Heritage Gas

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ENVIRONMENTAL PROTECTION PLAN

Date of Issue: 2003-11-25

Heritage Gas Limited
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OWNERSHIP PAGE

ENVIRONMENTAL PROTECTION PLAN

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November 2003

TO ALL EMPLOYEES

ENVIRONMENTAL PROTECTION PLAN

The senior management of Heritage Gas, on behalf of all other employees and shareholders, commits the Company to protecting the environment and conducting business in a manner that is consistent with the principles and contents of the Heritage Gas EPP.

Harvey Fedyk, P. Eng.
VP, Engineering & Operations

Michel Sarrouy, P.Eng.
Manager, Engineering and Safety

Ray Ritcey
President, Heritage Gas

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Title:	**Heritage Gas Environmental Policy**	Section: **1.0**

Heritage Gas is committed to protecting the environment throughout all phases of its operations. Environmental protection is considered to be both a corporate and personal responsibility for Heritage Gas and all of its employees.

In keeping with the principle of Sustainable Development, our activities will integrate economic and environmental considerations in a way that meets present human needs without compromising the ability of future generations to meet their own needs. In keeping with the principle of Environmental Responsibility, we will provide appropriate education, training and awareness programs to support employees' responsibilities for protecting the environment, public health and safety.

Further to these principles, we will:

- Comply with, or exceed, applicable laws and regulations, as well as corporate and industry operating standards, policies, and procedures.
- Develop and maintain policies and procedures that provide a framework for environmental protection, accountability and stewardship.
- Maintain regular, open and timely communications with all parties affected by corporate environmental policies and performance. We will consult with employees, the public, regulatory agencies, and other stakeholders to provide and solicit input.
- Provide educational opportunities and programs that support employee responsibilities with respect to protecting the environment.
- Conserve resources through the safe, efficient and responsible management of materials and wastes. Wherever practical, we will reduce, reuse and recycle.
- Avoid, minimize and mitigate adverse environmental effects of company activities. We will design, construct, operate and decommission facilities in an environmentally responsible manner, considering applicable, unique ecological conditions of the activity area.
- Prepare for and respond to emergencies in a timely and effective manner, and remedy any resulting environmental damage.
- Conduct environmental monitoring of company activities to ensure compliance with regulatory corporate and industry standards, and to identify and correct potential adverse effects on the environment.

Title:	**Heritage Gas Environmental Policy**	Section: **1.0**

- Provide complete and timely environmental reports, both internal and external to the organization.

- Strive for continuous improvement in the area of environmental performance. We will accommodate evolving regulatory, corporate, and industry standards, and integrate, where appropriate, the results of scientific investigation and technological innovation in order to enhance environmental protection.

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Title:	**Corporate Commitment**	Section: **2.0**

1.0 GENERAL

1.1 Recognizing that environmental responsibility is a corporate value and that the management of environmental issues is an important corporate priority, Heritage Gas has developed this Environmental Protection Plan (EPP).

1.2 Environmental management practices are an important part of the EPP. They assist in the interpretation of the Environmental Policy Statement, guide decision making in environmental matters and provide guidelines and procedures that are designed to result in effective environmental management.

2.0 PURPOSE OF THE EPP

2.1 The Heritage Gas Environmental Policy Statement is the overall governing document for corporate environmental activities. The EPP provides practical guidance to help Heritage Gas meet regulatory and other environmental commitments. The EPP will facilitate meeting corporate objectives and targets.

2.2 The EPP has been prepared to:

a) outline Heritage Gas commitments to minimize potential environmental effects, and to ensure that these commitments will be met.

b) document permitting requirements and applicable legislation.

c) provide Heritage Gas personnel with an approach and guidelines regarding environmental protection measures applicable to gas distribution pre-construction, construction and operations.

d) provide an environmental reference for Heritage Gas when planning specific activities.

3.0 MANAGEMENT COMMITMENT TO THE EPP

3.1 The commitment to the EPP of the senior management of Heritage Gas is signified by the signatures at the front of this EPP.

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Title:	**EPP Responsibilities**	Section: **3.0**

1.0 GENERAL

1.1 All department managers, with assistance from the Environmental Coordinator, working in cooperation under the leadership of the Vice President, Engineering and Operations are responsible for the application of the EPP.

2.0 PREPARATION AND MAINTENANCE OF THE EPP

2.1 Preparation of the EPP and amendments to the EPP are subject to the approval of the Manager, Engineering and Safety, and the Vice President, Engineering and Operations.

3.0 TRAINING

3.1 The Manager, Engineering and Safety, with assistance from the Environmental Coordinator, is responsible for ensuring that Heritage Gas employees have a level of environmental training commensurate with their responsibilities. The Environmental Coordinator provides guidance to inspectors on environmental issues and audit activities as required ensuring that the requirements of the EPP are being met. The Manager, Engineering and Safety also ensures that contractor staff are aware of the environmental commitments applicable to construction, and that they have received awareness training.

4.0 REGULATORY LIAISON

4.1 The Manager, Engineering and Safety, is responsible for liaison with regulators as required with assistance from the Environmental Coordinator.

5.0 INSPECTION AND MONITORING

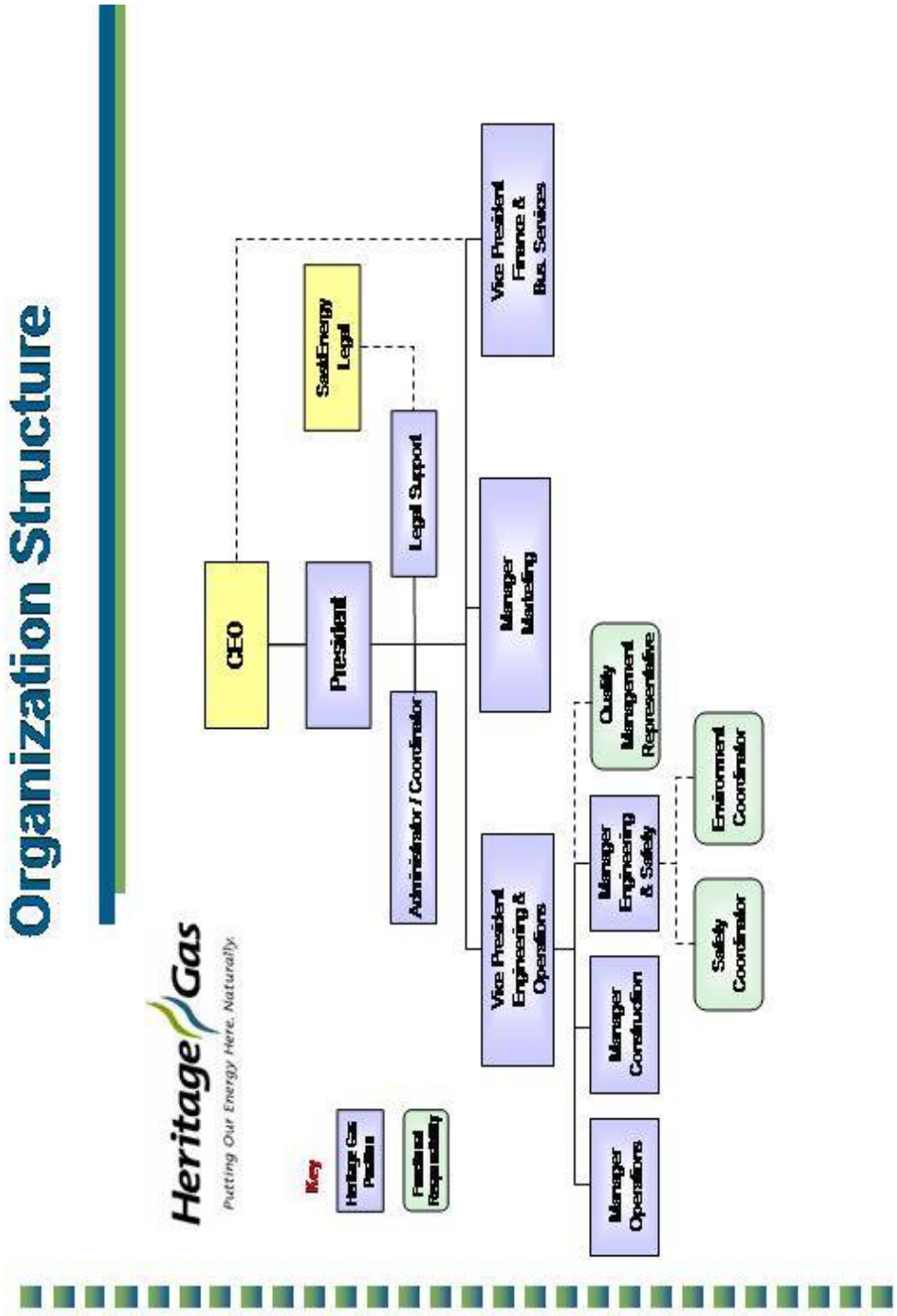
5.1 Inspectors are responsible for monitoring EPP and construction plan commitments and determining if they are being met during construction. Inspectors report to the Manager, Construction.

5.2 Distribution Technicians are responsible for monitoring EPP commitments and determining if they are being met during operations. Distribution Technicians report to the Manager, Operations.

6.0 ORGANIZATION

6.1 The Heritage Gas organization chart is presented next page:

Title:	**EPP Responsibilities**	Section: **3.0**



Title:	**Environmental Risk Assessment**	Section: **4.0**

1.0 GENERAL

1.1 Periodic environmental risk assessments will be conducted to identify, assess and prioritize the environmental risks associated with company activities and to guide continuous improvement. Risk assessment considers cumulative, current and potential future environmental impacts of all company activities and sites.

1.2 The degree of risk associated with an activity, facility or site is determined by combining an assessment of the severity of the potential or actual harm to the environment with an estimation of the frequency with which an incident is expected to occur.

2.0 ENVIRONMENTAL IMPACTS

2.1 Historical, ongoing and future activities and site uses will be assessed for risks with reference to the following impacts.

a) spills to soil or water;

b) solid non-hazardous waste generation;

c) erosion;

d) pesticide or herbicide use;

e) hazardous waste generation (solid or liquid);

f) effluent discharge;

g) disturbance of heritage sites;

h) habitat disturbance (aquatic or terrestrial);

i) disturbance of sensitive ecosystems;

j) emissions to air, including odours and noise;

k) negative public relations.

3.0 SEVERITY OF IMPACTS

3.1 Severity considers the estimated consequences of a potential event with reference to conditions of the site prior to the company activity or the standard of the day for the remediation of the site. Impacts are rated on the scale of severity described in Table 4.1. The application of the criteria in the table shall consider the effects of a single event and the cumulative effect of like events, where they are reasonably expected to occur.

Table 4.1
Severity of Environmental Impacts

Rating	Severity	Description
0	Negligible	An event or accumulation of like events has no adverse effect on humans or the environment.
1	Low	An event or accumulation of like events that has a non-immediate adverse effect on humans or environment and satisfies all of the following: - no need to report to government agency - no need to remediate - no need to implement emergency response - no public relations impact
2	Moderate	An event or accumulation of like events has an immediate adverse effect on humans or environment and satisfies all of the following: - the cost of response and follow up is less than $10,000 - no need to implement emergency response - low probability of public relations impact.
4	Major	An event or accumulation of like events has an immediate adverse effect on humans or environment and satisfies any of the following: - the cost of response and follow up is $10,000 or more; - an emergency response is initiated; - moderate to high probability of public relations impact.

4.0 FREQUENCY OF OCCURRENCE

4.1 The frequency with which an incident is estimated to occur is determined through an informed assessment of the activity, facility or site by a knowledgeable person.

4.2 This assessment assigns a probability of an incident on a scale of 0-1.00, where 0 represents certainty that the event will not occur and 1.00 represents certainty that the event will occur at some point in the lifetime of the activity, facility or site. Guidance for determining probabilities is given in Table 4.2.

Table 4.2
Risk Assessment - Probability of Incident Occurrence

Probability	Frequency	Description
0	None	It is reasonable to conclude that the incident will not occur, given the operational characteristics of the activity or site.
0.01-0.10	Rare	There is a probability that the event will occur but procedures, equipment or other circumstances make an incident highly unlikely even under abnormal conditions.
0.11-0.50	Infrequent	Although procedures and equipment are in place to prevent an incident, human actions or equipment failure may lead to an incident.
0.51- 0.99	Common	It is reasonable to conclude that incidents may occur, even though precautions are in place to prevent, control or minimize impacts.
1.00	Certain	It is certain that incidents have occurred or will occur, given the operational characteristics of the activity or site.

5.0 DETERMINING RISK FACTOR

5.1 The risk associated with an activity, facility or site is determined in accordance with the following formula:

$$R = S \times P$$

Where: R = the Risk Factor associated with an activity or site

S = the estimated severity of an event or accumulation of like events, determined from Table 4.1

P = the estimated probability that an event will occur during the life of the activity, facility or site, as determined in accordance with Table 4.2

6.0 RISK FACTORS

6.1 Risk Factors shall be used to assess the priority with which procedures and policies should be developed to address environmental risks. Risk Factors may be categorized as determined by Table 4.3.

7.0 RISK ASSESSMENT MATRIX

7.1 The risk assessment matrix guides the rating of company activities according to their potential risk to the environment. The matrix is used to determine and prioritize risks and to establish a risk management action plan. The plan should be focused on prioritized risks and non-compliance items and should include suggested completion dates and required resources.

7.2 Following the initial risk rating, the matrix serves as an ongoing tool to track both implementation of action items and the minimization of risks resulting from the successful implementation of preventative planning, training, reclamation and other initiatives.

Table 4.3
Risk Assessment - Risk Factors

Risk Factor	Priority	Requirements
0	None	No special policies or procedures required. Monitor for change in risk.
0.01-0.99	Low	Review the need for policies and procedures required to address specific risks. Implement required procedures concurrent with or following those related to higher priority issues.
1.00-1.99	Moderate	Implement policies and procedures to address risks. Monitor status of risks.
2.00 and higher	High	Implement policies and procedures to address risks. Implement emergency response plans where appropriate. Measure environmental performance as required to ensure risk minimization.

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Title:	**Site Inventories**	Section: **5.0**

1.0 GENERAL

1.1 Records of the environmental characteristics and status of sites owned by Heritage Gas shall be maintained. The site assessment inventory system has four major components: Site Status Inventory, Cumulative Release Inventory, Reclamation Project Inventory, and Decommissioned Sites Inventory.

2.0 SITE STATUS INVENTORY

2.1 This inventory identifies the environmental status of each company site. Information shall include the nature of the activity and potential risks associated with the sites. If possible, photographs and any ecological baseline information about the site should be included.

2.2 The inventory should include the result of a Level 1 or other audit, including audit report and soil sample results. The audit results should promote an understanding of the historical and current activities and events impacting the site.

2.3 The inventory should also include records of all preventative planning measures taken at the site in response to an identified risk, as well as any remediation activities taken in response to a historical or current impact. Remediation activities should be substantiated with the following, to the extent they apply: photographs, reports, clean sample results, disposal records or other proof of the remediation work.

2.4 Once a site is decommissioned or sold, the information will be moved to the "Decommissioned Sites Inventory" and only a notation of the movement of information left in the original file.

3.0 CUMULATIVE RELEASE INVENTORY

3.1 Based on the results of the risk assessment framework and the information contained in the "Site Status Inventory", an inventory of sites potentially impacted by cumulative releases will be developed. These sites will be considered "potentially impacted sites" and their status prioritized for reclamation and possible cumulative release reporting.

4.0 RECLAMATION PROJECT INVENTORY

4.1 This inventory briefly describes the site issues being addressed as well as what and when remediation activities have taken place. A proposed schedule of future activities required to complete reclamation should also be provided in the inventory.

4.2 When the reclamation is complete, the site information shall be moved to the "Decommissioned Sites Inventory" if the site is fully decommissioned or moved to the "Site Status Inventory" if the company continues to own or operate the site.

5.0 DECOMMISSIONED SITES INVENTORY

5.1 This inventory will document sites sold or decommissioned.

5.2 The inventory will consist of the information held in the Site Status Inventory prior to the sale. In addition, if the property was sold, a copy of the purchase agreement will be kept if notations regarding acquisition of environmental liability is made.

5.3 The information will be maintained as reference in case of future suggestion of sole or joint liability for historical impacts to the site.

6.0 DOCUMENTATION AND RECORDS

6.1 The following documentation is relevant to the Company's Site Assessment Inventory activities:

a) Site Status Inventory and related reports;

b) Cumulative Release Inventory and related reports;

c) Reclamation Project Inventory and related reports;

d) Decommissioned Sites Inventory and related reports.

Title:	**Environmental Legislation**	Section: **6.0**

1.0 GENERAL

1.1 A summary of environmental legislation that governs the activities of Heritage Gas follows:

Nova Scotia Provincial Acts and Regulations
Environment Act 1994-95, c.1, s.1. ➢ Environmental Assessment Regulations (N.S. Reg. 44/03) ➢ Activities Designation Regulations (N.S. Reg. 47/95) ➢ Approvals Procedure Regulations (N.S. Reg. 48/95) ➢ Emergency Spills Regulations (N.S. Reg. 59/95) ➢ Pesticide Regulations (N.S. Reg. 61/95) ➢ Sulphide Bearing Material Disposal Regulations (N.S. Reg. 57/95) ➢ Solid Waste-Resource Management Regulations (N.S. Reg.24/03) ➢ Petroleum Management Regulations (N.S. Reg. 44/02) ➢ Air Quality Regulations (N.S. Reg. 55/95) ➢ Dangerous Goods Management Regulation (N.S. Reg. 23/02)
Dangerous Good Transportation Act R.S., c.119, s.1.
Gas Distribution Act 1997, c.4, s.1. ➢ Gas Distribution Regulations (amended to N.S. Reg. 31/99)
Health Act R.S., c.195, s.1.
Occupational Health and Safety Act 1996, c.7, s.1.
Mineral Resources Act 1990, c.18, s.1.
Pipeline Act R.S., c.345, s.1.
Public Utilities Act R.S., c.380, s.1., revision corrected 1997.
Special Places Protection Act R.S., c.438, s.1.
Utility and Review Board Act 1992., c.11, s.1. ➢ Utility and Review Board Regulations (N.S. Reg. 270/92)
Federal Acts and Regulations
Canadian Environmental Assessment Act 1992, c.37 as amended 2003
Miscellaneous Statute Law Amendment Act 1993, c.34 ➢ Comprehensive Study List Regulations. S0R/94-638 ➢ Regulations Amending the Comprehensive Study List Regulations SOR/DORS/99-439; 2003-282 ➢ Inclusion List Regulations SOR/94-637 ➢ Regulations Amending the Inclusion List Regulations SOR/DORS/99-436; 2003-280 ➢ Exclusion List Regulations SOR/94-639 ➢ Regulations Amending the Exclusion List Regulations SOR/DORS/99-437; 2001-256 ➢ Law List Regulations SOR/94-636 ➢ Regulations Amending the Law List Regulations SOR/DORS 99-330; 99-438; 2001-257; 2003-281 ➢ Amendments to the Law List Regulations and Inclusion List Regulations SOR/DORS 2000-308, 309

Title:	**Environmental Legislation**	Section: **6.0**

➢ Regulations respecting the coordination by Federal Authorities of Environmental Assessment procedures and requirements SOR/97-181
Fisheries Act R.S., c.F-14, s.1.
Migratory Birds Convention Act, 1994 c.22
Navigable Waters Protection Act R.S., c.N-19, s.1.
Ocean Dumping Control Act. 1998 under Part VI of the *Canadian Environmental Protection Act*.
Onshore Pipeline Regulations, 1999, Pursuant to Subsection 48(2) of the *National Energy Board Act*
Species At Risk Act, 2002 c.29
Transportation of Dangerous Goods Act 1992, c.34

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Title:	**Environmental Audits**	Section: **7.0**

1.0 GENERAL

1.1 The Heritage Gas environmental audit program applies to all company activities and sites.

1.2 Audits may vary in scope, depending on audit purpose and site use. In addition, properties to be acquired, leased, or sold will be reviewed in a manner that allows the Company to determine the reasonable probability of any existing liabilities related to the site.

2.0 AUDIT PROGRAM OBJECTIVES

2.1 The environmental audit program shall:

a) describe the audits to be undertaken;

b) assess compliance with applicable laws, regulations and company standards;

c) document the environmental status of company facilities and sites;

d) determine impacts of company activities on the environment;

e) identify potential environmental liabilities associated with the site;

f) make recommendations for corrective or preventative measures;

g) identify training needs.

3.0 AUDITOR QUALIFICATIONS

3.1 The audit program will be conducted in a manner that ensures independence and objectivity.

3.2 Environmental audits will be conducted only by individuals qualified on the basis of their training and experience. In-house personnel may conduct audits if they possess the required skills, knowledge, independence and objectivity.

3.3 Auditors should have adequate knowledge and skills in the following areas:

a) auditing procedures;

b) environmental risk assessment;

c) environmental protection measures;

d) regulatory requirements;

e) industry standards;

f) facility operations;

g) environmental management systems.

3.4 In-house auditors will receive training to keep them current with evolving standards and techniques.

4.0 AUDIT FREQUENCY

4.1 Environmental audit frequency will be appropriate to the degree of risk associated with sites, facilities, installations and activities as the result of a risk assessment.

