of streambed or banks • maintains normal streamflow • maintains fish passage • maintains vegetative buffer on either side of watercourse • not likely to result in HADD	• pump(s) may be required to drain seepage within the bellholes onto surrounding lands • possibility of sump water causing sediment release in watercourse • requires additional workspace for bellholes, spoil piles and sump(s) • potential for borehole cave-in	• can be fast and economical under the right conditions • minimizes clean-up of bed and banks • road boring equipment may be available	• can be slow or not feasible under adverse conditions • difficult with till or coarse material • potential for borehole cave-in • excessive borehole depth on deeply incised watercourses or watercourses with moderate or greater approach slopes • with excessive seepage in course fluvial materials it may be impossible to keep hole dry • seepage into bellhole may cause sloughing • possible need for specialized equipment and pump(s) • limited to approximately 100m	• fine-textured impermeable soils • low water table • where streambed cannot be disturbed • used most often on irrigation ditches • where fish / riparian habitat cannot be disturbed • where the watercourse is only slightly incised and approach slopes are absent or slight
	ii) Punching / Ramming	• ram or punch casing or pipe under watercourse	• no sediment release • no disturbance of streambed • no bank disturbance • maintains normal streamflow • maintains fish passage • maintains vegetative buffer on either side of watercourse • not likely to result in HADD	• pump(s) may be required to drain seepage within bellholes onto surrounding lands • possibility of sump water causing sediment release in watercourse • requires additional workspace for bellholes, spoil piles and sump(s)	• can be quick under the right conditions • minimizes clean-up of bed and banks • cave-ins of borehole are unlikely • large pipe diameters can be accommodated	• can be slow under adverse conditions • potential bellhole cave-in ahead of ram • seepage into bellhole • with excessive seepage in course fluvial material it may be impossible to keep hole dry • specialized equipment may be required • potential corrosion problems from coating stripping • relatively inaccurate • limited to ~ 50m in length • excessive borehole depth on deeply incised watercourses or watercourses with moderate or greater approach slopes	• fine-textured impermeable soils • low water talbe • irrigation ditches • where streambed cannot be disturbed • can also be used in coarse-textured substrate • narrow to moderate watercourse (i.e. <30m) • where the watercourse is only slightly incised and approach slopes are absent or sligh

			Environmental Considerations		Construction / Engineering Considerations		
Category	**Method**	**Description**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	**Appropriate Use**
TRENCHLESS (Cont'd)	iii) Directional Drilling	• slant drill used to drill under watercourse and, where practical, approach slopes	• no sediment release • no bank disturbance • no streambed disturbance • may avoid approach slope disturbance • maintains normal streamflow • maintains fish passage • not likely to result in HADD	• disturbance of drilling and target area • disposal of drilling fluids • fractures in substrate may release pressurized drilling fluids into watercourse • circulating drilling fluid may washout cavities under the watercourse and banks resulting in sinkholes • possible spills from drilling sump(s) down towards watercourse • large area may be required on flood plains	• eliminates clean-up and reclamation in between entry and exit points • reduced work in repairing and restoring banks • reduction in reclamation costs • reduction of long-term maintenance	• moderately to very expensive • success depends on substrate / bedrock • specialized equipment • slow construction / installation • limited to arc that can be drilled for pilot hole (10-20° entry / exit angles) • limit arc that pipe can "rope" through the hole, especially large diameter pipe • may take several attempts • drill stem may be "stuck in the hole" and tools get lost, especially on large diameter reams • no guarantees that drill will be successful • may damage coating / pipe	• watercourse with sensitive habitat where no instream activity allowed • watercourses where HADD may result from instream activity • areas with very unstable approach slopes • high aesthetic concerns (i.e., parks)
	iv) Microtunnelling	• use a small tunnel boring machine to create a tunnel for the pipe or casing	• no sediment release • no bank disturbance • no streambed disturbance • no approach slope disturbance • maintains normal streamflow • maintains fish passage • not likely to result in HADD	• tunnel spoil / slurry requires large areas • disposal of tunnel spoil • large space requirements on flood plains	• can be utilized in most substrates above or below the water table • eliminates clean-up and reclamation in streambed and banks	• special equipment and crew are required • limited by length of pipe to be pushed and the friction forces imposed • high cost • tunnel spoil / slurry may require removal or settling tanks and water treatment if chemical lubricants were used	• large diameter pipelines • watercourse crossings with ample room for tunnel spoil storage and bellholes • high aesthetic concerns (i.e., parks)
AERIAL	i) Bridge Attachment	• attach pipeline to existing bridge structure	• no sediment release • no bank disturbance • no streambed disturbance • maintains normal streamflow • maintains fish passage • not likely to result in HADD	• possible visual impact • safety and potential introduction of product into watercourse due to third party damage	• eliminates clean-up and reclamation of bed and banks	• potentially expensive • depends on bridge design • specialized crew and equipment • slow construction / installation • potential for third party damage • regulatory approval may be delayed or denied • ongoing maintenance required • approach bends may prevent pigging of pipe	• large watercourse with sensitive habitat where no instream activity is allowed • areas with very unstable approach slopes • high aesthetic concerns (i.e., parks) • where an existing bridge has been built • deep gorges / canyons • urban areas where bridges are abundant

			Environmental Considerations		Construction / Engineering Considerations		
Category	**Method**	**Description**	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**	**Appropriate Use**
AERIAL (Cont'd)	ii) Self-Supporting Bridge or Span	• Construct bridge or abutments to carry pipeline	• no sediment release • no streambed disturbance • no bank disturbance • maintains normal streamflow • maintains fish passage • not likely to result in HADD	• visual impact • safety and introduction to product into watercourse due to third party damage • instream construction required for bridge abutments • may trigger additional regulatory review	• eliminates clean-up and reclamation of streambed and banks	• very expensive • specialized crew and equipment • slow construction / installation • potential for third party damage • regulatory approval may be delayed or denied • ongoing maintenance required • approach bends may prevent pigging of pipe • requires design to meet *Navigable Waters Protection Act* requirements	• large watercourse with sensitive habitat with no instream activity is allowed • areas with very unstable approach slopes • deep gorges / canyons

Source: Canadian Pipeline Water Crossing Committee, 1999.

4.13 Waste Management Plan

Waste generation (domestic, construction, and/or hazardous) is a product of construction activity that must be managed appropriately to prevent attracting wildlife to the construction site, to prevent potential environmental impact and to maintain the construction site in an aesthetically acceptable condition.

Wastes potentially associated with the construction of the pipeline system include: domestic wastes (lunch bags, coffee cups, etc.) scrap pipe (steel and polyethylene), spent aerosol spray paint cans used for line locates, weld slag, metal shavings (fillings) and used welding rods (steel), bentonite (clay-based drilling mud, non-toxic), petroleum products (hydraulic fluid, oil, diesel), grease, empty primer and paint cans, and cleaning solvents. Although the wastes may not be limited to these items, these are the most common wastes resulting from distribution pipeline construction.

The following measures will be used for managing domestic, construction and hazardous waste generated by or encountered during the course of the project:

- No waste (hazardous or non-hazardous, domestic or construction) shall be disposed of in the trench.

- Waste containers are to be provided on-site by each contractor for the collection and storage of domestic and construction wastes (e.g., bags/bins for domestic garbage and pails or other containers for welding rods). Recyclable materials (e.g., wood, plastic, metals, used oil) will be separated for recycling where practical.

- Contractors will collect waste materials from the work area at the end of each day and transport them to a central location (e.g., EGNB's/contractor's work yard) for temporary storage until they can be transported to an approved facility (either a landfill or recycling depot, see attached Table 4.3 for some disposal options).

- If contractors do not wish to dispose of domestic waste in the on-site collection bin, domestic waste items (including lunch bags, pop cans, etc.) may be returned to the individual contractor's vehicle and disposed of at their convenience at an off-site garbage collection site (e.g., at a gas station or at their home). From either of these points, the ultimate disposal will be at an approved landfill.

- Waste materials considered hazardous (primers, thinners, cleaning solvents) will be collected as generated and stored in a sealed container designed to hold flammable liquids for disposal at an approved hazardous waste disposal site. Small quantities (e.g., 'as generated', a couple of gallons at a time) of hazardous wastes (e.g., non-

chlorinated solvents, gas, diesel, vasrol, and non-chlorinated thinners) may be disposed of at local fire departments within municipalities (e.g., the Kimble Drive Station House in Fredericton).

- Contractors typically have service agreements for vehicle maintenance with the companies from which they buy, rent or lease their equipment (e.g. John Deere, Ford). These companies will provide vehicle maintenance in their garages or in the Contractors work yards. Waste materials (e.g., used oil) will be collected, transported and disposed of by the service provider on an 'as-serviced' basis, i.e., no collection of large volumes of oils, lubricants on-site). In cases where Contractors have their own mechanics, waste materials may be stored in the Contractors work yard (e.g., in a 45 gallon drum) prior to collection and disposal by an approved waste transporter.