4.2 Type 1 Audit: will be conducted at all sites that are considered to present a high or moderate environmental risk, as determined by risk assessment procedures. All other sites will receive either a Type 1 audit or will be assessed on the basis of a sample audit of other sites with similar operating parameters, history and ecological conditions.

4.3 Type 1 audits will be conducted according to the following guidelines:

Site Risk Assessment	Audit Method	Audit Interval
High	Individual	3 years
Moderate	Individual	5 years
Low or None	Sample	5 years

4.4 In addition to the general audit requirement identified above, assessments will be conducted as follows:

a) Spot audits: Audits shall be conducted as required to address site specific issues, i.e. report of non-compliance, in response to an incident or following a change in practice, operator or regulations;

b) Property acquisition or sale: Audits shall be conducted to identify environmental liabilities associated with property bought or sold by the Company;

c) Construction sites: Audits will be conducted during or following construction activities to confirm Company and contractor compliance with approved procedures.

4.5 Type 2 and Type 3 Audits: typically completed following a Type 1 audit that identifies contamination of a site that requires remedial action. They may also be completed on an ad-hoc basis to determine whether or not a site is contaminated, even in the absence of a formal Type 1 audit. Accordingly, there are no specified frequencies for Type 2 or Type 3 audits.

5.0 GENERAL AUDIT METHODOLOGY

5.1 An audit is a planned environmental inspection that identifies and assesses past, current and potential environmental impacts at a site. Audits must be conducted in a manner that is consistent with formal, well-defined methodologies.

5.2 In general, an audit will include the following:

a) Collection and documentation of evidence

b) Analysis and evaluation of evidence

c) Documentation and reporting of findings

5.3 Audit findings are based on available evidence, resulting in uncertainty related to the reliability of findings. The audit risk is reduced through the use of qualified auditors and rigorous investigation methodology.

6.0 TYPE 1 AUDIT PROCEDURES

6.1 A Type 1 audit is a site assessment in which baseline and background information about the site is collected. These audits may be modified if not all of the information identified in this practice is required for the purposes of the audit.

6.2 The audit should include the use of a pre-established checklist to ensure that specific, critical elements at the site are documented.

6.3 A Type 1 audit consists of three parts: a Historical Review of the site, a site Walkthrough and Interviews with persons knowledgeable about the site and its history.

6.4 The essential components of the Historical Review part of a Type 1 audit are as follows:

a) Review information that is in the Company's possession, looking for details on the site's prior uses and potential environmental issues, including:

- land titles showing previous ownership and any environmental caveats, or other municipal documents that help to determine prior uses of the site;
- permits, approvals, government agency reviews and other records that may be related to air, liquid or solid emissions, chemical storage permits etc.;
- environmental audits, reports, assessments, inspections or sampling results; note any issues identified and any conclusions or recommendations;
- results of legal proceedings or government investigations if applicable; note any issues identified and any conclusions or recommendations.

b) Aerial photographs, if available, may provide information on prior uses of the property. In particular, look for the following:

- above ground storage facilities, especially fuel tanks, or vehicle service areas;
- activities on adjacent properties that may result in migration of contaminants;
- changes to the property over time, indicating prior use or practices such as the use of soil sterilants or the storage of products.

c) Conduct interviews with past and present owners, employees or neighbours to obtain information about events and operations at the site. Interviews should attempt to identify:

- previous and current uses of site and/or buildings;

- physical changes made to the site;
- age of buildings;
- when and where any buildings may have been moved;
- subdivisions of the site;
- historical waste or spill management practices, including product storage, and discontinued products or practices.

d) To the extent that it is available and considered useful, review relevant information available from government agencies.

6.5 The essential elements of the Walkthrough part of a Type 1 audit are as follows:

a) During a walkthrough inspection, operations at the site are observed to identify issues of environmental concern. Auditors will use Personal Protective Equipment as appropriate given the nature of the site.

b) A site representative with good working knowledge of the physical characteristics and uses of the property shall assist the auditor during the walkthrough inspection.

c) Check to ensure that corporate environmental policies are being followed at the site.

d) Determine if any issues noted in previous audits, or government inspections, have been resolved.

e) Complete a description of the site. Attach the site layout plan or sketch of the site and provide information on:

- site locator (number and location);
- size of the site;
- grade of the site and the direction of the grade;
- number of buildings;

- other structures on the site (e.g. above ground storage tanks, industrial equipment;
- description of present site uses;
- classification of site, i.e. industrial, commercial, or residential.

f) Describe the buildings on site, if appropriate to the scope of the audit. Provide information on:

- building size and age;
- building use (current and past);
- building construction (wood, brick, metal, etc.);
- building condition (good, poor, etc.);
- locations of exits.

g) Describe easements affecting the site. This may require communication with the relevant municipality or utility. Note locations and connections to the site for:

- water mains;
- overhead or buried electrical wire and cables;
- storm and sanitary sewer mains;
- natural gas or other pipelines or services;
- roadways.

h) Describe adjacent properties, providing the following information for each direction (north, south, east, and west) as appropriate:

- description of present and previous uses;
- physical description of sites (surface cover, grade direction, structures, etc.);

- easements (telephone, electrical, water, gas, sewer, etc.);
- potential environmental concerns such as the presence of potential contaminants, i.e. fuel storage, automotive servicing, storage of lead, mercury, arsenic, PCBs, radioactive materials;
- underground structures, i.e. basements, buried tanks;
- sensitive areas or ecological features such as parkland, wildlife reserves, or water bodies.

i) Inspect the site indications of environmental issues such as:

- evidence of spills or leakage, such as stained soils or floors;
- products used or stored on site such as chemical, fuel or hazardous materials;
- unidentified products, containers, substances or equipment;
- vegetation stress;
- compaction of the land inappropriate to its current or future land use;
- migration of adverse materials off or onto the site;
- previous or current underground and aboveground storage tank areas (note the age, size and condition of tanks);
- waste management practices, including disposal of products such as waste oil, used absorbents, process water, condensate, empty drums and containers, products from separator systems, etc.;
- obvious structural changes or damage, such as recently replaced gravel or concrete, degraded concrete or asphalt;
- condition of fill material, roads, parking facilities, rights of way, etc.;
- odours, noise and their potential sources;

- appearance of surface waters;
- building features such as PCB containing ballasts, asbestos insulation or pipe wrap, etc.;
- condition and use of drains, sumps and other low spots;
- condition and use of wells, pits, lagoons, waste water, watercourses, ditches, standing water, etc.;
- unusual land features such as mounds that might indicate buried material;
- site security to indicate potential for unauthorized dumping or vandalism;
- poor housekeeping or maintenance;
- accidental release response measures, if applicable.

j) Note the presence of the following products and their uses, if applicable:

- hydrocarbon products or by-products such as fuels, condensates and waste oils;
- asbestos that may yield airborne fibres;
- polychlorinated biphenyl (PCB) contained in electrical transformers or capacitors and hydraulic fluids (used at sites prior to 1979);
- mercury that may be contained in pressure recorders, batteries, paint pigments, preservatives and electrical equipment;
- pesticides and herbicides;
- radioactive materials;
- urea formaldehyde insulation;
- special wastes not previously identified that are considered to be hazardous to human health or the environment;

- emissions to air from existing equipment or practices.

6.6 The essential elements of the Interview part of a Type 1 audit are as follows:

a) Interview the site representative who accompanies the audit and others who have specific knowledge to determine and clarify information about the site. Preferably, the interviews should occur during the site visit and should seek the following information:

- identification of operational characteristics of the site, including products or equipment used and past or present practices;
- identification of potential risks, including a discussion of topics arising from the walkthrough inspection;
- details and results of previous investigations or assessments of the site;
- details of historical incidents or process problems.

6.7 At the conclusion of a Type 1 audit, a report shall be prepared to provide a clear indication of the audit results, deficiencies observed and any recommendations for remedial or follow-up action that apply.

6.8 Generally, the audit may come to any of the following conclusions:

a) there is no evidence of contamination or other adverse effects in connection with the site;

b) there is evidence of potential contamination or other adverse effects in connection with the site (these shall be listed and described);

c) there is evidence of actual contamination or other adverse effects in connection with the site (these shall be listed and described);

6.9 Where actual or potential contamination or other adverse effects exist, methods to confirm, refute or delineate the contamination or adverse effect shall be recommended.

7.0 TYPE 2 AUDIT PROCEDURES

7.1 A Type 2 audit is a sampling program that involves the collection of soil, water and waste samples in order to identify or confirm the presence of contaminants at the site.

7.2 The need for a Type 2 audit, and the parameters of the laboratory analysis, will typically be determined by the findings of the Type 1 audits. The sampling program should be carried out in accordance with the general procedures that follow.

7.3 A qualified environmental technician should direct the sampling program. A “grab” sample, taken by a site representative, may be adequate in some situations.

7.4 Samples must be taken according to protocol established for the material being sampled. Loss of quantifiable material and cross contamination of samples must be avoided.

7.5 Samples must be collected, stored and transported in containers that are appropriate for the type of material being sampled.

7.6 The sample shall be subjected to laboratory analysis and comparison with allowable limits for contaminants. The analysis must be appropriate to the known and suspected past and current uses of the property.

7.7 A report to outline the parameters of the investigation and an interpretation of the analytical results shall be prepared.

8.0 TYPE 3 AUDIT PROCEDURES

8.1 A Type 3 audit usually consists of the remediation of a contaminated site. It may, however, involve only an assessment of remediation alternatives if the site issues are very complex or if experimental remediation techniques are being considered.

8.2 A Type 3 audit includes the following:

a) Review all data from the Type 2 audit and identify areas of non-compliance.

b) Define remediation objectives with respect to the site.

c) Develop a plan for the remediation of impacted areas, complete with schedule and costs.

d) Carry out the remediation of the site.

8.3 On completion of remediation work, confirm its effectiveness through lab analysis of samples taken as per a Type 2 audit. The site will either be within acceptable limits of contamination or will require further remediation.

8.4 Prepare a report that documents actions taken and the final status of the site. The report may include photographs of the remediation work in progress.

9.0 AUDIT REPORTS

9.1 Audit reports should include the following, to the extent they are applicable:

a) the name and location of the site;

b) the date the audit was conducted;

c) the name of the auditor;

d) a list of reference documents used in the audit;

e) a list of persons interviewed;

f) a summary of the audit process;

g) a not-to-scale but generally proportional site layout showing:

- sample locations
- facility features relative to sample locations
- North indicator
- ecological features of the site and adjacent areas (including drainage pattern and vegetation if possible)
- approximate distances between important features shown on the plan

h) photographs of the site;

i) for a Type 2 audit, a log of samples that indicates:

- sample number

- sample depth
- sample location relative to the site layout diagram
- the depth of the water table if it is encountered
- sample characteristics such as soil type, odour, etc.

j) a description of the criteria to which the audit is conducted;

k) a summary of findings, including recommendations for a remediation plan or the results of the implementation of a remediation plan, as appropriate to the Type of audit;

l) the distribution list for the audit report.

10.0 AUDIT FOLLOW-UP

10.1 Effective follow-up on audit findings is essential for ensuring that performance and compliance deficiencies are addressed in a timely manner. The audit follow-up shall include:

a) development of action plans to address prioritized risk or non-compliance items, including suggested completion dates and required resources;

b) allocation of resources required to address identified deficiencies;

c) initiation of action items;

d) tracking and reporting on progress of action items until resolution of the issue.

11.0 DOCUMENTATION AND RECORDS

11.1 Final audit reports, including site assessments and information on remediation work, will be permanently retained.

11.2 Formal background information, including preliminary site assessments, working papers and photographs, will be permanently retained.

11.3 Information to be permanently retained will be incorporated into a dedicated filing system such as the site assessment inventory.

Heritage Gas

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Title:	**Environmental Incident Investigation**	Section: **8.0**

1.0 GENERAL

1.1 Incidents related to Heritage Gas facilities or the activities of Heritage Gas personnel or contractors that have or may have caused an adverse effect on the environment will be subject to an investigation.

1.2 Incident investigations will be conducted in a timely and diligent manner and the resulting information will be assessed to determine if process changes or additional training are necessary in order to prevent future incidents.

2.0 INCIDENT INVESTIGATION CRITERIA

2.1 An environmental incident investigation will include the following:

a) internal reporting of the incident using the “Incident Report” form or the “Near Miss Report” form of the Emergency Response Manual, as appropriate;

b) external reporting when required;

c) an investigation to determine the cause and environmental impact of the incident;

d) ensuring clean-up measures, if applicable, were taken and finalized;

e) identification of potential liabilities arising from the incident;

f) identification of corrective measures required to prevent recurrence;

g) monitoring of the implementation of corrective measures;

h) documentation and reporting of investigation findings;

i) Identification of training needs arising from incident investigation findings.

3.0 INCIDENT INVESTIGATION ROLES

3.1 Where the incident resulted from the activity of Company personnel or a Company contractor, the Supervisor of the Company’s employee carrying out or overseeing the activity is responsible for initiating the incident investigation, which maybe carried out by the Supervisor himself or the Environment Coordinator in consultation with appropriate personnel;

3.2 Where the incident is not the direct result of an action by Company personnel or a Company contractor, the person responsible for the facility or site at which the incident occurred is responsible for conducting the incident investigation, in consultation with appropriate personnel.

4.0 FOLLOW-UP ON FINDINGS

4.1 The person responsible for conducting the incident investigation is responsible for following up on the conclusions and recommendations of the findings to ensure remedial actions are taken as necessary.

4.2 The Manager, Engineering and Safety is responsible for reviewing the results of incident investigations and monitoring remedial actions.

5.0 DOCUMENTATION AND RECORDS

5.1 Completed “Near Miss Report” forms and supporting information shall be retained for two years from the date of the report.

5.2 Completed Incident Investigation reports shall be permanently retained.

5.3 Documentation shall include information on remediation or training actions taken and photographic evidence of incident sites and remediation activity, if applicable.

Heritage Gas

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Title:	**Permits and Approvals**	Section: **9.0**

1.0 GENERAL

1.1 Heritage Gas will construct pipelines only after all required permits have been applied for and obtained.

1.2 The Heritage Gas Permitting Plan is described in Table 9.1.

1.3 The permits referred to in the Permitting Plan, Table 9.1, relate primarily to environmental matters. Other permitting may be required for technical, labour standards, operating or other purposes.

Table 9.1
Heritage Gas Permitting Plan

Action	Authority	Notes/Comments	Timing/Responsibility
Environmental Assessment			
1. Provincial Environmental Assessment Process	Department of the Environment and Labour (NSDEL)	Onshore pipeline 5 km or more in length and MAOP equal to or greater than 3450 kPa are defined as Class I undertakings in Environmental Assessment Regulations. Heritage Gas will strive to obtain Ministerial approval to be granted following Registration, to include Environmental Assessment (EA) Report and Based on submitting a Registration that meets all requirements for approval by the Minister under the EA Regulations.	**Timing:** Submission of EA Registration documents for each pipeline that is subject to EA Regulations prior to construction each year, and continued compliance with Conditions of Approval. **Responsibility:** Manager, Engineering and Safety

Table 9.1
Heritage Gas Permitting Plan

Action	Authority	Notes/Comments	Timing/Responsibility
2. Federal Environmental Assessment Process	Federal authority usually takes on role of lead "responsibility authority" (RA). In this case, could be Canadian Coast Guard/Navigable Waters Protection Branch, or Habitat Management Branch – both within Fisheries and Oceans Canada. Could also be any federal agency whose lands are being traversed by a pipeline.	Canadian Environmental Assessment Act (CEAA) is triggered by application for approval of works or undertakings affecting fish habitat and applications to construct new work on, over, under, through or across any navigable water. It may be also triggered by access or traversing certain federal lands. Objective: Project approval following environmental screenings. Screenings should satisfy the federal responsibility because: • The project is not on the Comprehensive Study List. • Comprehensive study is not required with a screening determination that with mitigation there are no significant adverse effects. • Scope of federal review will likely be limited to water crossing affecting fish habitat or navigable waters, where consideration of the overall project may be addressed under cumulative effects. • Also includes permission to use Federal lands.	**Timing:** Pre-Construction **Responsibility:** Manager, Engineering and Safety

Table 9.1
Heritage Gas Permitting Plan

Action	Authority	Notes/Comments	Timing/Responsibility
3. Permit to Construct	NS Utility and Review Board	Requires filing of detailed engineering and construction data as required under the Gas Distribution Act, the Pipeline Act and Pipeline Regulations. General Requirements include: • Detailed designs of pipeline. • Detailed specifications of pipeline components. • Quality assurance program. • System to monitor changes in design specifications standards and procedure. • Technical specifications. • Pressure testing program. • Safety manual. • Environmental protection plan. The Board may retain an independent firm as a "Certifying Authority". Successfully obtaining the Permit to Construct is a pre-condition of the Licence to Operate.	**Timing**: Pre-Construction **Responsibility:** Manager, Engineering and Safety

Table 9.1
Heritage Gas Permitting Plan

Action	Authority	Notes/Comments	Timing/Responsibility
4. License to Operate	NS Utility and Review Board	Compliance with conditions attached to Permit to Construct is a pre-requisite. General requirements, include: • Compliance testing program to establish that system has been constructed in accordance with drawings and specifications. • Pipeline control system. • Pipeline integrity management program. • O&M manuals. • Safety manual. • O&M employee safety program. • O&M training program. • Monitoring and surveillance program. • Emergency plan and emergency procedures manual, with an emergency awareness program. • Document audits. • Record retention.	**Timing** Post-Construction **Responsibility:** Manager, Operations

Title:	**Permits and Approvals**	Section: **9.0**

Provincial Approvals			
5. Approval for work in a watercourse or wetland	NSDEL	Required under Activities Designation Regulations and the Approvals Procedure Regulations of the Environment Act. Applies to installation or maintenance of a pipeline in a surface watercourse, dredging of a watercourse, or any type of removal of material from a surface watercourse or wetland. Note: as a general guide, pipelines shall not be constructed in wetlands protected by the Agricultural Marshland Conservation Act.	**Timing**: Pre-construction, monitored during construction, as required. **Responsibility:** Manager, Engineering and Safety
6. Soil Breaking Permit	NSTPW	Required before breaking the soil of any public highway. Include most highways within counties, and some within urban municipalities and towns.	**Timing**: Pre-Construction **Responsibility:** Manager, Engineering and Safety
7. Notification and Approval for works affecting sulphide bearing material	NSDEL	As required by the Sulphide Bearing Material Regulations, this relates to construction activities in areas where there is sulphide-bearing material, primarily pyritic slate bedrock of the Halifax Formation.	**Timing**: Construction, addressed as part of EPP submitted at pre-construction stage **Responsibility:** Manager, Engineering and Safety with Support of Construction Manager
8. License of Driver to transport dangerous goods	NSTPW	Required for certain materials used in construction which fall within the definition of “dangerous goods” under the Nova Scotia Dangerous Goods Transportation Act.	**Timing**: Construction **Responsibility:** Construction Manager
9. Permit to generate, carry, receive waste dangerous goods	NSDEL	“Waste dangerous goods” may be generated during some construction activities. Depending on volumes and characteristics, registration may be required.	**Timing**: Construction **Responsibility:** Construction Manager

10. Temporary Magazine License	NSDEL on behalf of the Explosives Regulatory Division (Federal)	Explosives and Detonators License is required when explosives are used.	**Timing**: Construction **Responsibility:** Construction Manager
11. Registration of and Installation of Petroleum Storage Tanks	NSDEL	Petroleum storage tanks may be installed and used in marshalling yards requiring permitting. Petroleum storage tanks of greater capacity than 4000 L must be registered.	**Timing**: Construction **Responsibility:** Construction Manager
12. Approval for the Use and Disposal of Water	NSDEL	When the pipeline is ready for hydrostatic pressure testing, the approvals are required under the Activities Designation Regulations and Approval Procedures Regulations. Detailed plans are required of locations of withdrawal and discharge points for the water used in the testing procedure.	**Timing**: Construction, addressed as part of EPP submitted at pre-construction stage. **Responsibility:** Construction Team with support of Design Team.

13. Granting of easements with respect to Provincial Crown Lands	NSDNR	The Nova Scotia Crown Lands Act provides that the Minister of Natural Resources may with Cabinet approval, grant and easement with respect to Crown Lands with terms and conditions. Surveys on Crown land require an order of survey from the surveys division of NSDNR. Access to Crown land within designated parks requires special consideration pursuant to the Parks Act. The approval procedure includes consideration of the request for an easement by the Integrated Resource Management Committee, relative to the impact of the easement on other land use. Also, obtained from NSDNR are approvals for work on Crown Land including surveys, approval to burn cleared vegetation on Crown Lands, access to Crown Lands within parks and the use of Forest Access Roads.	**Timing**: Pre-construction **Responsibility:** Manager, Engineering and Safety
14. Heritage Research Permit	Nova Scotia Museum	The Special Places Protection Act requires a heritage research permit to carry out exploration or excavation seeking heritage objects (archaeological or cultural heritage resources). The permit holder must submit a report on the work above.	**Timing**: Pre-construction, construction **Responsibility:** Manager, Engineering and Safety

Federal Approvals			
15. Approval of works or undertaking affecting fish habitat	Fisheries and Oceans Canada (DFO)	Application Form set out in Schedule VI to Fisheries (General) Regulations Will arise at watercourse crossings where construction activity may affect fish or habitat. In practice, it is likely that only wet crossings will require authorizations. Listed in Law List Regulations, and therefore triggers CEAA.	**Timing**: Pre-construction, monitored during construction as required. **Responsibility:** Manager, Engineering and Safety
16. Approval to construct or alter work on, over, under, through, or across any navigable water	Navigable Waters Protection Branch of Coast Guard (DFO)	Application to construct new work on, over, under, through or across any navigable water is listed in Law List Regulations, and therefore triggers CEAA, while application to alter an existing lawful work does not (where profile of structure does not change). Existing structures in abandoned rail ROW may be "lawful" because of original railway exemption from Navigable Waters Protection Act (NWPA). Many structures in roadways may not have received prior approval under NWPA. Work may be exempt where the Coast Guard believes that is does not substantially interfere with navigation and work is not a bridge, boom, dam or causeway.	**Timing**: Pre-construction **Responsibility:** Manager, Engineering and Safety
17. License or grant of interest in respect of Federal real property	Parks Canada, Department of National Defence, Public Works and Government Services	Depending upon the necessity to traverse or access other Federal lands, including military property. The CEAA process maybe triggered.	**Timing**: Pre-construction **Responsibility:** Legal with support of Manager, Engineering and Safety

18. Designation of reserve lands to Her Majesty for the purpose of being leased or a right or interest being granted	Indian and Northern Affairs Canada	This would be required if transmission lines cross First Nation Lands. Triggers the CEAA process. Distribution to customers on a reserve will require the consent of the affected Band Council, but does not trigger the CEAA process.	**Timing**: Pre-construction **Responsibility:** Legal with support of Manager, Engineering and Safety
19. Permit to transport Explosives	Energy Mines and Resources administered through Nova Scotia Department of Labour	Required during construction for blasting operations.	**Timing**: Construction **Responsibility:** Construction Manager

Title:	**Environmental Training**	Section: **10.0**

1.0 GENERAL

1.1 Heritage Gas will ensure that employees and contractors are trained to understand corporate environmental policies, procedures and priorities.

1.2 Training shall be carried out in a manner that ensures employees have the skills and contractors have the awareness required to implement environmental programs, as required by their positions or the types of activities they undertake on behalf of Heritage Gas.

1.3 The contents of the training provided to an individual will be appropriate to the environmental responsibilities of the individual

2.0 TRAINING PROGRAMS

2.1 For the purpose of general environmental training, employees and contractors shall be segmented into three groups. See Table 10.1.

2.2 Activity-specific training will be provided to employees who handle hazardous materials. See Table 10.2.

2.3 The timeline for training begins at the commencement of employment or contract status with the Company.

3.0 DOCUMENTATION AND RECORDS

3.1 The following documentation and records, related to environmental training of employees and contractors of Heritage Gas, shall be maintained under the responsibility of the Manager, Engineering and Safety:

a) environmental training requirements of various positions;
b) contractor qualifications and required environmental knowledge;
c) training delivery schedule, including required update intervals;
d) who has received training (name, position, location)
e) the type and content of the training;
f) the date of delivery of the training;
g) participant testing and performance results to confirm understanding of material;
h) training session evaluations;
i) “TDG” program information;
j) First Aid program information;

k) "WHMIS" program information.

Table 10.1
Environmental Training Subjects and Intervals

Group Description	Training Required	Frequency of Training
High Priority Group (includes: construction, operations, technical personnel and construction contractors)	Environmental Awareness	Within 1 Month of Hire
	Environmentally-Responsible Construction Practices	Prior to Being Put in a Responsible Position
	Global Warming and Greenhouse Gases	Within 1 Year of Hire
	Review	Every 2 Years
Senior Management (includes: President, Vice-Presidents, Managers)	Environmental Awareness	Within 6 Months of Hire
	Global Warming and Greenhouse Gases	Within 1 Year of Hire
	Review	Every 3 Years
All Other Employees	Environmental Awareness	Within 1 Year of Hire
	Global Warming and Greenhouse Gases	Within 1 Year of Hire
	Review	Every 3 Years

Table 10.2
Activity-Specific Training

Product Transporters (includes: employees and contractors who transport any quantity of hazardous or controlled products to, from or between company sites)	"Transportation of Dangerous Goods"	Upon hire, renewal required every 36 months
	Release Response and Reporting	Upon hire, review every 5 years
Product Handlers (includes: employees, supervisors and contractors that handle, store or dispose of hazardous or controlled products before, during, or after transport)	"Workplace Hazardous Material Information System"	Upon hire, annual review required
	First Aid	Within 1 year, review every three years
	Release Response and Reporting	Upon hire, review every 5 years
	"Transportation of Dangerous Goods"	Within 1 year, renewal required every 36 months

Heritage Gas

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Title:	**Pre-Construction Activities**	Section: **11.0**

1.0 GENERAL

1.1 Supporting activities are required before design is completed and construction begins. These include: route selection; easement acquisition, environmental and cultural resources investigations, pre-construction surveying and geotechnical investigations.

2.0 ROUTE SELECTION AND EASEMENT ACQUISITION

2.1 Prior to acquisition of the easement, a route selection process will be completed. Routes selected for pipelines shall minimize potential environmental impacts by: minimizing stream crossings; avoiding areas of erodible soils; and avoiding areas of known rare flora, significant wildlife habitat, and cultural resources.

2.2 Prior to construction, determine the required easement width and locations requiring additional temporary work room. Refer to Figure1.0.

3.0 ENVIRONMENTAL AND CULTURAL RESOURCES INVESTIGATIONS

3.1 Pre-construction environmental investigations, such as rare plant reconnaissance, fish habitat assessment, cultural resources surveys and surveys for potentially contaminated, will be conducted by appropriately qualified personnel in accordance with this EPP, where applicable, federal and provincial regulations and associated permits.

4.0 SURVEYING

4.1 Surveying involves gathering topographical data required for the design of the gas distribution system.

4.2 Surveying may require the cutting of vegetation along survey lines to provide a clear line of sight to equipment.

4.3 Procedures for environmental protection during surveying:

a) Clear the necessary vegetation according to Section 12.0, Clauses 12.4 and 12.5.

b) No fording of streams is permitted.

c) Handle all waste and litter according to Section 12.0, Clause 12.17.

d) Handle all hazardous materials (i.e., fuels and lubricants) during survey activities according to Section 12.0, Clause 12.12.

5.0 GEOTECHNICAL INVESTIGATIONS

5.1 Surficial soil conditions, depth to bedrock and the nature of the overburden and bedrock are determined during pre-construction geotechnical investigations.

5.2 Geotechnical investigations may involve excavation by mechanical equipment and drilling, and may require the cutting of trees and shrubs.

5.3 Procedures for environmental protection during geotechnical investigations:

a) Clear only the vegetation necessary to access the site according to Section 12.0, Clauses 12.4 and 12.5.

b) Equipment shall be refueled and lubricated prior to being mobilized to the site.

c) Wherever possible, use existing roads and trails to access drilling/test pit locations

d) Watercrossings shall be avoided, where possible. If watercrossings are required, temporary bridges shall be installed.

e) Minimize disturbance of ground cover when accessing or drilling/excavating an area. Where required utilize swamp matting or similar technique to prevent exposure of soil.

f) Place slash or hay on exposed soil to protect the soil from erosion prior to right-of-way or easement grading.

g) Fill and abandon all drill holes and test pits before leaving the site using excavated material supplemented, where necessary, with clean material from off-site.

h) Handle all waste and litter according to Section 12.0, Clause 12.17.

i) Handle all hazardous materials (i.e., fuels and lubricants) during geotechnical investigations according to Section 12.0, Clause 12.12.

Title:	Construction Activities - General	Section 12.0 Clause: 12.1

12.1 GENERAL

1. Construction activities will be conducted in a manner that minimizes adverse effects and undesirable impacts on the environment.

2. Where required by the nature of the work, construction plans will include specific environmental protection measures. These measures shall form a mandatory part of the construction work to be carried out.

3. This Section is divided into 23 Clauses, each of which starts on a new page for ease of presentation and for use as a reference by field staff.

12.2 MANAGEMENT OF EROSION, SEDIMENT AND CONSTRUCTION DRAINAGE

1. Grubbing, grading, excavation, and backfilling leave soil exposed. When the soil is exposed, it becomes susceptible to erosion.

2. To the extent possible, areas containing high-risk soils will be determined as part of planning and design activities before the construction season. Site-specific mitigation measures will be addressed in construction plans.

3. Buffer Zones: The following procedures apply to the establishment of buffer zones around areas of potential sedimentation or erosion, to aid in protecting the environment in those areas:

    a) Maintain a 10 m vegetated buffer zone and delineated with environmental fencing or flagging tape around watercourses and wetlands, until 24 hours prior to construction. The buffer zone extends 10 m each side of the crest of the slope of a watercourse or wetland.

    b) Temporary workspace is not permitted within 10 m of a watercourse or wetland.

    c) In areas of sensitive soils, staging areas within 30 m of watercourse or wetland should be surfaced with clean rock to minimize soil disturbance.

4. Erosion and Sediment Control: Procedures for the protection of the environment from erosion and sedimentation damage:

    a) Install erosion and sediment control features prior to working at a site within 30 m of a watercourse or wetland. Do not remove sediment control until vegetation is established.

    b) Ensure that the following construction sequence for sedimentation and erosion control is used: siltation fence/straw bales; ditching, sediment traps; sediment basin; temporary ditches (e.g., swales). Use the reverse sequence for taking down the protection measures.

    c) Minimize the use of construction equipment within the delineated buffer zone.

d) Ensure that crossings with steep approach slopes have additional on-land sediment control strategies such as diversion berms or sediment barriers. Refer to Figure 20.0, Figure 21.0 and Figure 22.0 for guidance on the construction of diversion berms, with and without flow channels.

e) Ensure that erosion control work (i.e., riprap and filter stone) are constructed of clean, non-ore bearing, non-toxic, non-erodible, and non-porous materials.

f) Where fine-grained soils are encountered, apply erosion and sediment control measures at the edge of the work areas. Minimize grading on steep slopes and areas of fine-grained soils.

g) Limit grading to the areas required for providing a safe construction surface. Refer to Figure 8.0, “Grading the Right-of-Way”.

h) Grade stream banks so that ground elevations gradually decrease from the top of the bank to the edge of the stream. Refer to Figure 8.0, “Grading the Right-of-Way”.

i) Use tackified straw mulch, polyethylene sheets or other geosynthetic materials as a temporary stabilization method if there is an impending rainfall event, of if a disturbed area cannot be permanently stabilized immediately.

j) Ensure that the site is restored immediately following construction, in accordance with Clause 12.11 of this Section.

k) Sediment fencing will be removed following construction and once the site has been stabilized.

5. Construction Drainage and Trench Dewatering: Procedures to protect the environment during the drainage of construction water:

a) Where soil is susceptible to erosion, install diversion ditches upslope of the work area to minimize the amount of runoff entering the trench during construction.

b) If work cannot be delayed during high water levels, special trench dewatering, erosion and sediment management practices will be designed and applied in site specific construction plans.

c) Where applicable, establish roadside ditches to inlets and outlets of culverts as early as possible and reduce the silt levels of surface/overland drainage in roadside ditches with erosion protection material.

d) During watercourse construction, where steep approaches exist construct slope breakers to divert sediment-laden runoff away from the disturbed right-of-way or easement into a vegetated area.

e) Sediment leaden trench water will be diverted through a vegetated area, sediment basin, or filter bag, to minimize the potential for sediment to enter any watercourse.

f) Reduce the velocity of runoff over the construction site by providing settling ponds or sediment traps. These should be sized with adequate retention time to settle out solids. A minimum requirement is that 200 L of storage be provided for every metre of exposed construction area.

g) Ensure that water discharge sites are well vegetated, stabilized and located at least 15 m from the watercourse or wetland. Ensure that the topography of the site allows for filtered water for flow away from the work area.

h) Ensure that dewatering activities do not cause erosion, sedimentation, or ponding of water on agricultural lands. If necessary, use scour protection during discharge (e.g., use of filter bags, rock aprons, plastic sheeting, plywood, straw bales, and level spreader as appropriate). Where energy dissipation is considered appropriate, refer to Figure 23.0, “Energy Dissipator” for guidance.

i) For trench dewatering ensure hoses are of sufficient length and working condition to transfer the water to the desired location.

j) Survey proposed area of discharge to ensure watercourses or drainage ditches are not nearby. Closely monitor the discharge area for trench dewatering. Change the hose discharge location if conditions become saturated to point that adequate natural filtration is no longer possible.

k) Trench dewatering will be conducted in accordance with Erosion and Sedimentation Control Handbook for Construction Sites (NSDOE, 1988) with appropriate sediment filtration and testing prior to disposal in any watercourse.

l) As a minimum, any water discharged into the watercourse cannot exceed a suspended solids concentration of 50 mg/L on a grab sample or 25 mg/L on monthly arithmetic mean or turbidity concentration of 15 Nephelometric Turbidity Units (NTU) above upstream levels.

m) Temporarily divert any upslope sheet runoff or overland flow drainage away from the construction site. Ensure that other drainage problems are not created by the diversion. The diversion will remain within the construction easement.

n) When disposing of drainage over a steep cut or fill, construct an apron, diversion dyke, or discharge pipe to the bottom of the embankment when undue erosion is expected to affect a watercourse.

o) Install trench breakers in all trenches at the point where they enter the watercourse or wetland, prior to initiating construction in the trench.

p) Leave trench breakers in place 10 m uphill of the wetland or watercourse boundary. Hard trench plugs (minimum 3 m width) will be maintained in place until the initiation of watercourse crossing.

q) Install trench breakers at locations along the trench line where the natural profile drainage pattern and backfill materials will cause the trench to act as a drain. Breakers will be installed at the base of the slopes adjacent to watercourses and wetlands, and where needed to avoid draining a wetland.

r) Construct trench breakers with sand bags or polyurethane foam.

s) Construct trench breakers so that the bottom of one breaker is at the same elevation as the top of the next breaker located down slope.

t) Refer to Figure 19.0, “Typical Sack Breakers” for guidance on the fabrication and installation of trench breakers.

12.3 TIMING OF CONSTRUCTION

1. Construction planning should consider environmental issues that can be mitigated by timing construction to less sensitive periods or by increased monitoring.

2. Due to increased sensitivities during specific times of year, preferred construction windows are identified for various aquatic and terrestrial resources (e.g., fisheries and raptors). Weather conditions also include the level of potential impact as a result of activities.

3. In general, the construction period for each year is May 1 to December 1.

4. Consult with regional fisheries and wildlife biologist to ensure construction windows are identified and adhered to where practical.

5. Ensure that construction windows for sensitive species are adhered to, or provide any necessary additional measures when work outside the preferred window is unavoidable (refer to Table 12-1).

Table 12-1
Examples of Preferred Construction Windows for Sensitive Species

Resource	Construction Window
Eagles	July 1st to January 31st (if <400 m from nest)
Fish Habitat*	June 15th to September 15th
Waterfowl	July 15th to April 30th
*Note: In-stream construction activity will take place within the appropriate construction window of June 15th to September 15th to minimize the impacts to sensitive aquatic life unless otherwise specified. Less sensitive watercourses maybe crossed from June 1st to September 30th.	

6. Specific construction windows will be indicated in construction plans, where appropriate.

7. Procedures for the protection of the environment through the timing of construction activities:

   a) Halt construction during wet weather conditions in accordance with Clause 12.19 of this Section.

   b) Schedule construction and cleanup activities to minimize the duration that the trench and spoil piles are exposed.

   c) Adjust schedule for watercourse crossings to maximize the likelihood of work during low flow conditions to allow dry crossings.

   d) Schedule blasting to avoid periods of high biological sensitivity such as spawning periods or within over-wintering areas during the winter season.

8. Seasonal considerations:

   a) Monitor the effectiveness of sediment and erosion control measures during spring runoff.

   b) Monitor frost depth during construction to ensure the continued support of the equipment.

   c) Ensure that construction is within the established construction windows and follows other timing considerations.

Title:	Construction Activities – Clearing	Section: 12.0 Clause: 12.4

12.4 CLEARING

1. Vegetation is cleared for construction purposes or to establish an adequate, safe workspace.

2. Procedures for environmental protection during clearing:

   a) Where possible, to the discretion of Heritage Gas, conduct clearing in winter.

   b) Delineate clearing boundaries prior to cutting to minimize the extent of clearing to prevent erosion.

   c) Minimize damage to the property and fell trees in an appropriate manner to avoid damage to adjacent trees. Do not fell trees in watercourses.

   d) Non-tracked vehicles will travel on approved access roads, where possible, and avoid steep approach slopes.

   e) Remove vegetation within temporary construction workspaces by cutting as close to the ground as possible, except where otherwise specified.

   f) When clearing, retain stumps and root systems, where practical, except over the ditch line and where removal is necessary for safe equipment access. Perform grubbing according to Clause 12.4 of this Section and Figure 4.0, “Green Area Grubbing”.

   g) Do not clear during heavy rainfall or snowmelt events (refer to Clause 12.19 of this Section).

   h) Cut merchantable timber in lengths suitable for salvage. Refer to Figure 5.0, “Salvage of Merchantable Timber”.

   i) Handle waste and litter generated by clearing according to Clause 12.17 of this Section.

   j) Where cutting of cavity trees is required, check trees to determine if nesting species are present.

k) Bore, tunnel or hand-dig under large/mature trees or hedgerows that provide a natural vegetation screen.

l) Maintain aesthetic value associated with corridor along rail trails or other recreational areas in agreement with the appropriate rail trail organization and regulatory authority.

m) Maintain road allowance and road vegetation screens where possible.

n) Use light weight and wide tracked equipment where soil stability is an issue.

o) Use pruning, fencing, tying back of vegetation or barricading to protect trees within the work area, as an option to cutting them down.

p) Retain tree branches, brush and undergrowth for use as rollback during the clean up phase, or chip the branches and use this material for erosion control. Refer to Figure 6.0, “Slash Disposal by Rollback”.

q) Control unwanted vegetation using non-chemical techniques such as mechanized cutting, hand cutting, mowing, shredding, chipping and grubbing.

r) Move or remove cut vegetation where it is a hazard or obstruction to pipeline right-of-way or easement use.

s) Limit brush control for pipeline marker visibility.

t) Prior to burning slash obtain approval from Heritage Gas.

u) Where slash is to be burned for disposal, ensure all required permits have been obtained and that fire fighting equipment is readily available during the burning process. Refer to Figure 6.0, “Slash Disposal by Burning”.

Title:	Construction Activities – Clearing in the Vicinity of Waterbodies	Section: 12.0 Clause: 12.5

12.5 CLEARING IN THE VICINITY OF WATERBODIES

1. Prior to any construction activity in proximity to a watercourse, silt fence must be installed along the top of the stream bank. Placement shall be done such that fencing does not come in contact with the watercourse or any portion of the embankment that may encounter flow during periods of high water. Installation shall be done manually to minimize potential for damage or erosion near the watercourse.

2. Procedures for environmental protection during clearing in the vicinity of watercourses:

    a) Fell trees and vegetation away from watercourses. Remove trees, debris or soil inadvertently deposited within the flood plains to minimize disturbance to the watercourse bed and banks.

    b) Minimize clearing of the easement and work areas near watercourses, and hand clear areas within 10 m of the crest of the slope of a watercourse or wetland.

    c) Manually clear large trees and shrubs within the watercourse crossing area or use equipment that can reach in to buffer zones.

    d) Clearing of the riparian buffer areas will be delayed until immediately prior to construction.

    e) Avoid watercrossings where possible. If a watercrossing is unavoidable, then a temporary bridge shall be used following Figure 26.0

12.6 GRUBBING

1. Grubbing involves stripping the vegetative mat to prepare for excavation or grading activities.

2. Grubbing exposes the soil, leaving it susceptible to erosion.

3. Procedures for environmental protection during grubbing:

    a) Do not grub within the buffer zone (i.e., within 10 m of the wetland or watercourse) until 24 hours prior to construction of the crossing.

    b) Manage sediment and erosion control in accordance with Clause 12.11 of this Section.

    c) Install temporary culverts prior to grubbing in accordance with Figure 25.0.

    d) Construct and maintain check dams, sediment traps or filters in roadside ditches prior to grubbing, where applicable.

    e) Where the pipe trench intersects a watercourse, restrict all grubbing to trench line within 1 m of the watercourse.

    f) Grubbing in wetlands is restricted to the areas where it is necessary for trenching or safety.

    g) No grubbing will take place during heavy rainfall or snowmelt events.

    h) Keep grubbing to a minimum to facilitate re-growth

4. Refer to Figure 4.0, “Green Area Grubbing” for guidance on grubbing of the right-of-way or easement.

Title:	Construction Activities – Grading	Section: 12.0 Clause: 12.7

12.7 GRADING:

1. Grading involves the preparation of the right-of-way or easement for equipment access including working side road construction.

    a) Grade only to the extent necessary to provide adequate surface for construction equipment. Where applicable segregate topsoil from mineral sub-soil (spoil).

    b) Maintain a minimum separation of 1 m between topsoil and spoil piles.

    c) Stockpile topsoil and spoil in areas where it can be easily recovered and where it will not block natural drainage.

    d) Slope cuts sufficiently to enhance stability and minimize erosion

    e) Rock excavated as part of grading a trenching shall be placed at the limit of the right-of-way or easement unless otherwise directed by Heritage Gas.

    f) Assess and manage potential sulfide-bearing materials within the buffer zone in accordance with Clause 12.18 of this Section.

    g) Control excessive dust for aesthetic and/or safety purposes using water or calcium chloride.

    h) Manage the discovery of contaminated materials in accordance with Technical Specification IS-2-8030.

    i) Refer to Figure 8.0, “Grading the Right-of-Way” for guidance on grading of the right-of-way or easement.