- Wastes considered to be hazardous that are to be transported in quantities exceeding 5 L or 5 kg will be documented on a waste manifest from the point of origin to disposal. The generator/owner of the waste will be identified by a Provincial Identification Generator Number.

- The burning of petroleum based products, rubber products or other products in which combustion is considered harmful to the environment is prohibited.

- Bentonite can be disposed of at Regional Petroleum Products Recycling in Saint John (see Table 5.3 of the Contaminated Sites Contingency Plan). This facility accepts drilling mud from other contractors and can introduce the bentonite into their system on a gradual basis. Bentonite, if in excess, would be removed from the bore location following completion of the drill. If dried, it may be removed manually, if wet, it may be pumped into a container. Typically, excess bentonite from drilling operations is not a consideration with the smaller diameter pipes (i.e., less than 16 inches).

    - In the event of clearing, merchantable timber will be salvaged. Unsalvageable timber will be disposed of through chipping or burning or at a landfill. (Wood chips may be disposed of in various ways: e.g., given to a municipality, taken to a landfill, or taken to a recycling facility for their compost operation, e.g., Envirem Technologies.) If burning is required, a permit from the Department of Natural Resources (for the months of April-October) or the NBENV (for the months of November-March) will be obtained. Material from grubbing will be disposed of at an approved site (see Table 4.3 for a partial listing disposal locations).

Table 4.3 – New Brunswick Solid Waste Commissions

Facility Name	Location	Operating Status	Approved to Process
Fredericton Region Solid Waste Commission 506-453-9930	Wilsey Road South Fredericton	NBENV Approval: Current	Domestic waste, grubbing material and brush, clean soil and rock, untreated wood, scrap metal (separated), water and oil-based paints solidified with kitty litter or peat moss. *No hazardous materials.*
South West Solid Waste Commission 506-466-7830	5749, #3 Hwy Lawrence Stn	NBENV Approval: Current	Domestic waste, grubbing material and brush, clean rock and soil, untreated wood, scrap metal (separated). *No hazardous materials.*
Westmorland-Albert Solid Waste Corporation 506-877-1050	Berry Mills Road Moncton	NBENV Approval: Current	Domestic waste, grubbing material and small bushes, untreated wood, scrap metals (separated). *No hazardous waste.*
Fundy Region Solid Waste Commission 506-634-7928	37 Hanover St. Saint John	NBENV Approval: Current	Domestic waste, wood, scrap metals (separated), plastic, brush, soil. *No hazardous materials.*

5.0 Contingency Plans

5.1 Archaeological Discovery (During Construction)

- **Issues**

The routes for natural gas distribution systems are selected so as to avoid, where practical, known archaeological and heritage sites. NB is a province containing both pre and post-contact history, and there exists a chance for unexpected discovery of such finds during construction. This is particularly important in areas where heritage resources are known to exist, as well as areas that have been shown, through predictive modeling, to have high potential for archaeological finds. In order to minimize negative impacts to heritage resources, the following contingency plan has been developed. It serves to outline the response to an unexpected archaeological discovery to ensure that such resources are properly protected.

Prior to construction, the EGNB Inspector should be made aware of identified sites that may contain heritage resource material and should ensure that:

- Areas are fenced and marked with flagging tape and that personnel are discouraged from unnecessary access to these sites;
- Construction personnel do not collect artifacts or disturb historic and/or pre-contact sites;
- Construction personnel report any unusual materials unearthed during construction to their Construction Supervisor who will take control of the situation, and notify the appropriate authority.

- **Mitigation Measures**

The mitigation measures available for archaeological discovery during construction include those listed below, as well as those discussed in Section 4.0.

If any significant artifacts or evidence of habitation are found in the project area, all work in the vicinity of the discovery should be suspended. The definition of artifacts should be determined prior to construction through consultation with Archaeological Services Heritage N.B. (ASHNB) The Inspector will be notified so that he/she can take the appropriate action;

- Until a qualified archaeologist arrives at the scene, no one shall disturb, move or rebury any uncovered artifact. This particularly applies to the discovery of bones. The archaeologist may want to photograph the scene and or collect samples for analysis;

- Construction at the site may resume only when authorized by ASHNB and once mitigative measures have been completed.

5.2 Discovery of Human Remains

- **Issues**

The discovery of suspected human remains is unique due to the potential sensitivities as well as legal and health implications. The discovery of human remains is governed by provincial legislation and various agencies may become involved such as the RCMP, ASHNB, the Coroner's office or the Chief Medical Officer's Office. If it is a suspected First Nations burial site, the appropriate First Nations/aboriginal communities should be contacted.

Human remains will usually fall into two categories:

Legal Evidence: Upon first discovery of human remains, the area should always be treated as a crime scene until this possibility can be ruled out. The remains should be treated as potential legal evidence.

Archaeological Remains: Archaeological remains include pre-contact remains that were interred as a result of religious or socially accepted burial practices of the time. An example would be an unrecorded First Nations burial site.

- **Mitigation Measures**

In the event of the discovery of human remains the following mitigation measures will be followed:

- Halt all construction activities in the vicinity of the discovery;
- The RCMP should be notified immediately;
- Secure the site. The area should be flagged with at least a 5 m buffer zone on all sides. Until determined otherwise, the remains should be treated as evidence in a criminal investigation and the surrounding area should be considered a potential crime scene;
- If the remains are found in the bucket of heavy equipment, the bucket should not be emptied as physical evidence may be destroyed;
- Suspected human remains should be covered with a tarp;
- Any equipment in the area should be shut off and left in place.
- People already in the area should only use one route to depart the scene.

The lead police agency will make a decision as to whether the Coroner and/or Archaeological Services Unit should be involved.

5.3 Contaminated Sites

The purpose of the following contingency plan is to outline steps to take in the event that contaminated soil is unearthed or contaminated trench water is discovered during construction, either due to migration of contaminants from a known site, or by disturbing a previously unrecorded site.

EGNB and its Contractors may find themselves in one of the following two circumstances pertaining to contaminated areas:

1) an unknown/unidentified contaminated area; or
2) a known/previously identified contaminated area.

As part of the route selection process, a preliminary environmental screening was conducted for the routes in each community. Data from the NBENV Environmental Database was used for this screening. In some cases, route changes were made based on this information, so, in most cases, the contamination discovery will be an unforeseen event.

The following measures will apply to either of the two situations:

- Halt construction in the immediate area. Cordon off the area if required and move construction activities to another area.
- In the interest of public and worker health and safety, assume the worst. Stay upwind of the contamination and don protective attire. Any necessary precautions for the protection of human health and safety shall be employed.
- Notify the Pipeline Inspector, Construction Supervisor/Foreman and Senior/Environmental Inspector that contaminated soil/trench water has been encountered.
- Notify the NBENV of the contaminant discovery. NBENV may then be able to inform EGNB of the status of the site (known vs unknown contaminated site, type of contaminant, extent of impact, whether the site has been remediated to appropriate guidelines).
- Implement emergency containment measures to prevent spread of contaminants (e.g., use of plugs in trenches or limit further disturbance of impacted soil).
- Collect a sample of the soil/trench water to be sent for laboratory analysis. Results are to be forwarded to NBENV for their records.

The purpose of the following procedure is to assist EGNB and its Contractors in dealing with the discovery of unknown or known contamination in a consistent, safe and environmentally responsible manner. It will help EGNB to identify contaminated areas, minimize risk to human health and safety and to the environment, ensure handling of the contaminated soil or water is done in accordance with applicable regulations and minimizes delays to the construction schedule.

- Have the Senior/Environmental Inspector or Pipeline Inspector conduct a preliminary site assessment to determine the type of contamination (look for evidence of staining or soil discolouration, unusual or different soil texture, hydrocarbon odours, presence of free product, an oily sheen in standing water, distressed vegetation, presence / proximity of storage drums/containers, surrounding land use).
- The results of the preliminary assessment will assist EGNB in deciding whether a continued delay of the work is required or if work can proceed in the area. The type of contamination, current state of the contamination (mixed with the soil or 'oozing free product') and potential threat to worker safety in the trench will determine where and when work can proceed.
- Contaminated soil will be excavated from the trench and disposed of at an approved location (see Table 5.1). If there is the potential for contaminants to migrate to adjacent "clean" properties, the use of "plugs" in the trench will be considered.
- If contamination other than hydrocarbon is suspected, a representative sample of the contaminated soil/trench water will be collected and sent to a laboratory for 'rush' (24 hour) analysis. The laboratory results will assist in determining where the contaminated soil/trench water can be disposed of.
- Contaminated trench water is to be removed from the trench by a vacuum truck from an approved waste management company (e.g., Melanson's, Falcon, Barrington Industrial, Crossby Industrial, etc.) and disposed of at an approved location. If contamination from other than hydrocarbons is suspected, the trench water can be stored temporarily in the yard of the waste management company until 'rush' laboratory results identifying the contamination are available.
- The extent of any contamination encountered may be determined in consultation with a consultant that specializes in delineation and remediation of impacted sites.
- Third parties (municipalities, property owners) will be notified of the contamination encountered along the route, as appropriate.
- Construction may resume in the area once the source or localized extent of contamination has been removed and the trench has been lined with clay to protect the integrity of the pipe. Start-up will be at the discretion of the EGNB Senior/Environmental Inspector.

- The Contaminant Discovery Report Form will be used to record the discovery of a contaminated site. The reports will be forwarded to the Operations Manager, the NBENV regional office, and other appropriate regulatory authorities following completion of the appropriate mitigative action.

Table 5.1 – Hydrocarbon Recycling Facilities in New Brunswick

Facility Name	Location	Operating Status	Approved to Process
Envirem Technologies Bob Kiely 506-459-3464	Fredericton Moncton	NBENV Approval: Current Site Capacity: 15 000 T NBENV Approval: Current Site Capacity: 20 000 T	Petroleum contaminated soil, with the exception of Bunker C, asphalt or crude oil. Not permitted to accept for treatment: contaminated water, sludge or synthetic absorbent materials
Elmtree Environmental Darren Chamberlain 506-444-0133 1-800-565-2839	Fredericton Moncton Regional Landfill	NBENV Approval: Current Site Capacity: 60 000 T NBENV Approval: Current Site Capacity: 60 000 T	Petroleum contaminated soil with the exception of Bunker C, asphalt or crude oil. Not permitted to accept for treatment: contaminated water, sludge or synthetic absorbent materials.
Falcon Petroleum Environmental Services Russel Waugh 506-453-1221	Fredericton	NBENV Approval: Current	Contaminated water, sludge, absorbent materials.
Galbraith Construction Bob Ridgway 506-635-8855	Saint John	NBENV Approval: Current Site Capacity: 15 000 T	Petroleum contaminated soil with the exception of Bunker C, asphalt or crude oil. Not permitted to accept for treatment: contaminated water, sludge or synthetic absorbent materials.
Regional Petroleum Products Recycling Bill Shannon 506-635-4837	Saint John	NBENV Approval: Current Site Capacity: 25 000 T *(Require NBENV inspector approval)*	Petroleum contaminated soil, contaminated water, sludge (including bentonite), absorbent materials.

5.4 Spill Response

- **Issues**

During the course of construction, the transfer of fuel and chemicals from storage containers or tanker trucks, vehicle accidents, and leaks from transportation / storage facilities or delivery lines can cause damage to humans, soils, vegetation, surface water, groundwater and wildlife. Safe and proper containment and disposal of spilled materials is essential. The purpose of the following contingency plan is to protect the public and staff and to minimize the release of contaminants to the natural environment.

- **Mitigation Measures**

- Eliminate fire danger by shutting off any power supply or source of ignition at the spill location;
- Evacuate people and restrict access to the spill site, if required;
- Contain the spill to the extent possible by spreading absorbent products, blocking drainage ditches, catch basins, digging trenches, or creating dykes; and
- Notify local authorities and appropriate regulatory agencies (refer to Table 5.2).

Spill Response Plan

If an accidental spill occurs, the following procedure will be implemented:

- The individual who discovers the spill will immediately attempt to locate the source of the spill, where possible, and stop the flow.
- Report the spill immediately to the Senior Pipeline Inspector and Environmental Inspector.
- The Senior Pipeline Inspector and/or Environmental Inspector will report the spill to the applicable regulatory departments as per regulatory requirements (i.e., may require notification to NBENV through Environmental Emergencies: 1-800-565-1633 as per the definition of ‘emergency spill’ below).
- ‘Emergency spills’ will be reported to the NBENV through the Canadian Coast Guard (1-800-565-1633) or by calling “911”. Emergency spills must be reported within four hours (or less) of the time when the release first becomes known. An emergency spill is defined as:
    - any spill near watercourses, wetlands or groundwater sources (or near a conduit that can lead to the above, i.e., storm sewer);

    - all spills near residences; or
    - any spill that exceeds 100 L (hydrocarbons).
- EGNB will assume the overall responsibility of coordinating the clean up of the spill and remediation of the site without unnecessary delay.
- EGNB will coordinate the spill clean-up as outlined below. Clean-up, depending on the size and potential impact of the spill, may involve consultation with regulatory authorities.
    - Personnel will contain the spill using booms, dykes, absorbent material, as applicable.
    - Assess site conditions and potential environmental impacts of various clean-up procedures.
    - Select and implement and appropriate clean-up procedure.
    - Mobilize pumps or empty storage containers (drums) to the site of the spill as required.
    - Materials used to clean up the spill (and the contaminated soil, if applicable) will be disposed of at approved locations (e.g., local fire stations, hydrocarbon recycling facilities as per Table 5.1).
    - EGNB will take all necessary precautions to ensure that the incident does not reoccur.
- The Internal Spill Report Form (detailing clean-up activities) will be completed by the Pipeline Inspector/Senior Pipeline Inspector and/or Environmental Inspector immediately upon discovery of a spill. The report will be forwarded to the Operations Manager, the regional NBENV office, and other appropriate regulatory authorities within two working days.
- EGNB will notify third parties of the spill as applicable (e.g., municipalities, property owners).

Spill Clean-up Criteria

For ‘emergency spills’, site clean-up will be conducted as outlined below. Following clean-up activities, verification sampling will be conducted and the following guidelines will be used to determine the suitability of the clean-up.

- **Soil**

Results for BTEX and TPH will be compared to the limits outlined in Surface Soils of the Guidelines for the Management of Contaminated Sites, Appendix C (NBDOE&LG, 1999). A residential, non-potable site classification with the appropriate soil type will be

used unless a potable water supply is located within the vicinity of the spill. In this case, a residential, potable land use scenario with the appropriate soil type will be used.

Results from PAH, PCB and phenols will be compared to limits in the table of Interim Canadian Environmental Quality Criteria for Contaminated Sites (CCME, September, 1991). A land use consistent with that surrounding the public road allowance will be assumed, unless NBENV advises otherwise.

Results for other parameters will be compared to the limits contained in Recommended Canadian Soil Quality Guidelines (CCME, March, 1997). A land use consistent with that surrounding the public road allowance will be assumed, unless NBENV advises otherwise.

For sites where subsurface impacts are present (i.e., greater than 1 m depth) and the potential exists for vapour to impact a commercial or residential property, the results for BTEX and TPH will be compared to the appropriate limits in Sub-Surface Soils of the Guideline for the Management of Contaminated Sites, Appendix C (NBDOE&LG, June 1999).

- **Groundwater**

Results for BTEX and TPH will be compared to the limits in the Table for Groundwater of the Guideline for the Management of Contaminated Sites, Appendix C (NBDOE&LG, June 1999). A residential, non-potable site classification with the appropriate soil type will be used unless a potable water supply is located within the vicinity of the spill. In this case, a residential, potable site classification will be used.

Results for other parameters will be compared to the limits contained in Canadian Water Quality Guidelines (Health Canada, 1995). Parameters not found in this document will be compared to the limits set out in Interim Canadian Environmental Quality Criteria for Contaminated Sites (CCME September, 1991), using the 'Freshwater Aquatic Life' criteria.

- **Surface Water**

Results for BTEX and TPH will be compared to the following guidelines:

A) If there is potential for surface discharge to recharge a groundwater resource or there is very little dilution in the receiving water:

Benzene	50 ppb
Toluene	240 ppb
Ethylbenzene	24 ppb
Xylene	1000 ppb
TPH	100 ppb

B) All other situations:

Benzene	300 ppb
Toluene	300 ppb
Ethylbenzene	700 ppb
Xylene	1000 ppb
TPH	2000 ppb

Results for PAH, PCB, metals, and phenols will be compared to limits contained in Table 3 of Sampling and Analysis of Hydrocarbon Contaminated Groundwater (Environment Canada Tab 5, March 1992). Column C criteria will be used for PAH. The 'Freshwater Aquatic Life' criteria will be used for all other parameters.

Results for other parameters will be compared to limits contained in Interim Canadian Environmental Quality Criteria for Contaminated Sites (CCME, September 1991), using the 'Freshwater Aquatic Life' criteria.

5.5 Emergency Preparedness and Response

EGNB maintains emergency response capabilities to respond in less than 24 hours to any emergency problem. EGNB provides a full spectrum of emergency response services from immediate response and containment to subsequent investigations and final restoration. As part of these capabilities, EGNB maintains an on-going relationship with a number of key service providers, including:

- a number of excavation contractors;
- drilling contractors;
- analytical laboratories;
- soil disposal facilities; and
- hazardous waste disposal facilities.

EGNB will coordinate the activities of the service providers to ensure emergencies are properly addressed.