Title:	Construction Activities – Trench Excavation and Spoil Storage	Section: 12.0 Clause: 12.8

12.8 TRENCH EXCAVATION AND SPOIL STORAGE

1. Trench excavation involves the removal of unwanted soil from the pipeline trench during construction. Some environmental considerations during trench excavation include: erosion and sediment control, encountering contaminated soils or cultural resources, and topsoil management.

2. Procedures for environmental protection during trench excavation:

    a) Delay trenching in buffer zones until immediately prior to pipe installation. Trench plugs will be used to prevent sediment laden water from entering the watercourse. Plugs will be removed when construction of the crossing is initiated.

    b) Implement sediment and erosion control measures and perform trench dewatering according to Clause 12.2 of this Section.

    c) Rip or chip bedrock, where appropriate and practical, using hydraulic breakers.

    d) Where possible, minimize the width of the trench using a chain trencher or narrow bucket hoe.

    e) Leave 10-20 m breaks in spoil piles at appropriate areas along the right-of-way or easement to coincide with locations of trench plugs and established wildlife travel corridors.

    f) In areas of open trench ensure that the ends of the trench are ramped or stepped to facilitate access out of the trench for wildlife.

    g) During excavation, ensure that topsoil is managed in accordance with Clause 12.22 of this Section.

    h) Any surplus material excavated from the streambed or banks during trenching operations must be disposed of away from the stream in accordance with Clause 12.10 of this Section.

    i) Contain excavated stream spoil using sumps, berms, silt fences, etc. to prevent silt laden water from entering local watercourses.

j) If spoils are stockpiled for an extended period of time or are in proximity to a watercourse/wetland, install sediment fences on the downslope side of the pile (refer to Clause 12.2 of this Section).

k) Stockpiles of soil will be located and managed in a manner to prevent sediment laden runoff from entering watercourses (may include containment berms). Avoid placement of spoil piles or graded materials on steep slopes within 20 m of a watercourse.

3. Refer to the following Figures for guidance in trenching and spoil storage:

- Figure 14.0, “Two Lift Spoil Replacement for Rocky Subsoils”
- Figure 15.0, “Trench, Spoil and Work Area Topsoil Stripping”
- Figure 16.0, “Three Phase Soil Handling”

12.9 CONSTRUCTION OF WATERCROSSINGS

1. Watercourses will be crossed by a variety of methods during distribution system construction. Site-specific methods will be determined during the engineering design process and documented on the construction plans.

2. Construction in and around watercourses can have serious impacts on fish habitat. Each crossing method presents specific issues of concern. However, in general, soil erosion and sedimentation are common issues to most crossing methods. Sedimentation can lead to reduced oxygenation of water, siltation of spawning beds and can be problematic to fish health.

3. General considerations for the protection of the environment during planning for construction that involves crossing of waterbodies include:

    a) Avoid steep slopes, drainage outlets and unstable terrain, where possible.

    b) Wherever possible, establish the crossings perpendicular to watercourses.

    c) Delineate a sufficient, but minimal, working space on the approach slopes and at watercourse crossing locations.

    d) Locate staging areas at least 30 m from the stream bank, where possible.

    e) Outline site-specific measures in construction plans for each construction area prior to construction.

    f) At crossings where there is potential for sensitive habitat to be affected, include site specific sediment and erosion control measures in construction plans to outline the crossing layout, techniques to be used, environmental protection measures and on-land sediment control strategies to be employed during construction. If necessary, develop a site-specific reclamation plan to ensure that impacts to aquatic resources are minimal in magnitude, short-term in duration, and non-residual in nature.

4. General procedures for the protection of the environment during the construction of watercrossings:

a) Ensure that copies of all federal and provincial permits together with their conditions are available on the site at all times during construction.

b) Liaise with the Department of Fisheries and Oceans (DFO) and the Nova Scotia Department of Environment and Labour (NSDEL) prior to construction.

c) Dry crossings are the preferred watercourse crossing method because they minimize impact on fish habitat and generation of sediment.

d) Schedule watercourse crossings within construction windows and follow other timing considerations according to Clause 12.3 of this Section.

d) Minimize the length of time of in-stream construction.

e) No fording of watercourses will be permitted. For guidance on methods for providing crossing capability for construction equipment, refer to the following:
- Figure 25.0, “Vehicle Crossing- Culvert”
- Figure 26.0, “Timber Bridge for Small Streams”

f) Where a wet crossing is approved, refer to Figure 28.0, “Wet Crossing” for guidance.

g) Halt construction of watercourse crossings during wet weather, in accordance with Clause 12.19 of this Section.

h) Clear vegetation in accordance with Clause 12.4 of this Section.

i) Grub the construction area accordance with Clause 12.6 of this Section.

j) Ensure that the necessary materials and equipment required for constructing the watercourse crossing are on-site and assembled prior to trenching.

k) Prepare the pipe for installation (i.e., string, weld, coat) prior to initiating the watercourse crossing.

l) Maintain fish passage during construction, where fish movement has been identified.

Title:	Construction Activities – Construction of Watercrossings	Section: 12.0 Clause: 12.9

m) Prior to construction relocate fish that may be directly affected by crossings (e.g., within dewatered areas). Obtain DFO approval prior to fish relocation.

n) If permanent culverts are required, ensure that they are designed to meet fish passage requirements as per DFO guidelines.

o) If necessary, remove beaver dams in accordance with Clause 12.20 of this Section.

p) Store on-site machinery and potential pollutants in an area above the flood water limits and outside specified buffer zones.

q) Do not wash machinery (e.g., concrete trucks) within 30 m of a body of water or wetland, or in an area where wash water may run into a body of water or wetland.

r) Handle hazardous materials (e.g., fuels and lubricants) in accordance with Clause 12.12 of this Section.

s) Dispose of construction debris in accordance with Clause 12.17 of this Section.

5. Bridge Crossings (Aerial): Procedures to protect the environment when installing a pipeline on a bridge to cross a waterbody:

a) Install slope breakers down-gradient of the transition between the buried and aerial pipe.

b) Limit clearing or grubbing on the approach to the watercourse, within 3 m of the crest of the slope, to the area required for pipe placement only.

6. Under Existing Culvert

a) Restore the culvert stability to a condition that is equivalent or better than the original culvert.

7. Over Existing Culvert: Procedures to protect the environment when installing a pipeline over an existing culvert (where acceptable to regulatory authority):

   a) Employ erosion and sediment controls on a site-by-site basis to prevent sediment delivery to the watercourse during and after construction. (Refer to Clause 12.2 of this Section).

   b) Use earth berms and straw bales to contain runoff from topsoil and trench spoil.

   c) Ensure construction methods include contingencies for periods of heavy rainfall.

   d) Restore the shoulder and keep sediment and erosion control measures in place until such time as sediment delivery has returned to pre-construction delivery methods.

8. Dam and Pump Watercrossing

   a) Estimate streamflows for the scheduled construction period.

   b) Have adequate pump capacity on site to handle anticipated flows and any potential increases in flow during the construction period.

   c) Have spare pump(s) and generator(s) when applicable, on site.

   d) Have all required dam construction material and installation equipment on site.

   e) Begin the operation in the morning to allow for same day installation, if possible.

   f) Select appropriate dam construction materials for the size of the watercourse.

   g) Install emergency dissipater at hose outlet.

   h) Screen intakes, install pumps and equalize flow.

   i) Screen intakes as per DFO Freshwater Intake End-of-Pipe Fish Screen Guidelines for pumps installed (Appendix 2)

j) Construct upstream dam. Ensure that upstream dam is set back far enough from the trench so that integrity of the dam will not be at risk during trenching.

k) Use a polyurethane liner if required to reduce permeability and assist in limiting subsurface flows.

l) Install a second upstream dam if the potential is high for subsurface flow. Pump water from the sump around the work area.

m) Remove fish via electrofishing (obtain DFO approval prior to fish removal)

n) Construct downstream dam if required, and line with polyurethane. Ensure dam is set back from the trench area.

o) Excavate sump downstream of trench.

p) Excavate trench storing spoil on the banks within a spoil containment area, if necessary.

q) Pump water (from groundwater flow or dam seepage) out of the sumps to a location away from the watercourse such as a well vegetated area or isolated site channel where reintroduction to the watercourse will not occur.

r) Following backfilling and bank restoration, wash the trench area (if dry) into the sump and pump out silt laden water.

s) Remove the downstream dam, then the upstream dam(s).

t) Remove the pumps.

9. Procedures for a flume crossing include:

a) Ensure that flumes and pumps are sized to convey anticipated flows as well as potential lows occurring over the construction period.

b) Ensure that there is fish passage in flumes.

c) Conduct fish salvage or rescue as required (obtain DFO approval prior to fish removal).

d) Maintain the stability of temporary dams.

e) Maintain a 100% backup capacity for pumps.

f) Monitor pumps continuously during pump operation.

g) Refer to Figure 30.0, “Flume Watercourse Crossing” for guidance.

10. Horizontal Directional Drilling and Boring: Procedures for the protection of the environment during the construction of watercrossings using the horizontal directional drilling or boring methods:

a) Minimize the duration of HDD and bore activities as much as possible.

b) Minimize the disturbance to stream banks and riparian areas during HDD and bore activities.

c) Clear and grub work areas in accordance with Clauses 12.6 and 12.7 of this Section respectively.

d) Place silt fences and/or straw bales along the perimeter of the workspace in accordance with Clause 12.2 of this Section.

e) Conduct excavation and dewatering of bore pits in accordance with Clause 12.8 of this Section

f) If HDD or bore methods are used, do not remove the trench plug when the crossing construction is initiated.

g) Undertake proper management of drilling fluids. In particular, monitor the pressure and delivery rate of bentonite mud, such that the process can be halted immediately if significant variances occur.

h) Ensure that drilling muds are contained and disposed of appropriately.

i) Monitor upstream and downstream of the site during HDD for fluid plumes resulting from fractures in the substrate, which may release pressurized drilling fluids in the watercourse.

j) Locate bore pits outside riparian areas, where possible.

k) Locate drilling areas and exit target outside riparian area, where possible.

l) For HDD or other methods where in-stream work will not occur, do not establish the drill set-up area within 10 m of the watercourse. If sensitive conditions are present, the set-up area must be farther than 10 m. Where possible, establish drilling areas, exit targets and bore pits outside riparian zones.

11. Wet Methods: Procedures for the protection of the environment during the construction of watercrossings using the wet method:

a) The temporary work area will be staked and flagged prior to commencement of construction to ensure that equipment is restricted to the authorized work area.

b) Pipe required for the river crossing shall be strung, welded, concrete coated, pressure tested and ready for installation prior to any instream activity.

c) Warning signs will be placed in a visible location two weeks prior to instream work, upstream and downstream of the crossing location which state:
"Pipeline Crossing in Progress.
Please Proceed with Caution
Date: "

d) A survey of the river shall be conducted on a minimum of three transects to establish a baseline which shall be used to re-establish the approximate contour following construction.

e) Any equipment to be used instream shall be cleaned with high pressure water, to remove any grease and oils which may be present prior to arriving on site. All equipment will be thoroughly checked by qualified personnel to ensure the integrity of the hydraulic components (no leaks or drips).

f) Deploy diversion booming at an angle from one bank to the other, diverting any product away from sensitive areas for recovery.

g) No in-stream work will begin until site setup, fabrication and approach trenching is complete.

h) Instream work shall not commence until all required resources (material, equipment and labour) are on site. The crossing will be constructed in a continuous and diligent manner to complete the construction as quickly as practical.

i) Additional geotextile material, sediment control fencing, absorbent material and erosion control matting will be readily available on site in case they are required for unexpected erosion and sediment control problems.

j) Prior to any blasting or construction, where feasible, the area of crossing will be contained with barrier nets and have all fish removed and released outside of the construction area.

k) If feasible, a sump pump will be placed within the trench behind the plugs to remove suspended sediment.

l) The wet crossing will be completed as quickly as possible to limit the amount of sediment that is mobilized from the trench.

m) Weather reports shall be monitored by the contractor to ensure a clear window exists for the expected duration of the crossing. If storm events are predicted the wet crossing will not proceed until a clear weather forecast has been received. Local weather conditions will also be considered in the decision to proceed with a wet crossing. Where the expected duration of the crossing is longer than weather predictions, on-site decisions will be made to suspend work if required and employ additional resources to prevent any adverse environmental effects.

n) Back-up equipment will be available to limit the construction time for a wet crossing in case of equipment failure.

o) The wet crossing site will be restored to a comparable state as that which existed prior to the work.

Title:	Construction Activities – Construction of Watercrossings	Section: 12.0 Clause: 12.9

12. Wet Crossing: Open Cut – Backhoes off bank or rock pad

The following points describe the sequence of construction activities undertaken to install the pipeline using the open cut – Backhoes working off bank or a rock pad method:

a) In cases where the watercourse bank width is less than 10 metres the backhoes can work from either bank to excavate the trench. If bank width is between 10 – 20 metres the equipment will be required to excavate the trench operating from rock or swamp mat pads constructed in the watercourse extending out from the banks.

b) The excavated material will be placed back from watercourse on the easement within a contained area. Spoil may also be placed directly into tandem dump trucks and hauled to a containment area or placed in a sump and if appropriate, pushed within a dozer back to the containment area.

c) Once the trench is excavated the pipeline will be installed by winching the drag section into place. The pipe lowering equipment (sidebooms) will either travel to the banks of the watercourse and then the pipe winched into place or if an access road (bridge or culvert) has been constructed across the watercourse the sidebooms may be able to traverse the watercourse on the access road and install the pipe in the trench.

d) The backhoes will return to the watercourse banks or constructed work pads and backfill the pipeline trench using native material if suitable or rock rip-rap.

e) Following the installation of the pipeline and backfill, a survey of the river bed will be conducted to verify that the river contour has not significantly changed as a result of the construction. If any changes or differences are noted, the backhoe will be on-site to make the necessary alternations to return the river bed to its original contour.

f) The watercourse banks shall be re-established to a stable slope. Clean rip-rap will be placed on the watercourse banks to the mean high water mark or as requested by the regulatory agencies. A sediment fence will be established at the top of the river bank, the exposed soil shall be seeded and erosion control matting will be installed from the top of the rip-rap to the sediment fence.

g) The duration of the instream work for this crossing methodology is anticipated to be completed within 3-5 working days – including site restoration.

h) Trench plugs will remain in place until after watercourse crossing is complete.

13. Wet Crossing; Open Cut – Backhoe(s) working instream

The following points describe the sequence of construction activities undertaken to install the pipeline using the open cut – Backhoes working instream method.

a) A rip-rap ramp will be constructed on both banks. This ramp will facilitate equipment entering the watercourse if access is required. If bank width is greater than approximately 20 metres the equipment will normally be required to excavate the trench from within the wetted portion of the watercourse.

b) Equipment will not be permitted to enter the watercourse if the depth of the water extends beyond the top of the tracks of the equipment. If water depth is shallow enough (< 1 m) and river bottom stable enough to support the excavation equipment it will be permitted to enter the watercourse and commence excavation.

c) If depth of water exceeds the height of the tracks of the equipment or watercourse bed is unable to support the weight of the equipment a rock rip-rap pad may be constructed across the watercourse along the alignment to facilitate equipment travel.

d) Two backhoes will proceed into the watercourse and commence excavation of the trench starting in the center of the river and working back towards the banks.

e) The excavated material will be placed instream in piles located on the downstream side of the trench in a shallow section of the river. Spoil should not be placed in such a manner to block the main flow of the watercourse. Near shore excavated material will be placed on shore wherever possible.

f) One the trench is excavated the pipeline will be installed by winching the sections into place. The pipe lowering equipment (sidebooms) will not be required to enter the river during this process.

g) The backhoes will return to the center of the river and backfill the pipeline trench using the

h) Previously excavated spoil material. If sufficient amounts of material are present, the remainder of the trench will be backfilled with the rip-rap material used to construct the pad.

i) Following the installation of the pipeline, a survey of the watercourse bed will be conducted to verify that the watercourse contour has not significantly changed as a result of the construction. If any changes or differences are noted, the backhoe will be on-site to make the necessary alterations to return the river bed to its original contour.

j) The watercourse banks shall be re-established to a stable slope. Clean rock rip-rap will be placed on the watercourse banks to the mean high water mark or as requested by the regulatory agencies. A sediment fence will be established at the top of the river bank, the exposed soil shall be seeded and erosion control matting will be installed from the top of the rip-rap to the sediment fence.

k) The duration of the instream work for this crossing methodology is anticipated to be completed within 3-5 working days, including site restoration.

12.10 BACKFILLING IN AND AROUND A WATERCOURSE

1. Trenches are backfilled following pipeline installation using the soil excavated from the trenches or where required, imported backfill. Backfill material must be stable and suitable for use in and around watercourses.

2. Procedures for environmental protection when backfilling in and around a watercourse:

    a) Ensure that erosion and sediment measures, in accordance with Clause 12.2 of this Section, are in place prior to backfilling.

    b) In the event of rain or rain forecast, stabilize backfill immediately.

    c) If it is suitable, reuse watercourse bed material for trench cover in a watercourse.

    d) Remove any material that is not suitable for backfilling (e.g., due to contamination or silt content) and replace it with clean granular material. Dispose of waste material in accordance with Clause 12.17 of this Section. See Section 24.0 for guidance on managing contaminated materials.

    e) Cover the trench through the watercourse with a surface cap of clean coarse imported material to promote bed stability and pipeline integrity and to provide a substrate conducive to fish habitat and re-establishment of benthic macro invertebrates.

    f) Compact backfill on approach slopes and stream banks and recontour to conform to natural topography and pre-disturbance profile.

    g) In areas with potential for acid generating rock, do not use slate or shale backfill in watercourses without approval from DFO or NSDEL.

12.11 SITE RESTORATION AND STABILIZATION

1. This activity involves restoring the construction site to a condition similar to its original configuration following completion of pipeline installation and backfilling.

2. Restoration of the site following construction activities will hasten the re-establishment of vegetation, stabilize disturbed soils and re-establish drainage patterns to their appropriate conditions. Once stabilized, soils are less likely to be eroded and mobilized as sediment in site runoff.

3. Procedures for environmental protection through site restoration and stabilization:

    a) Commence restoration activities immediately following backfill operations. Ensure that restoration is completed as quickly as practical.

    b) Re-vegetate and/or stabilize stream banks and approaches within one week of backfilling or immediately if rain occurs or is forecast. All other areas shall be stabilized within 30 days of initially grubbing the site, where possible.

    c) Re-contour stream banks and approach slopes to the original grade (unless the original banks were unstable), to ensure that natural drainage patterns are not altered.

    d) Restore riparian areas and existing riparian function using salvaged vegetation plugs. It is expected that herbaceous and shrub cover will be re-generated within the following growing season. Do not replace tree cover within 1 m of the pipe.

    e) Do not apply fertilizer, lime, mulch or pesticides when restoring areas within 30 m of wetlands.

    f) Replace the topsoil and salvaged vegetation plugs.

    g) Seeding is to take place during growth periods (March 15 – July 1 and September 15 – October 15). Re-vegetate stream banks and approaches with a Heritage Gas-approved seed mix compatible with local vegetation and appropriate growth for adequate stabilization.

h) Place mulch over seeded and un-seeded areas until growth is re-established. Use seed mixtures compatible with local vegetation and appropriate growth to stabilize the terrain surface and to control soil erosion.

i) Use temporary erosion control measures (e.g., slash, straw crimping, mats, netting, or soil tackifier) to control erosion prior to the establishment of a permanent vegetative cover (refer to Clause 12.2).

j) Use hydroseed for stabilization in all areas that have not been designated otherwise. Use tackified mulch when hydro seed is applied outside the growing season.

k) In areas with high slopes or erodible soils, install erosion control blankets before or after hydroseeding to protect the seed from washing away with rain and to provide the soil with splash protection while the grasses become established.

l) Use clear stone, surge rock or riprap in ditches where the water velocities are high, in areas with high slopes and erodible oils, or where energy from stormwater discharges must be dissipated.

m) Where coarse granular material placement is used for erosion protection, ensure that it is placed within 30 days of construction commencement. Where the trench material is not coarse, initiate erosion control within 48 hours.

n) Roach the trench according to Figure 18.0, “Roaching the Trench”.

o) Cover disturbed areas of the stream bank with bio-degradable geotextile to provide stability until growth is re-established.