EGNB also maintains a relationship with the provincial regulators in New Brunswick. In many instances, where time is of the essence, EGNB will work with the regulators to minimize the impact of any spill occurrence. Depending on the location, there are a number of agencies that may be contacted. These include the NBENV, Federal Emergency Response, RMCP and local police, Provincial - Emergency Response Contacts, and Occupational Health and Safety Commission. Table 5.2 lists emergency response contacts and corresponding telephone numbers.

EGNB shall review its emergency response procedures on an annual basis or following an accident or emergency situation, to determine the continuing suitability of the plans. Revisions will be made and documented as applicable.

Procedures outlined for emergency response shall be tested periodically where practical to ensure success.

5.6 Emergency Contact Numbers

TABLE 5.2
PROVINCE OF NEW BRUNSWICK EMERGENCY RESPONSE CONTACTS

AGENCY	TELEPHONE NUMBERS
DANGEROUS GOODS INCIDENTS	
Fredericton Police Department	(506) 452-9701, **911**
Codiac RCMP (Moncton)	(506) 857-2400, **911**
Sackville RCMP	(506) 533-5151, **911**
Saint John Police Department	(506) 648-3333, **911**
CFB Gagetown – Headquarters (Captain Ross Donald)	(506) 422-2000 ext 3089
Royal Canadian Mounted Police	1-800-665-6663
New Brunswick Emergency Measures Organization, (NBEMO)	1-800-561-4034
Federal Emergency Response Centre (CANUTEC) *	(613) 996-6666 (collect)
NBENV Environmental Emergencies (Canadian Coast Guard)	1-800-565-1633 or 911
Fire Department (any community)	**911**
Workplace Health, Safety and Compensation Commission	1-800-442-9776
Railways Canadian National Rail Canadian Pacific Rail New Brunswick Southern Railway (Steve Wills)	1-800-465-9239 1-800-716-9132 1-506-636-1897
New Brunswick Department of Environment- Provincial Mobile Communications Center (PMCC) **	(506) 453-7171
Spills Centre (Regional Operations Centre – Maritimes) – toll free 24 hour emergency phone number	1-800-565-1633
EXPLOSIVES	
NB RCMP – Protective Services Section – Fredericton	911
Local Police – see above	
RADIOACTIVE	
Department of Health and Wellness – Public Health (Radiation Protection)	(506) 453-2323
CFB Gagetown Duty Officer	(506) 422-2000 ext 1491
UTILITIES	
NB Power	1-800-663-6272
Aliant	1-800-332-3333
FOREST FIRE	
New Brunswick Department of Natural Resources – Forest Fire Center	(506) 453-3335
HOSPITALS	
Oromocto – Oromocto Public Hospital, 103 Winnebago Street	(506) 357-4700, **911**
Fredericton- Dr. Everett Chalmers Hospital, 700 Priestman Street	(506) 452-5400, **911**
Saint John Saint John Regional Hospital, University Avenue St. Joseph's Hospital, 130 Bayard Drive	(506) 648-6000, **911** (506) 632-5555, **911**
Moncton, George DuMont Hospital, 330 University Ave, Moncton	(506) 862-4000, **911**

Riverview & Dieppe — Moncton Hospital, 135 MacBeath Ave, Moncton	(506) 857-5111, **911**
Sackville Memorial Hospital, 8 Main Street	(506) 364-4100, **911**
Black's Harbour – Fundy Health Centre, 34 Hospital Street	(506) 456-4200, **911**
REGULATORY CONTACTS	
New Brunswick Energy and Utilities Board	(506) 643-3323
NB Dept of the Environment – Mr. Perry Haines	(506) 444-4599
Department of Fisheries and Oceans, Representative – Mr. Ted Currie	(506) 851-3650
Department of Fisheries and Oceans (St Stephen) – Mr. Robert MacDougal	(506) 529-5859
NB Dept of Natural Resources, Fredericton	(506) 453-2345
NB Dept of Natural Resources, Hampton	(506) 832-6055
NB Dept of Natural Resources, Islandview	(506) 444-4888
NB Dept of Natural Resources, Moncton	(506) 856-2344
NB Dept of Natural Resources, St. George	(506) 755-4040
NB Department of Energy – Calvin Duncan, Sr. Policy Advisor	(506) 457-7810
AREAS OF SPECIAL ENVIRONMENTAL CONSIDERATION	
Canadian Wildlife Services	(506) 364-5044
NB Dept of Archaeological Services, Representative – Albert Ferguson	(506) 453-2756
Archaeological Specialist, Chris Blair (Stantec)	(506) 457-3224

* Transport Canada has established CANUTEC, a 24-hour emergency information center for dangerous goods, at Ottawa, Ontario. CANUTEC can be contacted by collect telephone at 1-613-996-6666. The center will quickly provide accurate information about dangerous goods, their hazards, and what immediate action should be taken. They will also contact, on request, the various agencies as required under law, and those who can provide assistance in the accident.

** In an emergency, contact the Coast Guard at 1-800-565-1633. They will contact the PMCC. This number is to be used for communication with the PMCC after the Coast Guard has contacted the PMCC.

NOTIFICATION

When a transportation accident results in a spill or leak of a dangerous chemical or gas, the vehicle operator or his dispatcher is required by law to:

- Notify the local police directly, and an environmental inspector through the Coast Guard's 24 hour telephone number 1-800-565-1633 or 911; and
- Notify the shipping firm so that it may initiate its emergency response plan.

If the driver is not killed or injured:

The police dispatcher is responsible to notify fire and ambulance services as required and the NB Emergency Measures (1-800-561-4034).

6.0 Compliance Monitoring During Construction

Throughout the construction period, all construction will be undertaken in accordance with EGNB's environmental policy of "conducting all operations in an environmentally responsible manner" and in compliance with all applicable regulations, standards and guidelines. Where special mitigative measures have been specified by governing authorities, landowners or in site-specific environmental assessment reports, these shall be brought to the attention of personnel responsible for the construction, as well as all outside contractors, to ensure their appropriate implementation.

Compliance monitoring applies to all aspects of distribution system construction including direct and indirect activities and is typically completed by the environmental inspector. Where required compliance monitoring activities should address construction issues such as:

- Site drainage and sediment control;
- Tree protection and mitigation;
- Watercourse crossing techniques; and
- Revegetation and planting plans.

Where the environmental sensitivities of a project warrant specialized expertise, EGNB's Inspector will be onsite during the construction to ensure that specified mitigative measures are implemented in a manner that minimizes potentially adverse environmental effects. On-site environmental inspection may be required for some watercourse crossings.

It is the responsibility of the Inspector to bring to the immediate attention of EGNB any activity which may cause negative environmental impact, or which may be in non-compliance with environmental regulations.

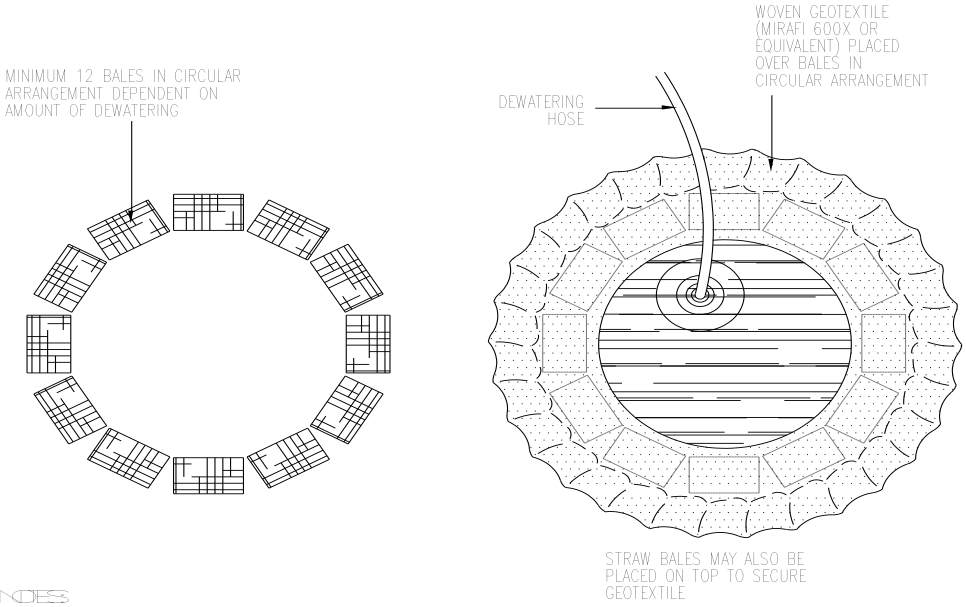
7.0 Environmental Effects Monitoring (Post Construction)

Following the completion of construction, an environmental effects monitoring program may be required to assess the effectiveness of mitigation measures in alleviating project impacts. Post-construction monitoring provides a mechanism for evaluating whether proposed environmental protection and mitigation measures were successful in attaining the goals of environmental protection. Additionally, post-construction monitoring provides important feedback that can be integrated into future planning, impact assessment and construction works. Where applicable, separate and distinct post construction monitoring programs may be implemented for land-based and water-based construction activities.

When a wetland has been directly disturbed, EGNB will work with its environmental consultant and the NBDENV to implement an EEMP to ensure that wetland function has not been altered or lost. The EEMP will include at least one year of monitoring post-construction unless additional follow-up monitoring is required.

APPENDIX A

SEDIMENT SETTLING POND

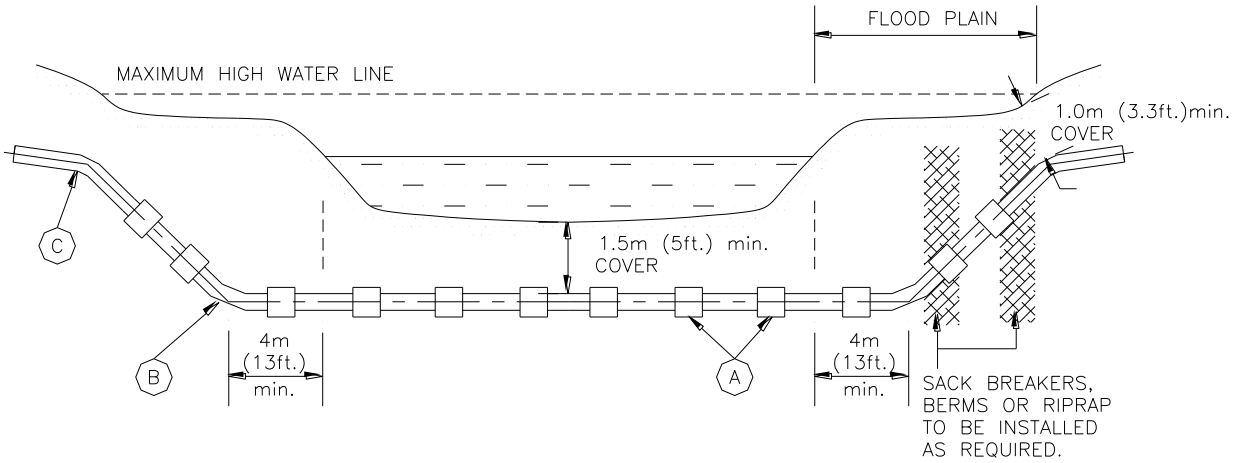


NOTES:

1. REPLACE GEOTEXTILE WHEN SEDIMENTS RESTRICT FLOW (EXCAVATION)
2. SEDIMENTS COLLECTED TO BE DISPOSED OF AT A HIGHER GROUND LOCATION ON THE RIGHT-OF-WAY.
3. IF SETTLING POND OVERFLOWS EXCESSIVELY, SIZE OF POND MUST BE INCREASED OR ANALTERNATE METHODS OF PHASE SLOWER THROUGHPUT USED.

Section:		Supersedes:	Dated:	Effective Date:	Dwg No:
6.0	**TRENCHING**	JANUARY 2006	JANUARY 2007	MARCH 1, 2007	6-1

TYPICAL WATERCOURSE CROSSING DETAILS



(A) CONCRETE SADDLE WEIGHTS

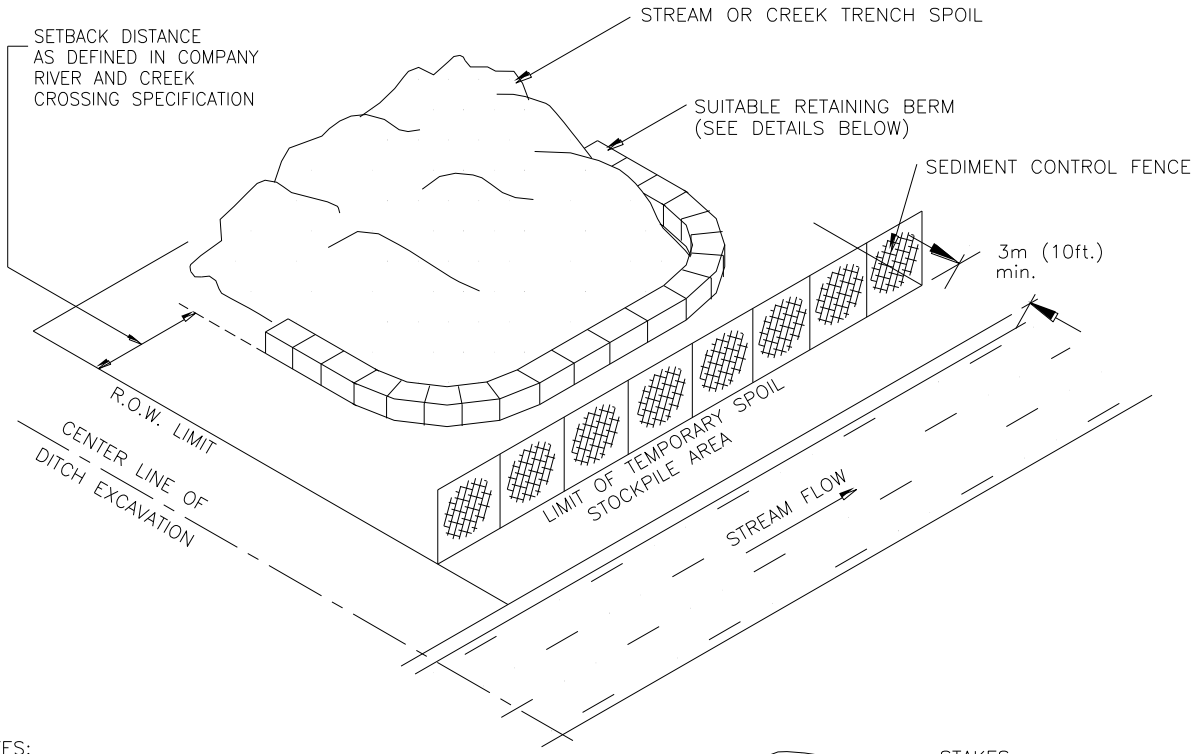
(B) SAG BEND

(C) OVER BEND

NOTES:

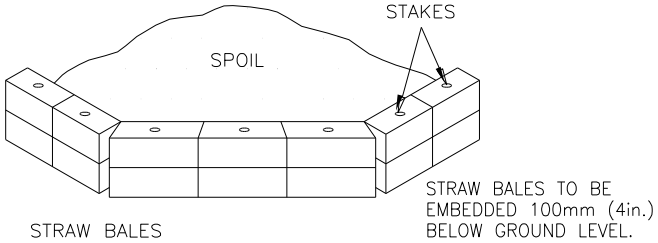
1. CONCRETE SADDLE WEIGHTS TO BE INSTALLED AT UNIFORM CENTRES ALONG PIPE AND TO COVER FLOOD AREA AS DETERMINED IN THE FIELD BY THE COMPANY.
2. THIS DRAWING APPLIES TO ANY NATURAL WATER COURSE OR SWAMP AREA.
3. ANCHOR TO BE PLACED ON SOLID GROUND AT DISCRETION OF THE COMPANY.
4. WOODEN SLATS TO BE INSTALLED BETWEEN SADDLE WEIGHTS AT DISCRETION OF THE COMPANY.
5. ROCKSHIELD MUST BE INSTALLED ON PIPE BEFORE WEIGHTS AND SLATS ARE ATTACHED.
6. PIPELINE ANCHORS TO BE SPECIFIED ON CONSTRUCTION DRAWINGS IF REQUIRED.
7. ALL BACKFILLING ON SLOPES MUST BE DONE DIRECTLY OVER THE MAIN AND FROM THE BOTTOM UP.
8. ALL SPECIFICATIONS IN THE SEDIMENT CONTROL PLAN WILL BE FOLLOWED.

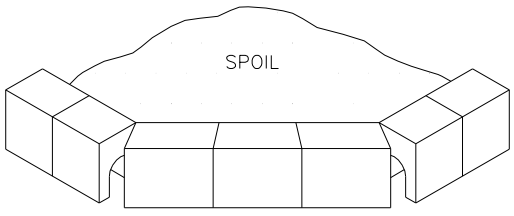
SPOIL RETAINING BERM



NOTES:

1. SEDIMENT CONTROL DEVICES MUST BE INSTALLED IN THE STREAM AS SPECIFIED IN THE SEDIMENT CONTROL PLAN.
2. WHEN TRENCH SPOIL IS STOCKPILED ON STREAM BANKS, SEDIMENTS FLOWING BACK INTO THE STREAM MUST BE PREVENTED BY PLACING THE SPOIL FARTHER AWAY FROM THE WATERS EDGE, OR BY CONSTRUCTING A SUITABLE BERM. UNDER NO CIRCUMSTANCES MUST TRENCH SPOIL PILES BE PERMITTED TO DAM THE STREAM FLOW.
3. EARTH PLUGS MUST BE LEFT IN THE TRENCH ON EITHER SIDE OF THE WATER CROSSING.
4. IF REQUIRED FOR SEALING, THE BERMS MUST BE LINED WITH GEOTEXTILE.