Title:	Construction Activities – Site Restoration and Stabilization	Section: 12.0 Clause: 12.11

12.12 REFUELING, MAINTENANCE AND HAZARDOUS MATERIALS HANDLING

1. Procedures for the protection of the environment during refuelling and maintenance of equipment used during construction and maintenance work:

   a) Store all hazardous materials, including fuel, in approved storage areas in accordance with federal and provincial legislation.

   b) Permit refueling or lubrication of equipment in designated areas only.

   c) Properly label all products. Only qualified personnel with appropriate training area permitted to handle hazardous products.

   d) Maintain a supply of emergency response equipment on-site to use in the event of a spill. The contingency plan for hazardous materials spills is detailed in Section 24.0.

   e) In the event of a spill, contain the product, clean the areas and report the incident according to provincial legislation to required regulatory agencies.

   f) Dispose of waste according to Clause 12.17 of this Section.

   g) Ensure that equipment used to work within or in proximity to a body of water is mechanically sound, with no leaking fuel tanks or hydraulic connections.

   h) Control potential discharge of petroleum, oil and lubricants during equipment storage through use of containment systems.

   i) Do not refuel or carry out equipment maintenance within 30 m of a watercourse or wetland.

   j) Do not fill vehicle fuel tanks to capacity to minimize overflow due to overfilling or expansion of the fuel under increased temperatures.

Title:	Construction Activities – Blasting	Section: 12. 0 Clause: 12.13

12.13 BLASTING

1. The environmental considerations for blasting include: damage to groundwater resources, building foundations and other structures, noise, debris, and disruption of sensitive species.

2. Procedures for the protection of the environment during construction that involves blasting with explosives:

   a) Where possible, all potential blasting locations must be identified prior to construction.

   b) Where feasible, rip or break bedrock rather than blast.

   c) Conduct groundwater resource surveys on wells within 200 m of the blasting activity, before and after blasting.

   d) Design blasts with charges and blast delays to ensure that air concussion and ground vibration at the nearest residence are below provincial guideline levels.

   e) Use blast mats to minimize the dispersion of blasted material.

   f) Notify the public prior to blasting activities according to provincial regulations and municipal by-laws.

   g) Only blast during approved construction windows, in accordance with Clause 12.3 of this Section. Schedule blasting to avoid periods of biological sensitivity.

   h) Use scare blast (e.g., prima cord or blasting caps) to frighten fish from the area of the blast prior to the main explosion.

   i) Follow DFO's Blasting Fact Sheet and Guidelines for Use of Explosives In or Near Canadian Fisheries Waters (1998) if blasting in the vicinity of fish habitat. Use barrier nets or relocate fish prior to blasting.

   j) If a beaver dam is encountered in the blast area, refer to Clause 12.20 of this Section.

   k) Conduct blast monitoring during blasting activities.

   l) Carry out blasting activities in accordance with applicable provincial regulations and municipal by-laws

Title:	Construction Activities – Blasting	Section: 12. 0 Clause: 12.13

12.14 AIR EMISSIONS

1. Construction equipment can emit gases, fumes or dust particles into the air. The primary air emission issue of concern during construction is dust generation.

2. Procedures for the protection of the environment from air emissions created during construction activities:

   a) Where possible, control dust by water.

   b) If water is used for dust control, ensure that withdrawal is in accordance with provincial requirements and use fish screens as per DFO guidelines.

   c) If dust cannot be controlled by water, use another dust suppressant, such as calcium chloride, subject to review by the Environmental Coordinator. Do not apply calcium chloride on agricultural lands or within 30 m of a watercourse.

   d) Consult local road authorities prior to the application of dust suppressant on access roads.

   e) Monitor and control dust generation in sensitive areas.

   f) Maintain equipment in good working order to maximize fuel efficiency and minimize greenhouse gas generation.

3. There shall be no burning of used oil, treated wood, rubber or plastic materials. These materials must be disposed of in accordance with all applicable regulations

12.15 NOISE

1. Noise may be generated from construction activities and equipment. Excessive noise may become a nuisance to nearby residents and sensitive species.

2. Procedures for the protection of the environment from noise generated during construction activities:

    a) Ensure that vehicles and equipment have noise suppression equipment and that it is maintained in good working order.

    b) Use rubber-tire equipment where possible to reduce noise.

    c) Where noise becomes a nuisance to nearby residences, alter the construction schedule or erect temporary noise barriers and consult with affected residences to determine effectiveness of mitigation.

    d) Monitor noise in sensitive areas

    e) Carry out construction activities in accordance with applicable provincial guidelines and municipal by-laws.

12.16 HYDROSTATIC TESTING

1. During hydrostatic testing, pipelines are filled to capacity with water and pressurized. As the construction of each section of pipeline is completed, hydrostatic testing may be required, as called for in the design.

2. The environmental considerations for hydrostatic testing include the source and disposal of the test water.

3. Procedures for the protection of the environment during construction that involves hydrostatic testing:

    a) Ensure the water withdrawal and discharge is in accordance with applicable legislation.

    b) Identify the proposed water sources and alternates, and submit applications for approval of water use and disposal in advance of construction.

    c) Use intake screens to prevent the entrainment of fish in hydrostatic test water. For guidance refer to DFO's Freshwater Intake End-of-Pipe Fish Screen Guideline (1995)

    d) Ensure that adequate flow rates, as determined by approvals, are maintained in watercourses used as the source of test water.

    e) Use municipal water sources where available.

    f) Ensure that water samples are taken from the watercourse immediately downstream of the discharge area before, during, and after hydrostatic test water discharge to monitor any changes in water quality.

    g) Dechlorinate and test water prior to discharge. Analyze the discharge water for total suspended solids (TSS) before release.

    h) Ensure that pumps used for hydrostatic testing within 30 m of watercourse or wetland are located in bermed areas, with sufficient containment for accidental fuel spills.

    i) If there is an accidental fuel spill, refer to the contingency plans referenced in Sections 24.0 and 26.0.

j) Do not use additives in test water, except where dechlorination is required.

k) Ensure that the test water is discharged into the same watershed from which it was withdrawn, and that the discharge is conducted at the appropriate time (i.e., not during low flows). If site-specific conditions do not permit, seek special approval.

l) Where test water quality is suitable, discharge the test water using energy dissipators (e.g., rock or timber spill pads, vegetated area) to control the velocity of water re-entering the watercourse.

m) Where test water quality is suitable, if possible, discharge test water into municipal storm sewer system.

n) Where test water quality is unsuitable for disposal in the field, treat, dispose of the test water at an approved facility (refer to Clause 12.17 of this Section).

o) Ensure that sedimentation and erosion are controlled during discharge according to Clause 12.2 of this Section and Figure 23.0, “Energy Dissipator”.

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12.17 WASTE MANAGEMENT

1. Construction and commissioning may result in the generation of both liquid and solid wastes.

2. Potential liquid wastes include oils, solvents, grease, fuels, drilling muds, and sewage.

3. Potential solid wastes include wood, plastic, paper, brush, cables, rock, grubbings, temporary fencing and bridge material, signs, containers, welding rods, slag and metal filings.

4. Procedures to protect the environment from wastes generated during construction:

   a) No solids or liquids are to be disposed of in the trench.

   b) Recycle or re-use liquid wastes (e.g., fuel, oil, and solvents) where possible, and dispose of the remaining materials according to local and provincial standards.

   c) Collect and dispose of sewage and grey wastewater from construction activities according to local and provincial standards.

   d) Re-use or recycle solid wastes whenever possible. Ensure that the remaining municipal solid waste is collected by a licensed contractor and disposed of at a provincially permitted facility.

   e) Provide secondary containment for liquid hazardous wastes. Liquid hazardous wastes (e.g., waste paint) shall be disposed of at a provincially permitted facility.

   f) Chip and dispose of non-merchantable timber and grubbings according to provincial standards.

   g) Remove litter and construction wastes from the site daily.

   h) Ensure that the quantity of stored wastes is minimized.

   i) Where feasible, substitute products for less hazardous materials.

   j) Reduce wastes by returning used product, empty containers and out-of-specification products to the suppliers for re-use or recycling.

   k) Burning of petroleum based products, rubber tires, or other products where combustion is considered harmful to the environment is prohibited.

12.18 MANAGEMENT OF ACID GENERATING BEDROCK AND KARST TOPOGRAPHY

1. During pipeline construction, acid rock drainage may be produced when bedrock, overburden material and fill containing sulphide mineralization reacts with air and water. The resulting acid dissolves naturally occurring metals. Low pH and high metal concentrations may be deleterious to fish or fish habitat.

2. Procedures for the protection of the environment during construction activities that encounter acid-generating bedrock:

   a) Do work in accordance with Technical Specification IS-2-8020

   b) Environmental protection measures and a contingency plan for encountering acid generating bedrock will be addressed in site-specific reports as part of specific construction plans, where excavation of potential acid generating bedrock exceeds 500 m^3 or 1300 tonnes. Similarly, areas of suspected or known subsidence or karst topography will be addressed in site-specific construction plans.

   c) Where acid generating rock has been identified, berm and collect the site runoff, monitor the pH until the work is complete and the trench is sealed. Divert upgradient surface water around the stockpile.

   d) Direct surface runoff away from the trench.

   e) Dispose of excavated materials containing sulphides in excess of 0.4% in accordance with applicable regulations and the specifications.

   f) Stockpile excavated regulated sulphur bearing materials in designated and controlled areas and not within 100 m of a watercourse or wetland

   g) Backfill trenches with fine-grained clay fill or compacted till with no rock or stone greater than 50 mm to reduce water percolation through the trench.

   h) Remove water collecting in open trenches immediately to prevent further acidification. Discharge trench water in designated areas.

   i) Install trench plugs at each end of the affected area to limit water transport through the excavation.

   j) Avoid or minimize blasting in areas identified as having acid generating rock

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Title:	Construction Activities – Wet Weather Shutdown	Section: 12.0 Clause: 12.19

12.19 WET WEATHER SHUTDOWN

1. Procedures for the protection of the environment when wet weather is experienced during construction:

   a) Monitor daily and extended forecasts to determine potential conflicts with timing of construction in sensitive areas.

   b) Immediately preceding, during or following storm events where runoff is high, watercourse crossings will be not be initiated nor will work proceed within 30 m of wetlands or ecologically sensitive areas.

   c) Monitor soil conditions closely during rain events and snowmelt.

   d) Suspend construction activities, and stabilize where necessary to prevent damage to work areas or watercourses.

   e) Use additional mitigative measures to ensure the productivity of soils is maintained for work proceeding during wet soil conditions.

   f) Ensure availability of additional protection measures to address excessive runoff during storm events.

   g) The Inspector will make wet weather shutdown decisions based on the following criteria.

      - Has the topsoil been removed?
      - Is rainfall expected to continue? If topsoil is near saturation and rainfall is expected to continue, shutdown procedures should be implemented.
      - Is the soil saturated beyond the topsoil?
      - Extent of surface ponding.
      - Extent and location of wet area where damage to soils may occur (i.e. can traffic be re-routed around area).
      - Type of equipment and nature of construction activities proposed for that day.
      - Type of soil in the area.
      - Proximity to watercourses.
      - Schedule considerations.
      - Land use (existing and planned).

- Potential for topsoil loss due to rutting.
- Potential for breakdown of soil structure.
- Potential for subsoil compaction.
- Availability and effectiveness of mitigative techniques.
- Forecasted rain and drying weather.

h) Monitor sediment and erosion control structures during periods of prolonged rainfall.

i) Restrict traffic on or through the work area during periods of extreme wet weather.

12.20 WILDLIFE AND ECOSYSTEMS AT RISK OR OF CONCERN

1. Disturbance resulting from construction may create potential for encounters between wildlife and construction personnel. Without adequate environmental protection measures, construction can be detrimental to sensitive habitat or species.

2. General Procedures to Protect Wildlife:

   a) Conduct site reconnaissance in areas identified as having wildlife potential.

   b) Ensure that construction occurs within the construction window and follows other timing considerations according to Clause 12.3 of this Section.

   c) Log the presence of wildlife (e.g., log book/photograph.

   d) Interaction with wildlife, including feeding, is not permitted.

   e) Pets are not permitted on the right-of-way or easement at anytime.

   f) The possession and use of firearms on the right-of-way or easement is prohibited.

   g) Minimize potential for nuisance wildlife by handling waste and litter according to Clause 12.17 of this Section.

   h) Notify the Nova Scotia Department of Natural Resources (NSDNR) and Nova Scotia Museum (NSM), as appropriate, or sightings involving rare, at risk, protected or nuisance species.

   i) Ensure that construction staff has received the appropriate training with respect to wildlife sensitivities and policies.

   j) Delineate areas known or suspected to support sensitive wildlife or species at risk with snow fencing prior to construction.

   k) Restrict ground and noise activities within areas delineated as wildlife sensitive.

l) Contact NSDNR to determine where deer and moose wintering areas are located and avoid construction in these or other significant areas during sensitive periods (i.e., November 15th – April 15th, moose calving in spring.

m) Ensure that access to deer yards is maintained.

n) Any unlawful accidental killing of wildlife must be reported to NSDNR within 24 hours.

Birds

o) Follow NSDNR osprey management guideline of a 100 m buffer zone around the nest site, prohibit construction within the buffer between April 1st and July 31st, and maintain 40 percent of the forest stands volume within the buffer.

p) Follow NSDNR eagle management guideline of a 100 m buffer zone around the nest site, exclude construction within the buffer year round and for up to 400 m between February 1st to June 30th.

q) Contact NSDNR Regional Biologist if a previously unidentified nest site is encountered or at any site where there is potential for interaction with raptors (Osprey, Eagles, Hawks).

r) Follow NSDNR woodland hawk management guidelines, limiting cutting of large areas in the vicinity of hawk habitat.

s) Establish a 200 m buffer zone around hawk nests sites from which construction is restricted between March 1st to July 31st.

t) Limit construction within 250 m of known loon nesting areas and avoid back-flooding loon nesting areas during watercourse crossing construction.

u) Avoid mechanical clearing an establish exclusions zones around ground nesting bird nests, where identified, during breeding season.

v) Adopt NSDNR colonial bird (Great Blue Herons, Martins) management guidelines limit disturbance between April 1st to May 31st when nests occur within 250 m of the right-of-way or easement.

w) Schedule clearing to avoid migratory bird breeding seasons or other sensitive periods where significant habitat is identified.

Title:	Construction Activities – Wildlife and Ecosystems at Risk or of Concern	Section: 12.0 Clause: 12.20

x) Construction activities in the vicinity of sensitive bird nests are to take place outside the spring nesting period to reduce potential impact to wildlife

Bats

y) Consult with NSDNR/NSM to determine known bat caves prior to each year's construction rollout or to report active hibernating areas encountered during construction. [should be done in EA]

z) Avoid blasting within 1 km of known caves and hibernating areas between mid-October and late May.

aa) If caves are encountered in the vicinity of the route during construction, determine, in consultation with NSDNR, whether or not the caves are hibernating areas, the potential for interaction and avoid impacts during the above mentioned sensitive period.

Ecosystems of Concern

bb) Restrict or prohibit access to sensitive areas (e.g., rare plants, herpetiles).

cc) Remove beaver dams and/or nuisance beavers where required, according to instruction from the NSDEL for watercourse alternation and NSDNR regional wildlife biologists (e.g., use machinery or manually remove, rather than blasting). Ensure that beaver dam removal is done such that potential for scouring of watercourse beds and transport of fine particles are minimized.

dd) Employ narrow workspaces to minimize impacts in areas with a high water table, or near wetlands and watercourses where sensitive habitat is identified.

ee) If wetlands along the route have been identified as "sensitive" with respect to indirect disturbance or noise disturbance, appropriate mitigation will be followed, as outlined in a site-specific construction plan.

ff) Construction adjacent to sensitive wetlands will not occur during storm events or immediately following storm events (refer to Clause 12.19 of this Section).

Title:	Construction Activities – Invasive Plant Species	Section: 12.0 Clause: 12.21

12.21 INVASIVE PLANT SPECIES

1. Construction equipment is prone to collecting soils, which may contain seed or root fragments, and vegetative matter, tracking them from one area to another.

2. The potential exists for the transfer, introduction, or invasion of non-indigenous species, such as purple loosestrife, along the right-of-way or easement.

3. Procedures to prevent the unintended transfer of invasive plant species during construction:

    a) Prior to arriving on-site, thoroughly clean and inspect construction equipment to ensure that no invasive plant species are transported to the work area.

    b) Ensure that ground cover is established as quickly as possible, according to Clause 12.11 of this Section, to prevent invasion by undesired species.

    c) Identify areas along the right-of-way or easement where invasive or undesirable species occur, and ensure appropriate actions to prevent spread of nuisance species.

12.22 TOPSOIL MANAGEMENT

1. Soil disturbance will occur to varying degrees throughout pipeline construction; for examples, during grading, trenching, and backfilling.

2. The potential effects of pipeline construction and operations on the physical properties of the soil are defined as soil mixing, compaction and cutting, and disturbance of contaminated soils.

3. Procedures to minimize the effects on topsoil during construction:

    a) In sensitive areas, determine the topsoil depth prior to or during initial construction activities. Salvage topsoil to the maximum extent practical over the trench or work area to minimize the risk of over-stripping.

    b) In sensitive areas or areas containing productive agricultural soils, store topsoil away from the trench and trench spoil storage area.

    c) In general, topsoil in forested areas is not salvaged. In special circumstances and on agricultural lands, negotiations with landowners will determine special topsoil stripping requirements.

    d) To avoid compaction and susceptibility to erosion, do not excessively handle topsoil during construction and restoration.

    e) Ensure that topsoil is protected against invasive plant species according to Clause 12.21 of this Section.

    f) Strip topsoil under dry conditions where feasible.

    g) Strip topsoil from all areas to be graded as well as from areas to be used for stockpiling excavated soils.

    h) Stockpile topsoil in a location that will ensure that natural drainage patterns are not impaired and risk of erosion in minimized.

    i) Consider the use of lightweight and wide-tracked rather than rubber tired equipment where soil stability or topsoil compaction is a concern.

j) Do not carry out topsoil stripping on steeply sloping areas if avoidable.

k) Never conduct re-spreading of topsoil during saturated conditions.

l) Re-spread topsoil at a uniform depth and segregate it from the subsoil.

4. Refer to the following Figures for guidance on topsoil conservation:

- Figure 9.0, “Topsoil Conservation in Side-Hill Grading”
- Figure 10.0, “Topsoil Conservation, Ditchline and Side Spoil”
- Figure 11.0, “Topsoil Conservation – Ditchline (Summer)”
- Figure 12.0, “Topsoil Conservation – Ditchline (Winter)”
- Figure 13.0, “Secondary Stripping for Topsoil Displacement”

Title:	Construction Activities – Pipe Hauling, Stringing, Fabrication and Lowering-In	Section: 12.0 Clause: 12.23

12.23 PIPE HAULING, STRINGING, FABRICATION AND LOWERING-IN

1. Activities related to the hauling and fabrication of pipe can interfere with farming activities, and the movement of livestock and wildlife. Long, continuous stretches of open trench and welding pipe may present barriers to wildlife, landowner vehicles, and livestock. Spent welding rods are a potential fire hazard.

2. Procedures for the protection of the environment when pipe is being hauled, strung, fabricated or lowered-in during construction of a pipeline:

   a) In agricultural areas, gap at least 3 metres wide will be left in pipe joints to allow vehicle access or livestock to cross from one side of the right-of-way or easement to the other. These gaps should coincide with trench plugs and gaps left in topsoil and spoil piles. See Figure 17.0, “Gaps in Pipe Stringing”.

   b) In non-agricultural areas, 3 metre gaps similar to those used in agricultural areas will be left to permit wildlife to cross the right-of-way or easement.

   c) In erodible areas, pipe will be bent to maximum permissible limits rather than grading the right-of-way or easement.

   d) On agricultural land, and wherever else possible, equipment and materials will be hauled in after topsoil stripping and prior to trenching to minimize soil compaction.

   e) Spent welding rods will be stored in receptacles for disposal. Spent welding rods will not be left on the ground or in the trench.

   f) Where and when the risk of fire is high, welding will not be done during high winds. Water trucks will be present in areas of high fire potential. Fire blankets will be utilized whenever possible.

   g) Gaps in continuous welded sections will be left every 1.6 kilometres, or as requested by the landowner/occupant, to permit access

   h) Lowering-in will occur as soon as possible to minimize the length of open trench.

i) The trench will be de-watered onto stable surfaces such that it does not cause erosion of soils or sedimentation of watercourses.

j) Before lowering-in, pipe sections to be installed at major water crossings and other sensitive environmental locations will be pre-tested.

k) Additional temporary work room will be acquired to accommodate construction requirements, if necessary. All necessary approvals will be obtained.

l) All vehicle traffic and construction activities will be confined to the right-of-way or easement.

Title:	**Environmental Monitoring During Construction**	Section: **13.0**

1.0 GENERAL

1.1 Construction activities will be monitored to ensure that they comply with the environmental protection measures outlined in this EPP, any specific environmental provisions that are included in the construction plans, and any conditions of approval.

2.0 ENVIRONMENTAL COMPLIANCE MONITORING (ECM)

2.1 The Inspector is primarily responsible for conducting ECM. However, ECM is the responsibility of all personnel.

2.2 Reporting for the ECM program will be conducted as follows:

a) The Environmental Coordinator will provide the Construction Manager and the Engineering and Safety Manager with periodic reports, which include tracking of environmental issues during construction.

b) In the event of incidents (e.g., sediment release, hazardous material spills), the Inspector will notify the Environmental Coordinator who will be responsible for providing event-specific reports (e.g., non-compliance report, spill report) to the Construction Manager and the Engineering and Safety Manager.

2.3 The ECM program may include monitoring for:

a) Compliance with protocols for mitigating acid generating rock

b) Effects on water wells

c) Watercourses and wetlands

d) Cultural resources

3.0 ACID GENERATING ROCK

3.1 Where there is a potential for the disturbance of acid generating rock due to construction, activities will be monitored to ensure compliance with Section 12.0 of the EPP, specific construction plans and all regulations.

4.0 WELLS

4.1 A pre-construction survey will be completed for wells within 200 m of, and considered to be at risk from, impact from blasting activities. The level of information required for each well selected for survey will be based on the degree of perceived risk to the well as determined by a qualified hydrogeologist.

4.2 Typical well survey components include the following:

a) Visit the potential groundwater users and confirm the actual number of users.

b) Determine the user's water supply source (e.g., dug well, spring, drilled well, surface water).

c) Use a questionnaire to obtain additional pertinent information on the groundwater supply source (e.g., depth, amount of casing, date drilled, original owner, current or historic problems).

d) Visually inspect readily accessible dug wells to determine water level and total depth measurements. Such measurements are not expected for drilled wells, since they are typically buried below ground surface.

e) Identify the well records associated with particular properties.

f) Identify the type of waste disposal systems.

g) Note potential water quality contaminants (e.g., fuel storage, animal waste piles).

4.3 Where deemed necessary by a hydrogeologist for route sections requiring blasting, collect and analyze a water sample from each well.

4.4 Where appropriate, a hydrogeologist will identify the need for additional post-construction monitoring or assessment of adjacent wells.

4.5 If, during construction, complaints concerning water quality or yield are initiated by landowners, immediate action will be taken to correct the situation. This may include:

a) Supply the landowner with suitable drinking water in the interim.

b) Determine if the complaint is linked to construction activities.

c) Replace the source of drinking water for the landowner, if necessary.

5.0 WATERCOURSES AND WETLANDS

5.1 At all watercourses crossings, and where the right-of-way or easement is adjacent to a wetland, the following measures will be implemented:

a) Monitor total suspended solids (TSS) levels in watercourses throughout construction. Where dry crossings are constructed, consult with the Nova Scotia Department of Environment and Labour (NSDEL) to determine the location of TSS samples upstream and downstream of the right-of-way or easement.

b) Ensure that sediment and erosion control features specified in the construction plan are in place, and are appropriate for the field conditions. Determine and maintain the effectiveness of sediment and erosion control features.

c) Conduct inspections of the watercourse crossings and wetlands prior to anticipated major storm events, and following major storm events, to ensure sediment and erosion control measures are adequate.

6.0 CULTURAL RESOURCES

6.1 Cultural - resources is the collective term given to artefacts, buildings, features, and landscapes that reflect past human activities.

6.2 Archaeological monitoring will consist of visual inspection of excavation activities and other construction activities that involve ground surface disturbance such as clearing, grubbing, drilling, blasting, filling, and grading. All archaeological monitoring must be conducted by qualified archaeologists.

6.3 Conduct archaeological monitoring in areas identified as having high archaeological potential under the terms of a Heritage Research Permit issued by the Nova Scotia Museum in accordance with the following:

a) The archaeological monitor will more closely scrutinize excavation in areas of high sensitivity. In areas of particular sensitivity or where there are identified cultural heritage resources, a backhoe will be used to exercise greater control during excavation.

b) Where necessary, have the Provincial Archaeologist inspect sites in particularly sensitive situations. When feasible, give the Provincial Archaeologist advance notice prior to construction in areas of particular sensitivity or identified resources.

c) Monitor activities within the easement of ancillary sites.

d) Modify monitoring to address variations in excavation techniques and different levels of sensitivity.

e) The archaeologist will document all resources recognized during monitoring with particular attention to the identification of spatial boundaries, complexity of the site, age and function. Where possible, draw and photograph stratigraphic profiles.

f) The archaeologist will collect any artefacts from spoil piles alongside trenches and document their location and association with features within the trench.

g) Do not backfill trenches until the archaeological monitoring is complete.

h) Where a pipeline right-of-way or easement conflicts with identified archaeological sites, the sites shall be protected in general accordance with Figure 2.0, “Protection of Archaeological Sites Adjacent to the Right-of-Way”.

Heritage Gas

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Title:	**Environmental Monitoring- Post Construction**	Section: **14.0**

1.0 GENERAL

1.1 Post Construction Monitoring (PCM) is conducted after construction and site restoration is complete.

1.2 The PCM program may include monitoring of wells, watercourses and wetlands and other environmental components that may be stipulated in conditions of approvals.

2.0 ENVIRONMENTAL EFFECTS MONITORING

The effects of the project on the environment will be monitored post-construction as required based on project/ecosystem interactions and conditions of approval. A program for monitoring environmental effects will be included in site-specific construction plans, if warranted.

3.0 WELLS

3.1 After blasting, conduct follow-up within the designated survey area. In areas of special concern or if problems are reported, this may include:

a) Sample and analyze well water, to ensure water quality is consistent with that recorded during the pre-blast survey.

b) Conduct follow-up sampling of well yield.

4.0 WATERCOURSES AND WETLANDS

4.1 At any watercourse crossing designated by the Environmental Coordinator, and where the easement is adjacent to a wetland, the following measures will be implemented:

a) Monitor the easement for soil erosion following the completion of site restoration activities.

b) Perform a visual assessment of potential for obstruction to flow or fish passage due to the pipeline crossing.

c) Perform a visual assessment of re-vegetation, stream banks, and channels following site restoration.

d) Monitor suspended sediment levels in watercourses during storm events after construction is complete.

e) Visually inspect and maintain permanent sediment and erosion control features installed in erosion prone areas.

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Title:	**Energy Conservation**	Section: **15.0**

1.0 GENERAL

1.1 Heritage Gas will carry out its business in a way that conserves and makes efficient use of energy and resources.

2.0 CONSERVATION INITIATIVES

2.1 Energy conservation will be pursued through the following initiatives:

a) assisting customers who request help in optimizing the efficiency of their natural gas applications;

b) reviewing operational practices to assess potential energy conservation initiatives;

c) engineering and designing facilities to increase energy conservation wherever operationally and cost effective;

d) responsibly using power in buildings (e.g.: lighting, machines, equipment, heating) and retrofitting to increase energy efficiency where it is cost effective to do so;

e) encouraging waste reduction, reuse and recycling programs as a means to decrease product purchase, maximize usage efficiency, and reduce energy demands required to process wastes through the regular disposal stream.

3.0 DOCUMENTATION AND RECORDS

3.1 Documentation relevant to energy conservation includes:

a) records of energy and materials use;

b) records documenting conservation initiatives and results;

c) records related to the Voluntary Challenge Registry program;

d) results of audits and cooperative workgroups.

Heritage Gas

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Title:	**Greenhouse Gas Emissions**	Section: **16.0**

1.0 GENERAL

1.1 The production or emission of greenhouse gases as a result of Heritage Gas operations will be controlled and reduced where practical.

2.0 EMISSION TYPES

2.1 The impacts of the various types of emissions resulting from operations will be controlled and reduced where operationally and cost effective, through preventive design and maintenance measures. The types of emissions include:

a) fugitive emissions (e.g.: leaks from pipe, fittings, valves, seals, gaskets, etc.)

b) vented emissions (e.g.: unintentional, as from line damages or intentional, from pipeline blowdowns)

c) combustion emissions (e.g.: products of combustion from engines, burners, flares)

3.0 FUGITIVE EMISSIONS

3.1 The incidence of leakage from Heritage Gas facilities will be monitored and analyzed to identify areas requiring repair, modification, replacement or more frequent assessment.

3.2 Leakage detection programs shall be implemented and maintained to identify system leaks. Leaks shall be repaired as soon as practical, given their location, size and the risk they represent.

3.3 All facilities, including storage tanks shall be designed and operated in a manner that reduces fugitive emissions.

3.4 The use of ozone depleting substances, such as chlorofluorocarbons (CFCs), shall be avoided or phased out where practical.

4.0 VENTED EMISSIONS

4.1 New facilities will be designed to reduce and, if practical, eliminate the need for equipment that requires the venting of greenhouse gases during operation or maintenance.

4.2 Where venting equipment is required, first consideration shall be given to the equipment that represents the smallest volume of in-service venting of greenhouse gases while in operation.

4.3 "Drips" will be blown for the minimum amount of time required to clear the line. Drips will only be blown if a proper device is in place to contain the discharged liquids.

5.0 COMBUSTION EMISSIONS

5.1 Company vehicles will receive regular maintenance checks to ensure they are operating in a manner that minimizes emissions and fuel consumption. There should be no unnecessary idling of vehicles.

5.2 Fuels with lower greenhouse gas potential than gasoline or diesel shall be considered for use in Company vehicles and equipment and introduced where it is operationally and cost effective to do so.

5.3 Burning of coal for thawing ground is acceptable but the burning should last only as long as necessary to accomplish the work that needs to be done. Practical alternatives to coal burning should be considered as they become available.

5.4 Checks of line heaters should be carried out at regular intervals to ensure they are burning at appropriate levels of efficiency and are not emitting a significant amount of unburned fuel.

6.0 DOCUMENTATION AND RECORDS

6.1 Documentation related to the reduction of greenhouse gas emissions includes:

a) annual comparisons of the estimated emissions from various sources;

b) details related to reduction initiatives;

c) information related to the Voluntary Challenge and Registry;

d) reports on leak surveys and results;

e) product information related to ozone depleting substances and possible emissions.

Heritage Gas

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Title:	**Material Purchasing**	Section: **17.0**

1.0 GENERAL

1.1 Environmental considerations shall be incorporated into Heritage Gas materials management and purchasing decisions.

1.2 Where two or more products meet the needs in terms of quality, availability and life cycle costs, the product that has the most significant environmental benefit should be purchased.

1.3 Suppliers shall be encouraged to develop, provide or purchase environmentally responsible products or services.

1.4 The purchase and use of products containing hazardous substances such as lead, mercury, cadmium, benzene, and chlorinated solvents shall be minimized and, to the extent practical, eliminated.

2.0 PRODUCT FEATURES

2.1 Products that have environmental benefits are those that, over their life cycle:

a) minimize waste through recycled packaging;

b) have expanded product life, thus reducing purchase frequency;

c) are available in bulk;

d) contain recycled content;

e) are reusable or recyclable;

f) conserve water and energy in their manufacture or use;

g) are non-toxic;

h) minimize emissions in their manufacture or use;

i) can be disposed of safely;

j) degrade to environmentally preferred forms.

3.0 DOCUMENTATION AND RECORDS

3.1 Documentation related to environmentally responsible materials management includes:

a) product purchase records indicating a product change and the perceived benefits, where applicable;

b) disposal and recycling comparisons between one year and subsequent or prior years;

c) cost savings information, where applicable.

Heritage Gas

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Title:	**WASTE MINIMIZATION**	Section: **18.0**

1.0 GENERAL

1.1 Waste minimization initiatives shall concentrate on the reduction of waste production, the reuse of materials and the recycling of waste products for a future use.

1.2 Materials shall be diverted from the waste disposal stream, as appropriate for the recycling facilities available in the area where the waste is produced. Alternatively, consideration shall be given to the routing of wastes through a central Heritage Gas program established for the purpose.

2.0 WASTE REDUCTION

2.1 Waste management practices shall be regularly assessed to identify opportunities for reducing the amount of waste associated with Company activities.

2.2 Planning, design and operations processes shall incorporate waste reduction objectives, as appropriate.

2.3 Waste reduction shall be considered at the purchasing stage, with consideration given to the purchase of environmentally responsible products.

3.0 WASTE REUSE

3.1 To the extent practical, items should be reused before they are considered for disposal or recycling.

4.0 WASTE RECYCLING

4.1 Recyclable materials that cannot be designated for reuse shall be segregated from the waste disposal stream. These materials shall be delivered to the nearest recycling depot as soon as it is made necessary by accumulated volume or safety.

4.2 Hazardous recyclable products shall be transported in accordance with TDG regulations and shall be handled and stored in compliance with hazardous waste management policies and procedures, e.g., WHMIS.

4.3 Wastes of products that should be recycled, where facilities exist, include:

a) oil (motor and hydraulic)

b) dry cell and wet cell batteries

c) paints and solvents

d) paper and cardboard

e) toner cartridge

f) plastics (including PE pipe remnants) and rubber

g) treated wood

h) glycol and chemicals

i) metals

j) other products for which recycling facilities exist.

4.4 In the event that recycling facilities are not available for used oil, treated wood, plastics and rubber materials, they shall be disposed of in accordance with applicable regulations. These materials shall not be burned for disposal.

5.0 DOCUMENTATION AND RECORDS

5.1 Documentation related to the waste reduction, reuse and recycling program include:

a) records indicating waste diverted to recycling facilities;

b) purchasing records that document environmentally responsible products being phased in, with a record kept of the product that it replaced, and any benefits derived from the change;

c) records that assist in the tracking of performance indicator items;

d) waste management assessment findings;

e) information on reduction, reuse, and recycling initiatives.

Title:	**HANDLING REGULATED WASTES**	Section: **19.0**

1.0 GENERAL

1.1 This Procedure addresses the management and disposal of wastes that have the potential to cause detrimental impact on human health and the environment.

2.0 WASTE TYPES

2.1 Two types of regulated wastes may be generated by Heritage Gas. They are classified as:

a) Waste Dangerous Goods : wastes *consist of* hazardous substances. Transportation of Dangerous Goods Regulations apply.

b) Special Wastes: wastes *contain* a hazardous substance. Transportation of Dangerous Goods Regulations may not apply.

2.2 For both types of wastes, proper disposal is essential.

3.0 WASTE SAMPLING AND CHARACTERIZATION

3.1 The proper disposal of Special Wastes or Waste Dangerous Goods may require sampling and characterization.

3.2 It is important to ensure that the collected sample provides an accurate description of the composition and characteristics of the waste. This information will determine how the material must be classified, packaged and where it may be shipped for disposal.

3.3 Generally, it is preferred to have a Waste Disposal Company undertake any sampling and analysis necessary to complete the disposal program.

3.4 Sampling of Solid Wastes:

a) A 500 ml representative sample (a composite sample collected from several points) placed into a glass jar should provide enough material to test for any required parameter.

3.5 Sampling of Liquid Wastes:

a) The volume of sample required is dictated by the analysis requested. Generally, one litre of liquid placed into a glass bottle or jar will suffice to conduct any required analysis. Composite samples are required from drums and tanks to

reflect the composition of the whole tank since layers of oil and water and other liquids stratify in fluids.

3.6 It is recommended that the waste management company or the analytical laboratory be contacted to identify specific volumes, packing and shipping requirements. The lab will also provide the necessary bottles, preservatives and shipping containers.

4.0 SAMPLE ANALYSIS

4.1 Analysis will be selected to determine the composition and characteristics of the waste.

4.2 The characteristics of the waste will determine its classification according to the Transportation of Dangerous Goods Regulations. The composition of the waste will determine how, and where, it will be disposed.

5.0 SAMPLE LABELING AND SHIPPING

5.1 Sample bottles must be labeled with the following information:

a) Date of sample

b) Heritage Gas name

c) Address or site location at which the sample was taken

d) Sample identifier (e.g. soil below line heater; Thornhill Station)

e) Name of person who collected the sample.

5.2 The sample bottle must be surrounded by absorbent material and packed in a second container. The outside container must be labeled with the address of the shipper and the address of the company to which the sample is being sent. This label must also state: “Test Samples”.

5.3 The gross weight of the shipment must not exceed 10 kg.

5.4 The sample must be accompanied at all times by a Shipping Document.

5.5 A copy of the Shipping Document must be maintained for 2 years.

Title:	**HANDLING REGULATED WASTES**	Section: **19.0**

6.0 TRANSPORTATION OF WASTES

6.1 Any movement of Waste Dangerous Goods is identical to the movement of Dangerous Goods and therefore, must be performed in accordance with Transportation of Dangerous Goods (TDG) Regulations.

6.2 At a minimum, Transportation of Dangerous Goods Regulations require the following:

a) Certificate of Training on part of the Shipper, Carrier and Receiver,

b) Visible safety marks (placards),

c) Shipping Document,

d) Proper means of containment for the dangerous good.

6.3 Waste Dangerous Goods that are shipped out of province require a Waste Manifest form.

6.4 Transportation of Dangerous Goods is not applicable to the movement of special wastes. Because of their nature, special wastes must be properly disposed of.

6.5 Table 19-1 provides generic information pertaining to waste dangerous goods and special wastes commonly expected from Heritage Gas activities. Information for each waste actually generated must be verified prior to transport.

7.0 SELECTING A WASTE DISPOSAL COMPANY

7.1 Prior to contracting for Special Waste or Waste Dangerous Goods disposal, Heritage Gas must be satisfied that the shipping company and intended receiving company are registered and competent to accept, handle and dispose of the special waste or waste dangerous goods consignment.

Title:	**HANDLING REGULATED WASTES**	Section: **19.0**

Table 19.1 - Waste Disposal Guidelines

Waste Disposal Guidelines

Waste Category (Description)	T.D.G. Regulated Waste	*Transportation of Dangerous Goods (T.D.G.) Criteria*				Preferred Waste Management Practices
		Shipping Name and Description	Class	Product Identification Number (PIN)	Packing Group	
ADHESIVES AND CEMENTS	yes	Waste Flammable Liquid Poisonous N.O.S.	3, 6.1	UN 1992	I	- collect waste products in secured containers - do not mix products - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
ALKALINE PRODUCTS	yes	Waste Corrosive Solid, N.O.S.	8	UN 1759	II	- reuse - neutralize pH - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
BATTERIES (ACID)	yes	Batteries, wet filled with acid	8	UN 2794	III	- for disposal, use approved waste management contractors - complete and retain shipping document
BATTERIES (ALKALI)	yes	Batteries, wet filled with alkali	8	UN 2795	III	- for disposal, use approved waste management contractors - complete and retain TDG bill of lading
BATTERIES (LITHIUM)	yes	Lithium Batteries	9	UN 3090	II	- for disposal, use approved waste management contractors - complete and retain TDG bill of lading
BATTERIES (NICKEL CADMIUM)	yes	Cadmium Compounds N.O.S.	6.1	UN 2570	I	- for disposal, use approved waste management contractors - complete and retain TDG bill of lading
CONTAINERS, EMPTY odorant, oil, etc.	yes	**see Note 1**	-----	-----	-----	**See note 1** for detailed information
CONTAINERS, PESTICIDE	yes	**see Note 1**	6.1	UN 2902	I	- drain and triple rinse - move to pesticide container collection site for recycling
CONTAMINATED SOIL	sometimes	**see Note 2**	4.1	UN 3175	II	See note 2 for detailed information
FILTERS (GLYCOL)	yes (some)					**See note 3.**
FILTERS (OIL)	yes (some)					**See note 4.**

Title:	**HANDLING REGULATED WASTES**	Section: **19.0**

Waste Disposal Guidelines

Waste Category (Description)	T.D.G. Regulated Waste	*Transportation of Dangerous Goods (T.D.G.) Criteria*				Preferred Waste Management Practices
		Shipping Name and Description	Class	Product Identification Number (PIN)	Packing Group	
FUEL (gasoline, diesel/kerosene)	yes	Waste gasoline	3	UN 1203	II	- reuse and/or recycle. - collect and store in secure containers
		Waste kerosene	3	UN 1223	III	- for disposal, use approved waste management contractors - complete and retain TDG bill of lading
GASES (acetylene)	yes	Waste acetylene	2.1	UN 1001	-----	- return to supplier if possible - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
GASES (nitrogen)	yes	Waste Compressed Nitrogen	2.2	UN 1066	-----	- return to supplier if possible - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
GASES (oxygen)	yes	Waste Compressed Oxygen	2.2	UN 1072	-----	- return to supplier if possible - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
GREASE, SEALANTS, and LUBRICANTS	no	-----	-----	-----	-----	- store unwanted volumes in sealed containers/drums - reuse and/or recycle - dispose using approved waste management contractors - notify E. Affairs, *immediately*, if Rockwell R860 sealant is involved
HYDROCARBON CONTAMINATED PIPING, VALVES, ETC	yes (some)					- segregate piping from other waste materials - "clean" material can be reused or recycled - **See note 6** for detailed information on contaminated piping and fittings
INDUSTRIAL CLEANERS	yes	Waste Corrosive Liquids, N.O.S.	8	UN 1760	I	- collect wastes products in secured containers - do not mix products - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
METHANOL	yes	Waste methanol	3, 6.1	UN 1230	II	- reuse and/or recycle - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
OILY RAGS/CLOTHING	yes (some)	Oily Rags/Clothing	4.1	UN1325	II	See note 7.