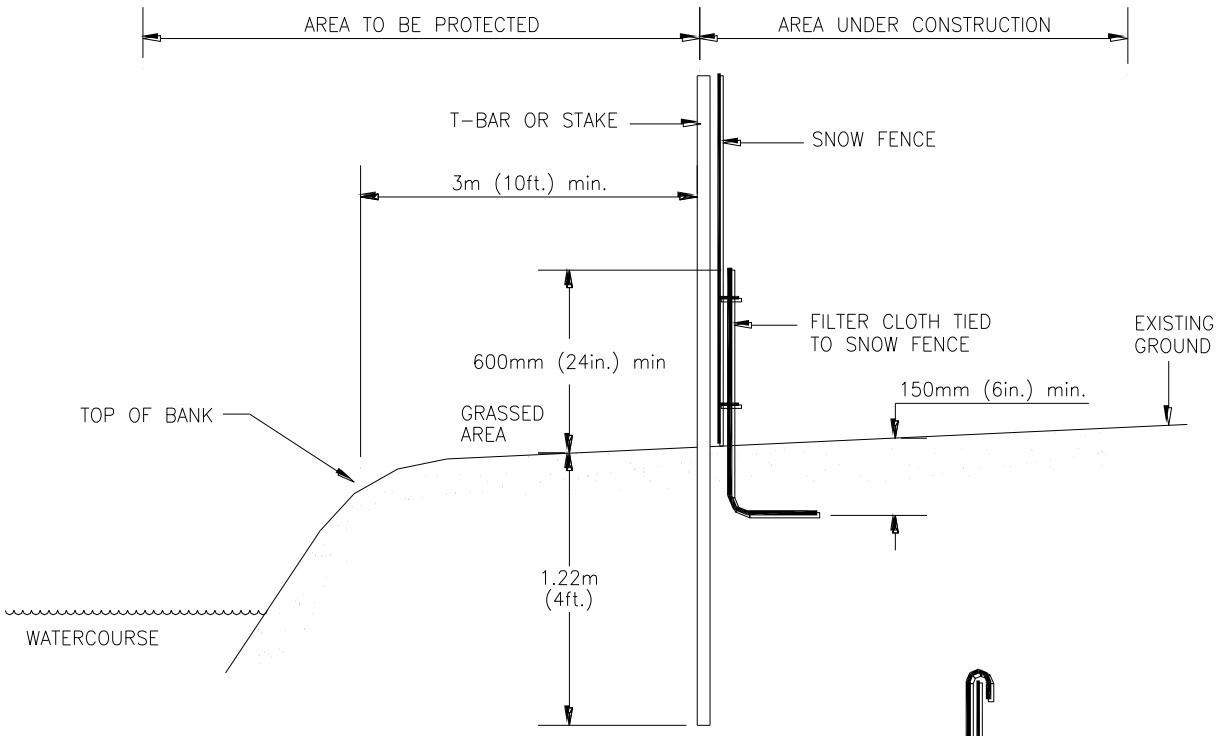


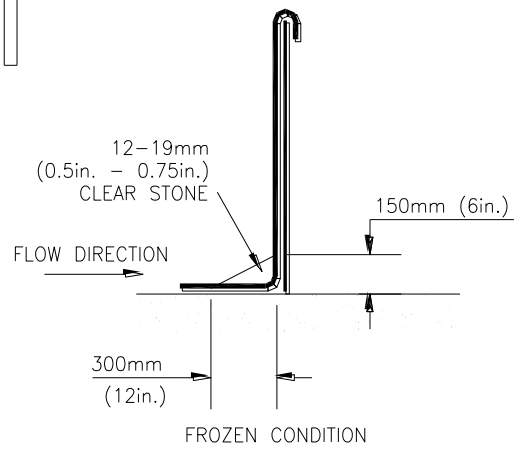


SADDLE WEIGHTS

Section:	Supersedes:	Dated:	Effective Date:	Dwg No:
16.0 RIVER & CREEK CROSSINGS	JANUARY 2006	JANUARY 2007	MARCH 1, 2007	16-4

SEDIMENT CONTROL FENCE

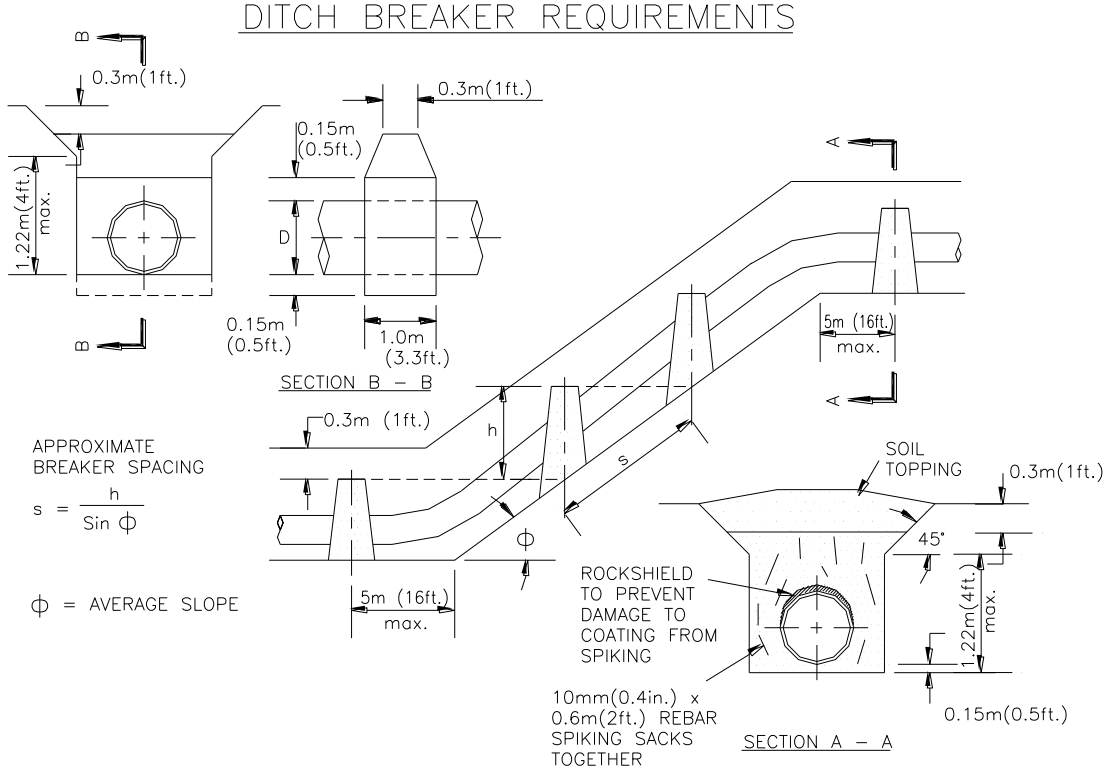




NOTES:

1. MATERIAL REMOVED FROM TRENCH TO BE REPLACED ON TOP OF FILTER CLOTH.
2. FILTER CLOTH TO BE HORIZONTALLY OVERLAPPED 0.5m (1.6ft.).
3. FILTER CLOTH TO BE TERRAFIX 270R OR EQUIVALENT.
4. PRESERVE VEGETATIVE BUFFER.

DITCH BREAKER REQUIREMENTS



NOTES:

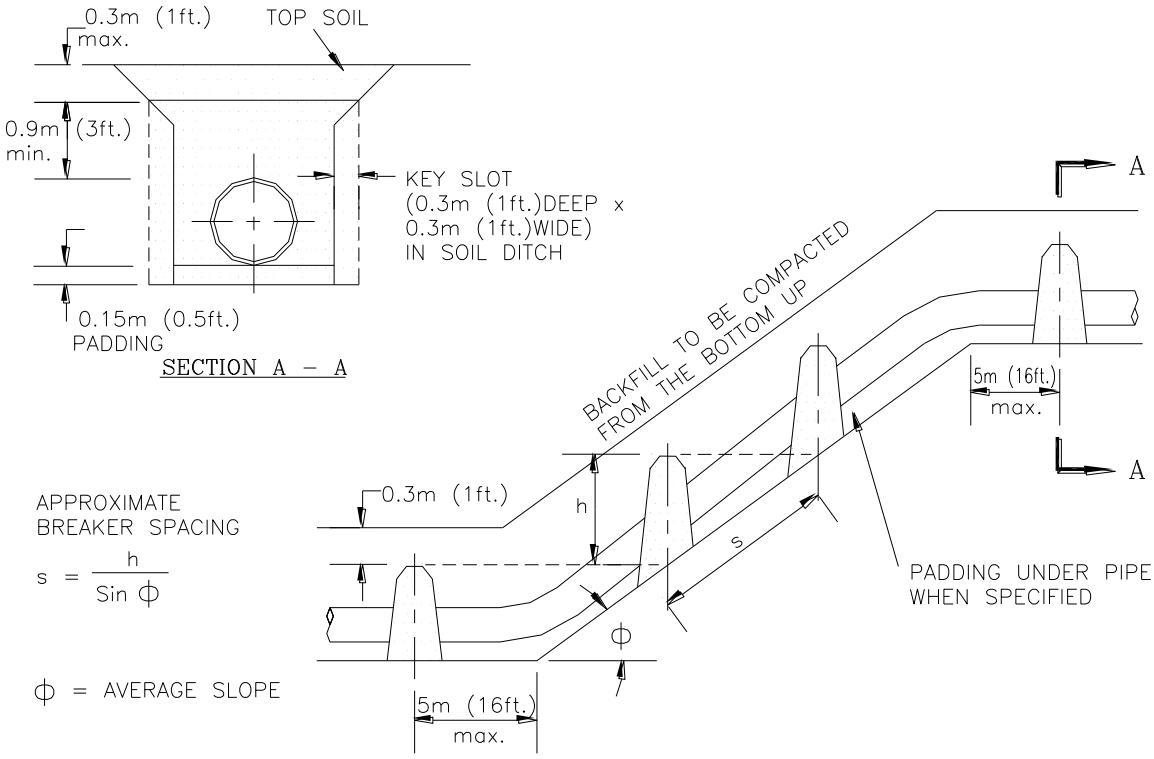
1. BREAKERS MUST BE INSTALLED AT SHARP CHANGES OF SLOPE ALONG TRENCH LINE, AND AT LOCATIONS WHERE THE NATURAL DRAINAGE PATTERN, PROFILE AND BACKFILL MATERIALS WILL CAUSE THE TRENCH TO ACT AS A DRAIN. LOCATION AND SPACING OF THE BREAKERS MUST BE AS DIRECTED BY THE COMPANY.
2. OPEN WEAVE HEMP OR JUTE SACKS MUST BE FILLED WITH AN AVERAGE 25kg (55lb) MIXTURE OF 1 PART CEMENT TO 6 PARTS SAND OR MINERAL SOIL* WITH JUST SUFFICIENT WATER TO PERMIT MIXTURE TO EXUDE AND BOND SACKS TOGETHER. REINFORCING BARS 10mm (0.4 in.) x 0.6m (2 ft.) LONG MUST BE SPIKED THROUGH SACKS DURING INSTALLATION TAKING CARE TO AVOID DAMGAE TO PIPE COATING.
3. PAYMENT FOR BREAKERS IN REGULAR TRENCH MUST BE BY UNIT BREAKER PRICE.
4. PAYMENT FOR COMPANY AUTHORIZED OVER–SIZED BREAKERS WILL BE FOR UNIT BREAKER PLUS THE ADDITIONAL VOLUME OF BREAKER INSTALLED ABOVE THE MINIMUM SIZE. THE NUMBER OF ADDITIONAL SACKS PAID FOR BY UNIT SACK MUST BE:
   $\frac{\text{BREAKER VOLUME } m^3}{\text{SACK VOLUME } = 0.014 m^3}$ minus MINIMUM No. OF SACKS RQD.
5. COMPANY MAY SPECIFY POLYURETHANE FOAM BREAKERS WHICH SHALL BE PAID FOR AS ABOVE, SEE NOTES 3 & 4.

* MINERAL SOIL = SOIL OTHER THAN TOPSOIL.

MINIMUM NUMBER OF SANDBAGS REQUIRED PER BREAKER IN REGULAR TRENCH		
PIPE O.D. (mm)	COVER	
	0.92m	1.22m
168.3	21	27
219.1	24	31
273.1	28	35
323.9	31	39
406.4	46	57
508	54	67
610	63	79
762	77	99
864	88	114
914	94	122
1067	114	148
1219	172	215

MINIMUM NUMBER OF SANDBAGS REQUIRED PER BREAKER IN REGULAR TRENCH		
PIPE O.D. (in.)	COVER	
	3.0ft.	4.0ft.
6.6	21	27
8.6	24	31
10.8	28	35
12.8	31	39
16.0	46	57
20.0	54	67
24.0	63	79
30.0	77	99
34.0	88	114
36.0	94	122
42.0	114	148
48.0	172	215

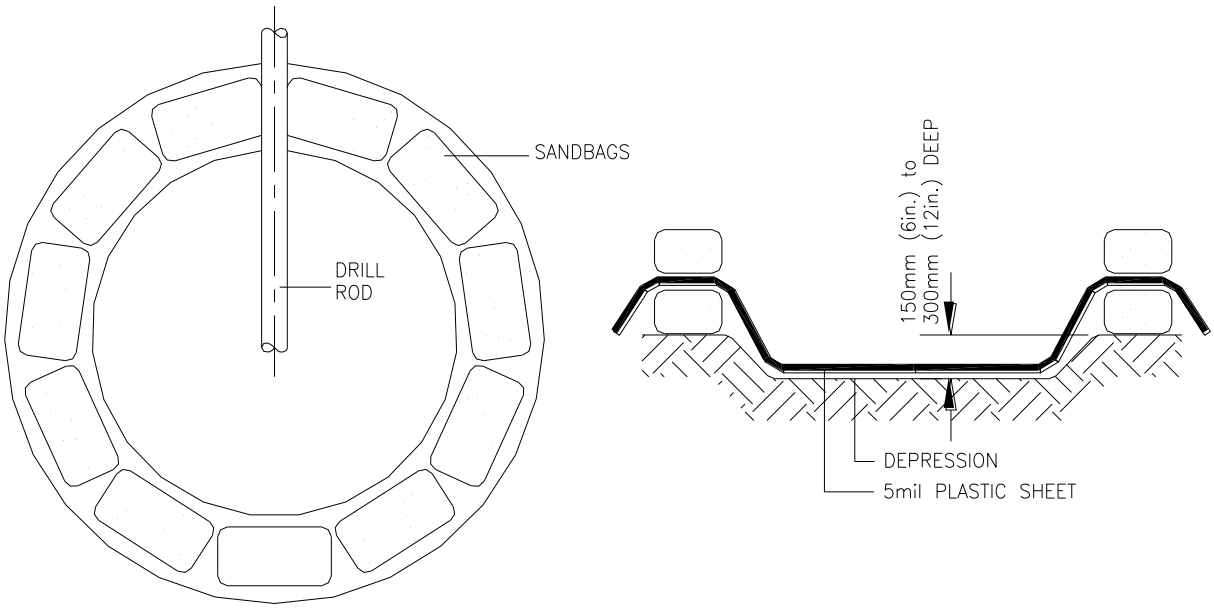
POLYURETHANE FOAM BREAKERS



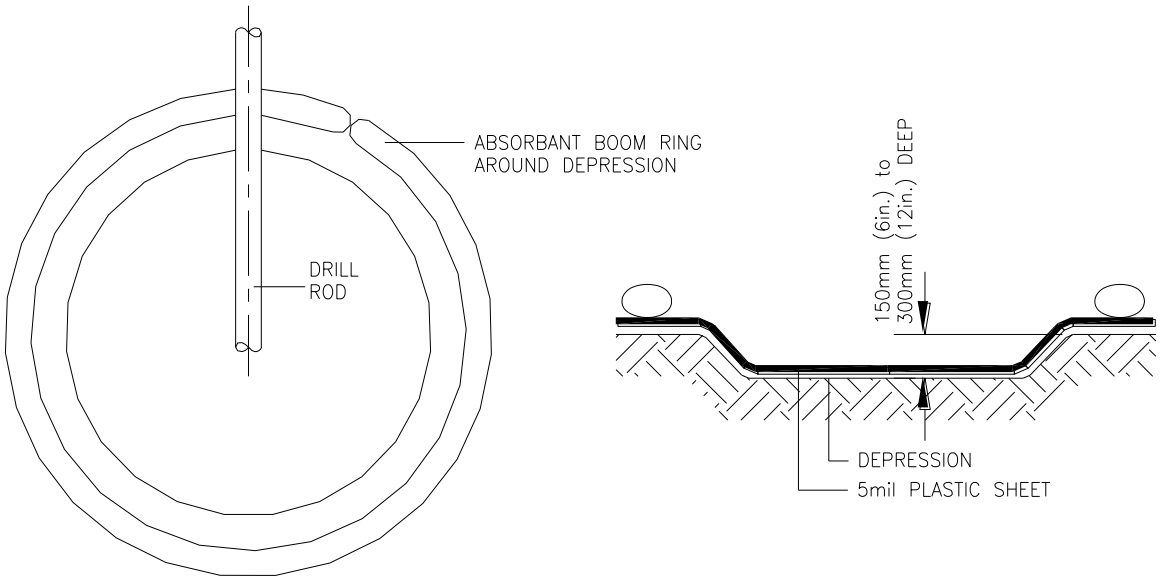
NOTES:

1. POLYURETHANE FOAM MUST CONFORM TO ALL MINISTRY OF ENVIRONMENT REGULATIONS CONCERNING CHEMICAL COMPOSITION.
2. FOAM WITH 32kg/m ^{3} (2lb./cu.ft.) DENSITY AND 0.207 MPa (30psi) MINIMUM COMPRESSIVE STRENGTH OR EQUAL MUST BE USED.
3. IF FORMING IS REQUIRED, STYROFOAM BOARD CAN BE USED.
4. IN VALLEYS, DRAINAGE AREAS OR AREAS WHERE WATER MAY FLOW ALONG TRENCH AND REMOVE PADDING OR BACKFILL FROM AROUND THE PIPE, ADJUST SPACING OF BREAKERS SO TOP OF BREAKER IS AT APPROXIMATELY THE SAME ELEVATION AS BOTTOM OF UPHILL BREAKER.
5. BREAKER SPACING AND CONFIGURATION MAY BE CHANGED AS DIRECTED BY COMPANY. DEPTH OF DITCH VARIES WITH SITE CONDITIONS.