Title:	**HANDLING REGULATED WASTES**	Section: **19.0**

Waste Disposal Guidelines

Waste Category (Description)	T.D.G. Regulated Waste	*Transportation of Dangerous Goods (T.D.G.) Criteria*				**Preferred Waste Management Practices**
		Shipping Name and Description	Class	Product Identification Number (PIN)	Packing Group	
PAINTS	yes	Paint and related material	3	UN 1263	I	- reuse or recycle the unused paint - collect unused paint and allow to dry, then landfill or - for disposal, use approved waste management contractors - complete and retain shipping document
PESTICIDES	yes	"name of special waste"	6.1	UN 2902	I	- drain and collect unused pesticide / herbicide - do not mix - for disposal, use approved waste management contractors - complete and retain TDG bill of lading
SALTS (NaCl and CaCl)	No	-----	----	-----	-----	- reuse if possible - for disposal, use approved waste management contractors - deep well inject salt solutions
SOLVENTS and RELATED PAINT MATERIAL	yes	Paint and related material	3	UN 1263	I	- reuse or recycle the unused product - collect unused product and allow containers to dry, then landfill or - for disposal, use approved waste management contractors - complete and retain shipping document
USED GLYCOL	Yes **See Bold Note***	Environmentally Hazardous Substance Liquid N.O.S	9	UN3082	III	- collect waste in secured containers / drums - dispose by using approved contractor - reuse or recycling preferred - complete and retain shipping document *** Not regulated if sent for recycling**
USED OIL	Yes **See Bold Note***	Environmentally Hazardous Substance Liquid N.O.S	9	UN3082	III	- collect waste in secured containers/drums - for disposal, use approved waste management contractors - complete and retain shipping document - (Recycling preferred) *** Not regulated if sent for recycling**
WATER TREATMENTS ADDITIVES	yes	Waste Corrosive Liquid, N.O.S.	8	UN 1760	I	- reuse if possible - for disposal, use approved waste management contractors - complete and retain TDG bill of lading

Note 1 **Empty Drums**

Mercaptan Containers

These containers are being handled through a SaskEnergy treatment program. Before shipping the containers, they must be labeled "Empty - Residue Last Contained - Waste Methyl Mercaptan" and be accompanied with a Shipping Document. See sample on next page.

Other Material

A deposit can be collected on most drums, therefore, these empty containers should be sent back to the distributor. The containers should be labeled "Empty - Residue Last Contained - Waste 'name of material' " (see sample on next page) and have the appropriate Shipping Document accompanying the drums. If the material is a waste, then the word "waste" should precede the name of the shipped material.

Note 2 **Contaminated Soil**

Depending upon the type of material that has contaminated the soil, a number of regulatory requirements may apply and a number of different disposal options may be available. Detailed sampling will likely be required. Contact Environmental Affairs for additional information.

With respect to gasoline-contaminated soil, consult Standard Practice Instructions Volume 1, Section A-01-06 and A-04-09 (Emergency Procedures), "SaskEnergy Spill Clean-up Instructions" for prior to any action. Contact Environmental Affairs for additional information.

Note 3 **Filters - Glycol**

Select one of the following:

Option 1:

Collect and store filters in filter bags or bins, impermeable tote bags placed in a frame on a pallet, or in drums. Ensure containers do not leak.
Contract a hazardous waste disposal firm to pick up and dispose.

TDG may apply. Filters may be flammable (Class 3.3), leachable (Class 9.3) or pyrophoric (Class 4.2). Consult with the hazardous waste management contractor

Option 2:

Drain filters for 3 to 7 days and crush to less than 25% of physical volume, then landfill or recycle. Dispose of liquids separately.

TDG will not apply to the filter elements or liquids but the liquids must be disposed of by a hazardous waste contractor.

Note 4 **Filters - Oil**

Select one of the following options:

Option 1:

Collect and store filters in filter bags or bins, impermeable tote bags placed in a frame on a pallet, or in drums. Ensure containers do not leak.
Contact a hazardous waste disposal firm to pick up and dispose.

TDG may apply. Filters may be flammable (Class 3.3), leachable (Class 9.3). Consult with the hazardous waste management contractor

Option 2:

Drain filters for 3 to 7 days and crush to less than 25% of physical volume, then land fill or recycle. Dispose of liquids separately.

TDG will not apply to the filter elements but will apply to the liquids.

Note 5 **Used Piping and Fittings**

The contaminant that is most likely to be on the pipes and fittings is a flammable paste or tar. This should either be cleaned with high-pressure steam or a solvent with a low flashpoint. The spent washing fluid should be collected in waste drums and handled as per instructions in this manual. Some

fluids in the piping should /may retain PCB's. Therefore, suspect piping should be treated in the fashion as filters containing Pipeline liquids. The piping should then be reused or shipped to a scrap dealer for recycling. Another option would be to have a registered disposal company pick up the piping, as is, for off-site processing. In this latter case, the material may be a TDG waste. Contact Environmental Affairs for additional information.

Note 6 **Oily Rags/Clothing**

Oily rags/clothing are not always considered TDG wastes. If the rags or clothing were heavily oiled, (having free liquid) then they would be classified as TDG wastes, and must be transported and disposed of accordingly.

The following TDG requirements apply.

1. For transport/disposal of oily rags less than 500 kg (1100 lb.)

   i) No TDG placards are required on vehicle
   ii) Containment drum or box must be labeled using the following:
      a) UN1270 - Petroleum Oil (UN1856 - Rags, Oily)
      b) TDG labeling (diamond shape safety marks) is required. A Class 3 - Flammable Liquid label is required. Labels can be made or purchased from a safety supplier.
   iii) A waste manifest must be completed for transportation

2. For transport/disposal of oily rags greater than 500 kg (1100 lb.)

   i) TDG placards are required on the vehicle
   ii) Containment drum or box must be labeled using the following:
      a) UN1270 - Petroleum Oil (UN1856 - Rags, Oily)
      b) TDG labeling (diamond shape safety marks) is required. A Class 3 - Flammable Liquid label is required. Labels can be made or purchased from a safety supplier.
   iii) A waste manifest must be completed for transportation

Heritage Gas

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Title:	**System Surveillance**	Section: **20.0**

1.0 GENERAL

1.1 Inspection and maintenance of gas systems will be conducted in a safe and environmentally sound manner following all applicable requirements of the EPP

1.2 Effective inspection and maintenance will help to ensure regulatory compliance while providing a means to identify and correct deficiencies in a timely manner.

1.3 Inspection and maintenance programs shall be designed and implemented to satisfy the requirements of the Standard Practice Instructions regarding system surveys, corrosion inspections, bridge crossing inspections and leak surveys.

2.0 WATERBODY CROSSINGS

2.1 An inspection of major water crossings should be completed the year following construction to ensure erosion control measures and other restoration measures in and around the crossing are effective. Following the initial inspections, the crossing shall be inspected during leak survey work.

2.2 Signs of bed and bank erosion and vegetation re-establishment at stream sides and slopes will be noted. If exposed lines are discovered, the Construction Manager and the Engineering and Safety Manager will be notified immediately. The site will be photographed, if possible.

2.3 Following exceptionally heavy rains and high run-off events, steep approach slopes to water bodies and other previously identified areas of environmental and geotechnical concern will be inspected for erosion damage.

3.0 CONSTRUCTION ACTIVITY

3.1 Inspections shall be conducted during or following construction activities to ensure compliance at construction sites.

3.2 Inspectors will stop work in progress if, in their opinion, the adverse effects on the environment are abnormal, unreasonable or cannot be mitigated through normal restoration methods.

3.3 The Environmental Coordinator will conduct periodic review of construction sites to monitor compliance with this EPP, appropriate regulations and any conditions of approval.

3.4 Pipeline repairs, rights-of-way or easement maintenance and facilities maintenance will be carried out in a manner that minimizes environmental impacts in accordance with this EPP. Routine maintenance and repairs will follow the same criteria as construction as it relates to protecting the environment, including proper separation of soils at bellholes and restoration of repair areas.

3.5 Inspection and maintenance activities will follow all applicable policies and procedures for materials handling. Where applicable, notify and consult parties affected by maintenance or repair activities.

4.0 DOCUMENTATION AND RECORDS

4.1 Documentation related to Inspections and Maintenance includes:

a) audit results;

b) any plan of work document developed for a water body crossing;

c) water crossing inspections information;

d) inspector reports including photos where applicable;

e) leak reports and survey results;

f) incident reports.

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Title:	**Vegetation Control**	Section: **21.0**

1.0 GENERAL

1.1 Vegetation control at Heritage Gas facilities and sites shall be conducted in a manner that minimizes adverse effects upon the environment.

2.0 FACILITY DESIGN

2.1 All new, rebuilt or significantly modified station and building yards will consider design and construction features that help to control unwanted vegetation.

2.2 Where its use is appropriate, a suitable landscaping fabric will be placed over the cleared and graded soil and covered with approximately 10 cm of crushed rock.

2.3 With or without landscaping fabric, sites may experience migration of weeds onto the site, transported by vehicles, shoes, and wind. Additional vegetation control may be required.

3.0 VEGETATION CONTROL TECHNIQUES

3.1 Above ground facilities, including Pressure Regulating Stations and building yards shall, to the extent practical, be kept free of noxious weeds in accordance with the Weed Control Regulations.

3.2 Liquid hazardous waste storage areas will be kept vegetation free.

3.3 The success of vegetation control techniques depends largely on the diligent use of the technique at the appropriate time in the seeding cycle. Techniques for controlling unwanted vegetation, in order of preference, are:

a) hand weeding;

b) mechanical removal;

c) annual or semi-annual application of approved herbicide in accordance with stipulations on use.

3.4 Soil sterilant shall not be used to control vegetation growth.

4.0 HERBICIDE USE

4.1 Only methods and products approved by the Manager, Engineering and Safety shall be used.

4.2 Vegetation control on a right-of-way or easement that involves the use of pesticides requires approval under the Activities Designation Regulation, unless the area to be treated is less than 100 square metres in area.

4.3 Herbicides and pesticides, other than those labeled “Domestic”, may only be applied by or under the direct supervision of an individual who holds a valid Class III pesticide applicator certificate in the appropriate category of pest control.

4.4 The following general procedures apply to the application of herbicides:

a) the Nova Scotia Department of Natural Resources shall be contacted prior to the commencement of spraying if burrows, dens or nests of endangered or threatened species are discovered in areas of vegetation control activity;

b) pesticides and herbicides must be stored in their original container unless stored in a labeled holding tank; if the original container is damaged, the product may be stored in a properly labeled temporary container;

c) all spray contractors will be assessed to ensure they have the necessary certificates and service registration and understand Company policies and procedures regarding vegetation control;

d) herbicide application contractor bids shall indicate the following:

- evidence of appropriate certificates and service registration;
- products suggested for use;
- equipment to be used;
- application quantity or rate;
- specific documentation requirements;
- description of how sensitive areas such as watercourses will be handled;
- description of how waste materials, including containers, will be handled;
- outline of a release response plan in the event of herbicide spillage or recognition of Heritage Gas release response and reporting procedures;
- safety precautions to be used.

4.5 Release response measures will be reviewed prior to the commencement of spraying;

4.6 Spraying shall be stopped when conditions are windy enough that drift may adversely effect areas not meant to be sprayed;

4.7 Landowners requesting notification prior to spraying shall be notified;

4.8 Mixing and loading of pesticides or herbicides may only take place in an area that is operated in a manner that will contain spills and may only be done by a licensed applicator.

4.9 Non-refillable plastic or metal containers that held non-domestic grade pesticides must be disposed of at a container collection site. Containers that held domestic grade pesticides may go to the landfill.

5.0 SPILL PREVENTION AND RESPONSE

5.1 Extreme care should be taken to avoid herbicide or pesticide spills. Release response materials will be available at the work site to address accidental spills.

5.2 In the event of an accidental spill of an herbicide or pesticide, release response and reporting policies and procedures must be followed. A release of any amount of pesticide, that has migrated or has the potential to migrate from Heritage Gas property or impact groundwater, must be reported to government agencies.

6.0 SPRAYING IN THE VICINITY OF WATERCOURSES

6.1 Only domestic grade glyphosate herbicide will be used within 30 metres of a watercourse.

6.2 In areas which are 5 to 30 metres from a watercourse, only restricted or noxious weeds will be sprayed, unless full vegetation control is required.

6.3 Within 5m of a watercourse, no vegetation will be sprayed but will be hand cut, with roots left intact to prevent erosion and the deposit of sediment into the watercourse.

7.0 DOCUMENTATION AND RECORDS

7.1 Documentation related to vegetation control activities includes:

a) results of spot checks;
b) records of product purchase and use by company employees;
c) copies of applicator certificates of contractors (valid for 3 years);
d) service registrations of contractors, if applicable;
e) special use registrations of contractors, if applicable;
f) contractor information and reports;
g) release response information for pesticides.

Title:	**Suspect Soils**	Section: **22.0**

1.0 GENERAL

1.1 "Suspect soils" are soils that are suspected or confirmed to contain hydrocarbons or other contaminants in concentrations harmful to human health or the environment.

1.2 Suspect soils shall be handled in accordance with regulations and Heritage Gas release response and reporting procedures, to the extent that they apply.

2.0 SUSPENSION OF WORK

2.1 When suspect soils are encountered prior to or during an excavation, work shall be suspended and the person responsible for supervising the activity shall be notified.

2.2 The area shall be cleared if necessary to maintain safety. The suspension of the work and the reason for it shall be communicated to site personnel to ensure that work does not recommence until approval to do so is given by the appropriate person.

2.3 Reasons for suspending work include:

a) soil contents at the excavation could pose a threat to the health or safety of personnel;

b) soil contents at the excavation could pose a threat to the environment in the area;

c) excavated soil may be considered a waste and it may be inappropriate to return it to the ground; continued excavation may create costly disposal requirements;

d) installing pipe in the soil may compromise the integrity of the pipe at a later date (e.g.: hydrocarbon effects on polyethylene pipe or coating);

e) it may be preferable to relocate or cancel the work to avoid the need to have remediation carried out by a third party.

2.4 Any employee who notices potential evidence of suspect soils shall suspend work activity until the supervisor responsible for the site activity is advised and provides further direction.

3.0 ASSESSMENT OF THE SITE

3.1 When suspect soils are encountered, an assessment shall be conducted to determine whether or not soil contamination exists and if work should continue.

3.2 Available evidence shall be considered in deciding if the soil shows signs of contamination. Suspect soils will likely be identified by sight and smell. Possible signs of contamination include, but are not limited to:

a) vegetation that is sparse, or lush, compared to the rest of the area;

b) uneven or mounded terrain in an otherwise flat area, or an unnatural hollow;

c) a location that is near a current or previous site of a gas station, refinery, chemical plant;

d) smell or odours that indicate buried waste;

e) staining in soil;

f) drums or refuse in the trench;

g) sticky substances in the soil;

h) corrosion of pipe along trench line;

i) mercury seen in the soil.

3.3 Answers to the following questions may provide further details that are useful in determining the potential for and nature of contaminants:

a) What is the specific location of the suspect soil?

b) Who was the previous owner or operator of the site?

c) Who is the current landowner or operator of the site?

d) What was the previous land use? (e.g.: gasoline station, oil refinery, chemical plant, landfill, poultry or other animal farm);

e) Who encountered the suspect soil?

f) How was the suspect soil noticed? (i.e.: can you see it? smell it? was it oozing, flowing, solid?);

g) How much suspect soil was excavated or encountered?

4.0 SECURING THE SOIL AND THE SITE

4.1 Unnecessary contact with suspect soils shall be avoided. Consideration should be given to changing the worksite, if possible.

4.2 If suspect soils are encountered at the location of an emergency repair, the need to continue work shall be assessed. If the emergency repair takes priority over concerns about the contaminated soil, site safety will be established prior to commencement of work. This is especially important where ignition sources are being used and the contaminant is not identified but is potentially explosive or flammable. Appropriate Personal Protective Equipment (PPE) will be used by employees, where appropriate.

4.3 Suspect soil that is excavated prior to work stoppage should be secured in the following manner:

a) place soil on plasticized tarpaulin or other suitable ground mat, if possible;

b) cover with a plasticized tarpaulin or other suitable cover to keep separate from other materials and prevent run-off of material during rain or wind;

c) store away from any watercourses, watersheds and crops;

d) use fencing or other barricades and signage, if appropriate, to ensure the safety of employees, public and livestock.

4.4 When suspect soils are encountered, the appropriate Company personnel shall be notified. The Manager, Engineering and Safety and the Environmental Coordinator should be contacted to provide technical support with regard to handling, testing and disposal of suspect soils.

5.0 COMPLETING THE INVESTIGATION

5.1 Prior to resuming work at the site in question, the issue of the suspect soil must be resolved. If necessary, the suspect soil shall be sampled and analyzed. The results of the analysis should attempt to identify the following:

a) probable responsibility for the soils and the related cost of testing and disposal;

b) appropriate methods for remediation or disposal of soils, if required;

c) reporting requirements, if any;

d) the requirements for continuation of work at the site.

5.2 Property owners should be involved in the investigation in order to possibly:

a) provide information on the origin of the contamination;

b) take financial responsibility for handling, testing and disposal of suspect soil;

c) provide authorization for construction elsewhere on the property.

5.3 Where it is not feasible to await the results of a suspect soils investigation, permission will be obtained by the landowner for construction on another area of the property prior to proceeding with work at another location.

5.4 Soils that are determined to be contaminated shall be disposed of in accordance with all regulations at sites licensed for receipt of such materials. All required documents and manifests shall be completed. In particular, landfill sites must be advised of the nature of the soil prior to delivery to provide the opportunity for directing the soil to the appropriate disposal site.

6.0 DOCUMENTATION AND RECORDS

6.1 Records of suspect soils discoveries and how they were handled should be generated and maintained for a period of two years following the completion of site activity. These records include:

a) laboratory results from analysis of soil samples,

b) photographs, if appropriate;

c) field notes from assessment and construction activities.

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Title:	**Site Decommissioning**	Section: **23.0**

1.0 GENERAL

1.1 "Decommissioned sites" are tracts of land from which Heritage Gas facilities have been permanently removed and for which there is no anticipated future Company use.

1.2 Decommissioned sites shall be reclaimed in a manner that minimizes and mitigates impacts upon the environment and complies with applicable regulations.

1.3 Landowners, government agencies and other parties potentially impacted by the reclamation of a site shall be notified prior to the commencement of the work.

1.4 The crew carrying out the work shall comply with all Company policies and standards regarding site restoration.

2.0 CONTAMINATED SITES

2.1 Decommissioned sites shall be evaluated for potential contamination. Analysis will be appropriate to the past and present activities associated with the facility. Assessment to determine potential contamination will be conducted by a qualified person.

2.2 Sites determined to be contaminated shall be reclaimed to meet or exceed the standard required for future land use at the site, as defined by the 1997 CCME Recommended Canadian Soil Quality Guidelines and Atlantic PIRI Tier 1 Criteria.

3.0 RECLAMATION CRITERIA

3.1 If site remediation is required, an application will be made for a Certificate of Completion once the site has been restored to the meet the applicable Atlantic PIRI and CCME criteria.

3.2 Equipment removed from the site shall be transported, cleaned, moth-balled and stored in an area such that the environment, transport, cleaning, or storage areas are not adversely impacted.

4.0 DOCUMENTATION AND RECORDS

4.1 Documentation related to the decommissioning of Company facilities includes:

a) records of remediation projects in progress or pending summary;

b) decommissioned sites inventory;

c) site status inventory;

d) records of site assessment results;

e) records of audits;

f) Reclamation Certificates.

4.2 Records of decommissioned sites will be kept indefinitely as part of the Site Assessment Inventory.

Title:	**Contingency and Emergency Response Planning**	Section: **24.0**

1.0 GENERAL

1.1 The purpose of contingency and emergency response planning is to ensure adequate response for foreseen, but unplanned events.

1.2 Site specific emergency response plans will be developed for each site.

1.3 This section of the EPP outlines generic contingency and emergency response planning for construction activities, as follows:

a) Environmental Emergency Preparedness

b) Hazardous Materials Spills

c) Wildlife Encounters

d) Cultural Heritage Resources

e) Fire

f) Contaminated Areas

2.0 ENVIRONMENTAL EMERGENCY PREPAREDNESS

2.1 Environmental emergency preparedness encompasses activities required to ensure that there is appropriate response at times when excessive erosion and sedimentation occurs, due to incidents such as storm events or spring runoff.

2.2 Requirements for environmental emergency preparedness will be determined based on the nature of activities on a site and the sensitivity of the receiving environment where construction is taking place. Site specific construction plans and emergency response plans will be prepared to address these issues.

3.0 HAZARDOUS MATERIAL SPILLS

3.1 Refer to Section 26.0 of this EPP for Spill Response procedures.

3.2 The Nova Scotia Emergency Spill Regulations specifies hazardous material spill reporting requirements.

4.0 WILDLIFE ENCOUNTERS

4.1 While all efforts will be made to avoid wildlife as per the EPP, chance encounters with wildlife may still occur on the right-of-way or easement. In the event of an encounter, the following measure may be implemented.

a) If potentially threatening wildlife is encountered, attempt to leave the area without attracting the animal's attention.

b) If rare or sensitive species are encountered, contact the appropriate agency (Nova Scotia Department of Natural Resources, Nova Scotia Museum or Environment Canada) to determine if a work stoppage may be required.