DRILLING MUD PONDING CONTAINMENT



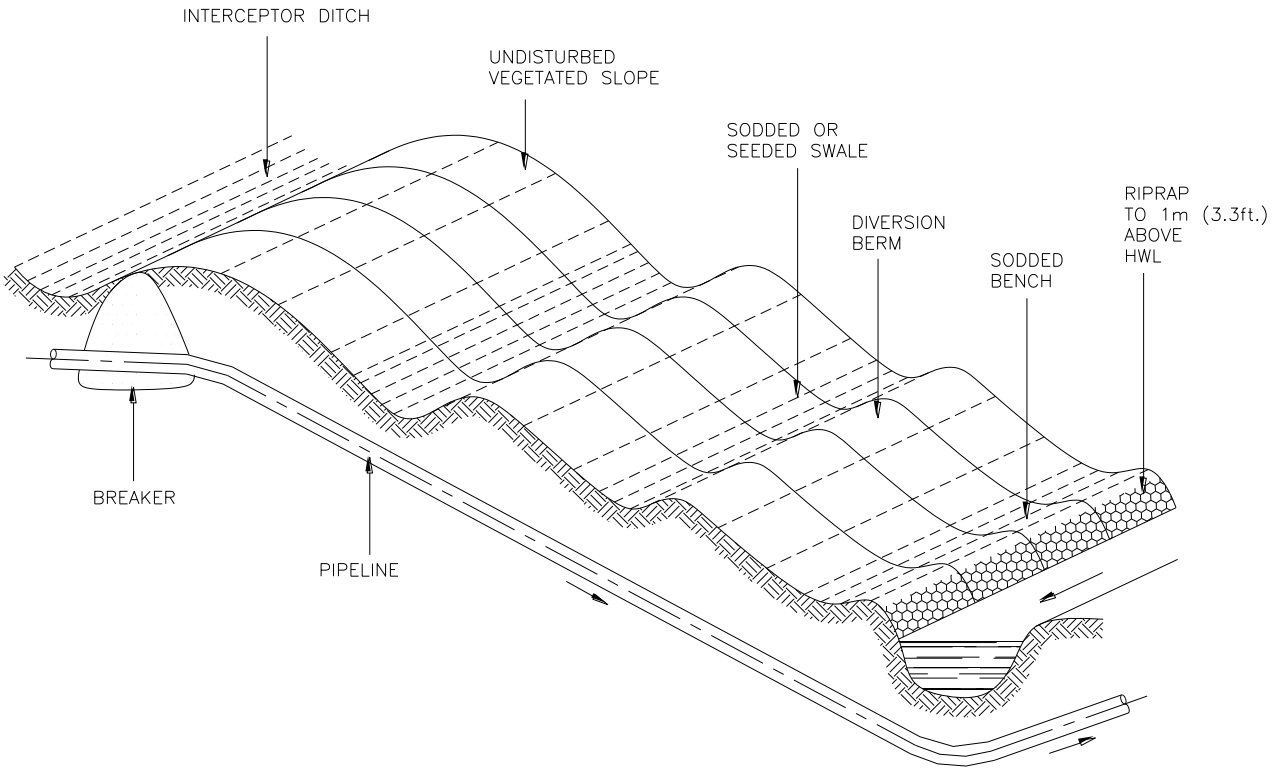
DRILLING MUD PONDING CONTAINMENT – ALTERNATIVES



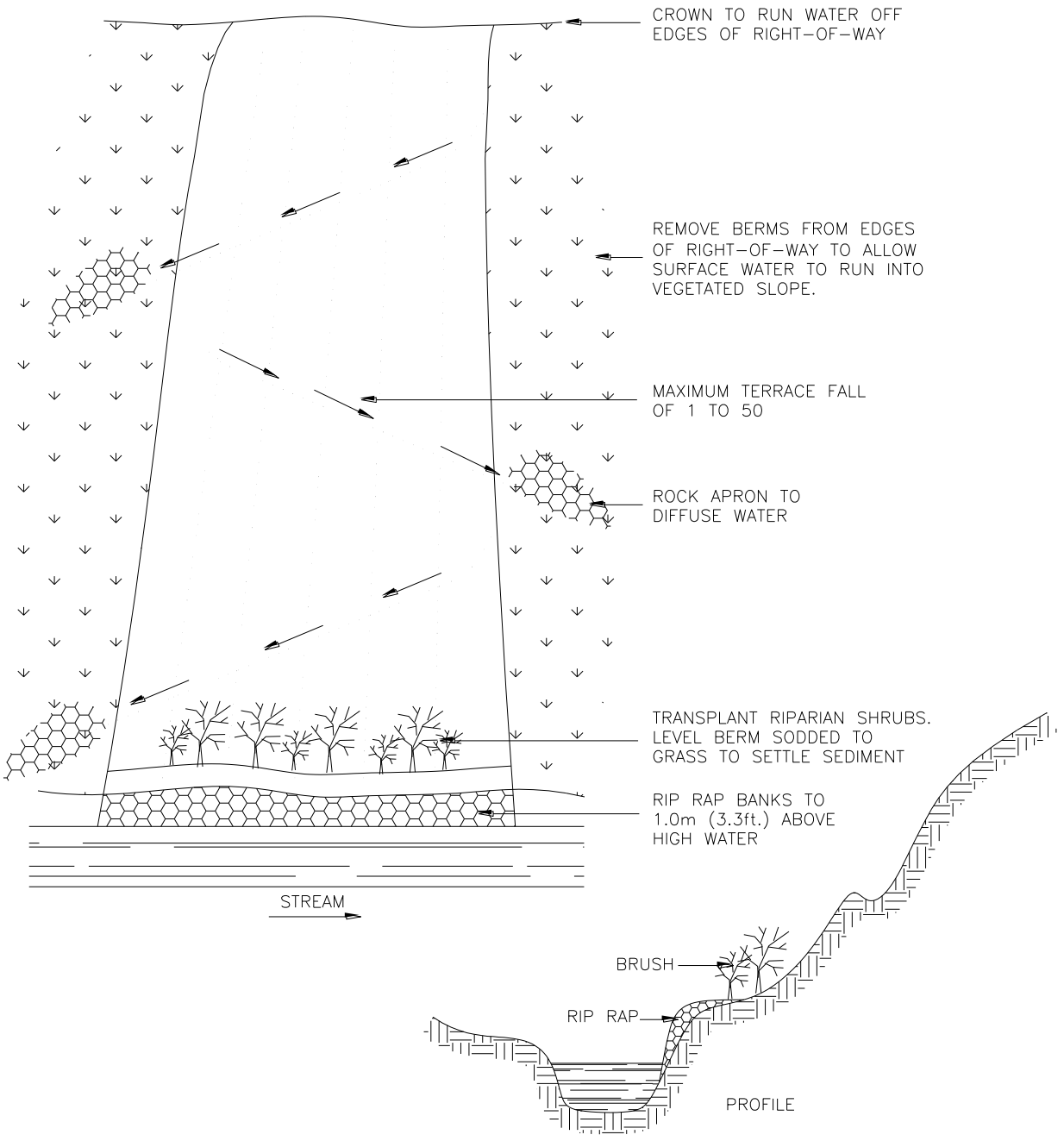
NOTES:

1. ENLARGE POND SIZE AS REQUIRED TO SUIT FIELD CONDITIONS.
2. SAND BAGS AS REQUIRED. SIZE TO BE FIELD DETERMINED.

SLOPE STABILIZATION TECHNIQUE



SLOPE STABILIZATION TECHNIQUE



Section:	Supersedes:	Dated:	Effective Date:	Dwg No:
24.0 SLOPE STABILIZATION	JANUARY 2006	JANUARY 2007	MARCH 1, 2007	24-2