5.0 CULTURAL RESOURCES

5.1 Significant Archaeological Resources

a) In the event that a suspected cultural heritage site is encountered in areas not subjected to archaeological monitoring, work will be suspended in the immediate area of the impact and the discovery reported immediately. The Inspector will then contact the archaeological monitors.

b) Subsequent steps will be conducted in accordance with the Archaeological Monitoring Protocol developed between Heritage Gas and the Nova Scotia Museum, refer to Technical Specification IS-2-8050.

c) Monitoring will be conducted by qualified archaeologists working under the terms of a Heritage Research Permit issued by the Nova Scotia Museum.

5.2 Discovery of Human Remains

a) In the event that human remains are encountered during construction, either associated with a known cemetery or an unmarked grave, work in the area of the discovery will stop immediately. The inspector will notify the archaeological monitors immediately.

b) Upon securing the site, the discovery will be reported to the closest detachment of the RCMP.

c) The subsequent steps will be conducted in accordance with the Discovery of Human Remains Protocol developed between Heritage Gas and the Nova Scotia Museum, refer to Technical Specification IS-2-8040.

5.3 Resumption of Work

a) Work in proximity to archaeological, palaeontological or historical sites as well as human interments discovered during construction shall remain suspended until permission to proceed is granted by authorities having jurisdiction.

6.0 FIRE

6.1 Heritage Gas personnel and contractor crews will be trained in fire prevention and response. Contractors will be required to provide fire fighting equipment. In the event of a fire the following actions should be taken:

a) Do not attempt to fight the fire alone before notifying nearby personnel.

b) Take immediate action to extinguish the fire using extinguishers or fire hoses if feasible.

c) If the fire cannot be contained, contact the appropriate fire department (i.e., Nova Scotia Department of Natural Resources or the local fire department, depending on the nature of the fire).

d) Report forest fires immediately to Nova Scotia Department of Natural Resources at 1-800-565-224 informing them of the location and severity of the fire as well as the name and contact number of the person reporting the fire.

e) Call 911 or the appropriate number in the area for the local fire department (refer to site-specific health and safety plans).

6.2 During fire season, a permit is required to burn within 300 m of a wooded area. Permits may also be required to travel on certain roads at times when the risk of forest fire is high. Construction planning should take into account these requirements.

6.3 When welding is being done within 300 m of a wooded area during the fire season, fire fighting equipment as specified for a Class I machine in the Forest Fire Protection Regulations shall be available at the welding site.

6.4 Power saws used to clear a right-of-way or easement in a wooded area shall be equipped with a spark arrestor.

7.0 CONTAMINATED AREAS

7.1 Contaminated soils are usually initially identifiable by visual or olfactory inspection. If contaminated soils are encountered during construction the following general procedures will be followed. Specific procedures for managing contaminated areas are provided in Technical Specification IS-2-8030.

7.2 Suspended all construction activity within the suspended areas of impact until the situation is understood and under control.

7.3 Notify the Inspector to confirm suspected contamination.

7.4 Delineate the area to prevent additional disturbance.

Title:	**Hazardous Substance Storage**	Section: **25.0**

1.0 GENERAL

1.1 This section of the EPP provides direction for the design and operation of Heritage Gas facilities where hazardous substances or waste dangerous goods are stored.

1.2 These requirements apply to the storage of a hazardous substances or waste dangerous good under the following conditions:

a) Underground tanks storing hazardous substances or waste dangerous goods of any volume.

b) Above ground tanks, or collection of above ground tanks, storing hazardous substances in volumes of 4,000 litres or greater.

c) Above ground tanks storing waste dangerous goods of any volume.

d) All facilities storing hazardous substances in drums, bags, or other small containers in aggregate quantities equal to or exceeding 1,000 kilograms (1,000 litres) in the case of an indoor facility or 2,000 kilograms (2,000 litres) in the case of an outdoor facility. Small containers are considered to be less than 205 litres.

e) All facilities storing waste dangerous goods (except used oil and waste glycol solutions) in drums, bags, or other small containers in aggregate quantities equal to or exceeding 100 kilograms (100 litres). Small containers are considered to be less than 205 litres.

f) All facilities storing used oil and waste glycol solutions in small containers and drums where the aggregate capacity equals or exceeds 500 kilograms (500 litres). Small containers or drums are considered to be less than 205 litres.

g) Pesticide storage in quantities exceeding 25 litres.

1.3 These requirements do not apply to the temporary storage of materials for up to 1 year. Specific operations associated with temporary storage include plant turnarounds, construction operations, containment and clean up of a spill, site remediation, emergency conditions, testing and servicing operations. For these operations, storage requirements will be outlined in site-specific plans.

1.4 All installations of tanks for the storage of hazardous substances or waste dangerous goods shall be above ground.

2.0 HAZARDOUS SUBSTANCES AND WASTE DANGEROUS GOODS

2.1 Refer to Table 19.1 of Section 19.0 of this EPP for a list of hazardous substances and waste dangerous goods that may be used by Heritage Gas or which may result from the construction or operation of Heritage Gas pipelines and facilities:

2.2 New material on Table 19.1 shall be considered to be a hazardous substance. Used or waste material on Table 19.1 shall be considered to be a waste dangerous good.

3.0 PROVINCIAL REGULATORY REQUIREMENTS

3.1 The Nova Scotia Petroleum Storage Regulations, Nova Scotia Dangerous Goods Management Regulations and Nova Scotia Pesticide Regulations outline specific requirements for storage of these materials. These requirements, which include requirements for storage facility approvals, contingency plans and tank registrations, shall be considered in addition to the requirements outlined herein.

4.0 EXEMPTIONS

4.1 Where the storage of hazardous substances or waste dangerous goods do not fall under the Nova Scotia Management of Dangerous Goods Regulations, facilities shall comply with the National Fire Code unless exempted under Table 25.1.

5.0 NATIONAL FIRE CODE DESIGN REQUIREMENTS SUMMARY

5.1 Packages, containers and tanks used for storage shall be placed in a location that has been designed in accordance with the National Fire Code to minimize hazards and prevent contamination of the surrounding area should any material being stored be released.

5.2 Packages and containers shall be made of materials that are compatible with the product they contain and shall be constructed of durable material resistant to damage from normal handling. In the case where a transportation regulatory authority specifies a type of packaging, such a package shall be used to store that material, except where:

a) Flammable liquids and combustible liquids are stored in containers (<230 litres) and tanks. Containers and tanks shall be constructed in conformance with the National Fire Code.

b) Individual containers storing hazardous substances or waste dangerous goods shall be marked as to their contents. Labeling shall be in accordance with WHMIS except where;

- Flammable liquids and combustible liquids are stored in containers (<230 litres) and portable tanks (<2500 litres) where labeling requirements are already defined under the design requirements of:

  i. The Transportation of Dangerous Goods Regulations

  ii. CSA B376-M "Portable Containers of Gasoline and Other Petroleum Fuels"

  iii. ULC/ORD-C30 "Safety Containers"

  iv. Section 6 of CSA B620 "Highway Tanks and Portable Tanks for the Transportation of Dangerous Goods";

c) Flammable liquids and combustible liquids are stored in storage tanks (>230 litres):

- Storage tank connections shall be identified in conformance with CPPI, using the CPPI Colour-Symbol System to Mark Equipment and Vehicles of Product Identification.

5.3 Materials shall be kept in segregated storage in accordance with the National Fire Code of Canada and in conformance with the information provided in the MSDS for the specific material being stored. Table 25.2 is provided as a guide for the segregation of hazardous substances and waste dangerous goods. Further reference to the National Fire Code should be made regarding spacing requirements and storage arrangements for the storage of hazardous substances and waste dangerous goods, as each type of material may have additional requirements.

5.4 Individual storage areas at a facility shall be clearly designated using placards. Placards to be used shall conform to the Transportation of Dangerous Goods Regulations as laid out in the following circumstances:

a) Where storage consists of a single product, only the UN Product Identification Number (PIN) need be posted to designate the area.

b) Where storage consists of multiple products within the same class, the individual class and division placard need be posted to designate the area.

c) Where storage consists of more than one class, the TDG "DANGER" symbol shall be posted to designate the area.

d) NOTE: where tanks with a capacity > 2500 litres of flammable liquids or combustible liquids are located in a room, the room should be placarded in accordance with i) through iii) and the capacities of the storage tanks shall also be posted at entrance locations of the room.

5.5 Flammable Liquids and Combustible Liquids shall be kept in closed containers and stored in a cabinet. The volume of material stored in a cabinet shall not exceed 250 litres. The cabinet shall conform to ULC-C1275 “Storage Cabinets for Flammable Liquid Containers” and be labeled to indicate that the cabinet contains flammable material and that open flames must be kept away.

6. OUTDOOR STORAGE

6.1 Facilities that will contain dangerous goods shall be designed to be:

a) Secure

b) Readily identified as a dangerous goods storage facility

c) Prepared to respond to an emergency

d) Staffed by trained employees

e) Protected against spillage.

6.2 The storage location shall be surrounded by a fence to restrict unauthorized access. The storage location shall be situated away from temporary or permanent human residence. The location shall be at least 500 metres from any area zoned as residential, hospital, senior citizen care home, school, day care center or prison.

6.3 The storage location shall be situated away from any area subject to flooding on a 1 in 500 year frequency.

7. INDOOR STORAGE

7.1 The storage location shall be at least 100 metres from an area municipally zoned as residential, hospital, senior citizen care home, school, day-care or prison.

7.2 Public access to the storage locations shall be restricted.

8. DESIGN REQUIREMENTS FOR OTHER VOLUMES OF HAZARDOUS SUBSTANCES AND WASTE DANGEROUS GOODS

8.1 Packages or containers shall be stored in a manner to minimize hazards and prevent contamination of the surrounding area should any material being stored be released. Hazardous materials shall be segregated from incompatible materials.

8.2 Packages and containers shall be made of materials that are compatible with the product they contain and shall be constructed of durable material resistant to damage from normal handling. Portable containers hall meet the packaging requirements prescribed in the Transportation of Dangerous Goods Regulations.

8.3 Individual containers shall be marked as to their content in accordance to WHMIS.

8.4 Material shall be stored in conformance with the information provided in the MSDS for the specific material being stored.

8.5 Areas used for storage shall be secured against unauthorized access

Table 25.1
Small Quantity Exemptions for Dangerous Goods
(Table 3.2.7.1 under the National Fire Code)

Class[1]	**Dangerous Goods**	**Maximum Exempt Amount**
1	Explosives	Storage must comply with Explosives Act
2	Gases Division 1[1] Flammable Division 2 Non-Flammable Division 3 Poisonous Division 4 Corrosive	 25 kg[2] 150 kg 0 0
3	Flammable Liquids and Combustible Liquids	0[3]
4	Flammable Solids Division 1 Flammable Solids Division 2 Subject to Spontaneous Ignition Division 3 Reactive with Water	 100 kg[4] 50 kg 50 kg
5	Oxidizing Substances Division 1 Oxidizers Division 2 Organic Peroxides	 250 kg or 250 L 100 kg or 100 L
6	Poisonous and Infections Substances Division 1 Poisonous Substances Packing Group I[5] Packing Group II Packing Group III Division 2 Infectious Substances	 0 100 kg or 100 L 1000 kg or 1000 L 0
7	Radioactive Material	Storage must comply with Atomic Energy Control Act
8	Corrosive Substances Packing Group I Packing Group II Packing Group III	 500 kg to 500 L 1000 kg to 1000 L 2000 kg to 2000 L
9	Miscellaneous Division 1 Miscellaneous Division 2 Environmental Hazard Division 3 Specific Wastes	

Notes for this Table:

(1) The numbers refer to the class and division of dangerous goods, as defined in the "Transport of Dangerous Goods Regulations".

(2) See A-3.2.8.2 in Appendix A of the National Fire Code to convert gas expanded volume to gas weight

(3) See Part 4 in the National Fire Code for specific requirements on the storage of Flammable Liquids and Combustible Liquids.

(4) 50 kg for nitrocellulose based products, and 10 kg for "strike anywhere matches".

(5) The "Transport of Dangerous Goods Act" defines "packing group" as "a level of hazard inherent to dangerous goods". Packing Group products are more hazardous than Packing Group III products.

(6) Small quantity exemptions may be determined by other authorities such as the "Transport of Dangerous Goods Act", the "Workplace Hazardous Materials Information System" (WHMIS), and environmental protection laws.

Table 25.2
Separation Chart for Storage of Dangerous Goods
(Table 3.2.7.6 under the National Fire Code)

Classification[(1)]	2.1	2.2	2.3	2.4	3	4.1	4.2	4.3	5.1	5.2	6	8
2.1	-	P	X	X	P	P	A	DS	X	X	X	X
2.2	P	-	P	P	P	P	P	P	P	P	P	P
2.3	X	P	-	A	X	A	A	DS	A	X	P	A
2.4	X	P	A	-	X	A	A	DS	A	X	DS	A
3[(1)]	P	P	X	X	-	P	A	A	X	X	DS	A
4.1	P	P	A	A	P	-	A	DS	X	X	DS	A
4.2	A	P	A	A	A	A	-	DS	X	X	DS	A
4.3	DS	P	DS	DS	A	DS	DS	-	X	X	DS	X
5.1	X	P	A	A	X	X	X	X	-	P	A	X
5.2	X	P	X	X	X	X	X	X	P	-	X	X
6	X	P	P	DS	DS	DS	DS	DS	A	X	-	A
8	X	P	A	A	A	A	A	X	X	X	A	-

X Incompatible goods, do not store together in same fire compartment indoors; in outdoor applications; incompatible goods must be separated by a minimum of 3 metres
A Incompatible goods, separate by minimum 1 m horizontal distance.
P Permitted, good are permitted to be stored together.
DS Refer to Material Safety Data Sheet.
Note: The numbers refer to the class and division of dangerous good in this Table. See Part 4 in the National Fire Code for specific requirements on the storage of Flammable Liquids and Combustible Liquids.

9.0 OPERATION AND MAINTENANCE- GENERAL

9.1 For locations where hazardous substances and/or waste dangerous goods are stored:

a) A Material Safety Data Sheet (MSDS) for all hazardous substances stored at the facility shall be maintained and kept on file at the facility.

b) An MSDS or laboratory analysis for all waste dangerous goods at the facility shall be maintained on file at the nearest Heritage Gas office.

c) A list of all hazardous substances and waste dangerous goods stored at the facility shall be maintained. The list shall include quantities based on the most recent inventory. The list shall be kept on file with the fire safety plan.

d) Inspection and maintenance records for the storage facility shall be maintained and kept on file at the nearest Heritage Gas office.

e) A site-specific emergency response plan shall be in accordance with the National Fire Code and available on site. The current response plan shall be supplied to the Local Fire Department and reviewed every 12 months.

f) Waste materials shall be disposed of in accordance with the applicable legislation and Heritage Gas waste management procedures.

10.0 EMPTYING OF TANKS

10.1 Care shall be taken to ensure that none of the material in the tank is spilled when the tank is being emptied.

10.2 The truck emptying the tank shall be electrically grounded.

10.3 The truck and the tank being emptied shall be electrically bonded.

11.0 ABOVE GROUND TANKS

11.1 An inventory shall be kept of the volume of the hazardous substance or waste dangerous good in the tank.

11.2 The inventory shall be revised each time liquids are added to or removed from the tank. Where this is not practical, an inventory shall be taken at least monthly.

12.0 CONTAINER STORAGE

12.1 An inventory shall be kept of the quantity of all hazardous substances and/or waste dangerous goods in storage.

12.2 The inventory shall be updated at least every six months

Title:	**Spill Response**	Section: **26.0**

1.0 GENERAL

1.1 This procedure covers the requirements for reporting and cleaning up a hazardous substance or waste dangerous goods spill that has occurred during Heritage Gas construction, operations or maintenance activities.

1.2 The response to the spill should also be carried out with reference to the Heritage Gas Emergency Response Manual, as applicable.

1.3 In any spill event, first consideration will be given to safety of people, and secondly, the protection of property and the environment.

2.0 SPILL RESPONSE STEPS – SUMMARY

2.1 The Nova Scotia Emergency Spill Regulations specifies hazardous material spill reporting requirements.

2.2 An appropriate spill response can mitigate risk to human health and safety and impacts on the environment due to a spill. In the event of a spill, the following action will be taken.

a) Upon discovery of a spill, call for help, and attempt to stop or contain the spill immediately if no additional safety equipment is required.

b) All spills, regardless of size, are reported to the Responsible On-site Person.

c) The Responsible Person stops work in the immediate area of the spill, and deploys the necessary personnel, equipment and materials to begin clean up or containment measures. In accordance with the Emergency Spills Regulations, the Responsible On-site Person reports the spills to the Canadian Coast Guard Environmental Emergencies 24-hour report line (1-800-563-1633), through which the appropriate agencies will be notified, and the Environmental Coordinator (?).

d) The Environmental Coordinator assumes overall responsibility for coordinating the cleanup.

e) Once the cleanup is complete, sample as appropriate to ensure that clean up measures have been effective and that regulatory requirements have been met.

f) Ensure contaminated materials are disposed of at an approval facility.

g) The Responsible Person will prepare a written report to the Environmental Coordinator documenting key information relevant to the spill, including but not limited to:
- product spilled
- quantity
- location of spill
- distance to the nearest residence or other facility
- distance to the nearest water body, well or dugout
- date
- time
- personnel present
- spill containment
- remediation activities
- notification and confirmatory sampling locations

3.0 MANAGER, ENGINEERING AND SAFETY RESPONSIBILITIES

3.1 The Manager, Engineering and Safety is responsible for:

a) Determining if the spill is reportable.

b) Responding to notification of the spill.

c) Notifying all appropriate individuals and agencies in a timely fashion.

d) Collecting specific information with respect to the spill.

e) Overseeing clean-up activities, and

f) Completing and submitting all required written reports.

4.0 REPORTING SPILL EVENTS

4.1 All spills that exceed the minimum reportable volumes shall be reported in accordance with Provincial and Federal Legislation. Where required, releases shall be reported to Nova Scotia Environment and Labour by telephone at the earliest opportunity.

4.2 The requirement to report a spill to Nova Scotia Environment and Labour does not apply to a release that is permitted in an approval issued under the Environment Act.

4.3 Table 26.1 table below summarizes the reportable volumes for chemicals that may be handled by Heritage Gas and which may be involved in a spill. More than one spill report may have to be written and filed with the appropriate Provincial and Federal agencies.

4.4 Reportable spills shall be reported in writing, using the Heritage Gas Spill Report Form.

5.0 SPILL CLEAN-UP PROCEDURES

5.1 Procedures to be followed in cleaning up a spill will be dictated by the circumstances of the event. Generally, attention must first be paid to direction given by regulatory agencies.

5.2 For non-reportable spill events, Heritage Gas has generalized procedures that should be followed in dealing with spills of common chemicals. These chemicals are listed below:

a) Diesel Fuel
b) Gasoline
c) Gasoline contaminated soil
d) Kerosene
e) Mercaptan (odorant)
f) Methanol (methyl alcohol)
g) New glycol
h) New oil
i) Pipeline liquids
j) Solvents
k) Used glycol
l) Used oil

5.3 In the event of a spill of any other material, contact the Manager, Engineering and Safety for direction.

Table 26.1
Reportable Spill Volumes

Category	**Nova Scotia Environment and Labour**	**Transportation of Dangerous Goods**
Adhesives (Flammable)	> 100 L	>200 L
Alkaline Products (Solid or liquid, poisonous or corrosive)	> 5 L or > 5 kg	>5 kg or >5 L
Asbestos Waste	> 50 kg	N/A
Acid (Batteries)	> 5 L or > 5 kg	>5 kg or >5 L
Nickel Cadmium (Batteries)	> 5 L or > 5 kg	>5 kg or >5 L
Compressed Gas	Flammable: > 100 L Non-Flammable, Non-Corrosive: > 100 L Toxic: Any amount Corrosive: Any amount	>100 L
Contaminated Soil	N/A	1kg – 50 kg
Corrosive Substances	> 5 L or 5 kg	N/A
Explosives	Any amount	Any amount
Fuel (Gasoline, Diesel, Kerosene)	>100 L	>200 L
Glycol (New and Used)	> 5 L or > 5 kg	N/A
Grease, Sealants and Lubricants	> 25 kg	N/A
Mercaptan (Odorant)	> 5 L or > 5 Kg	>200 L
Methanol	> 100 L	>200 L
Natural Gas	> 100 L	N/A
Oil (Used)	Not Contaminated: >100 L Contaminated: > 5 L	>200 L
Paints (Flammable)	> 100 L	>200 L
Pesticides	Concentrated form: > 5 L or 5 kg Diluted form: > 70 L	N/A
Pipeline Liquids	> 100 L	>200 L
Pipeline Liquids (containing PCBs)	> 0.5 L or > 0.5 Kg	>200 L
Solvents and Related Paint Material	> 100 L	On-site >25 kg

HERITAGE GAS
Spill Report Form

1. Date: _____Time: _____

2. Person Reporting:

   Name: _____

   Agency/Co.: _____

   Address: _____

   Phone Number: _____

3. Date Spill Occurred: _____

4. Material Spilled: _____

   _____

   Volume/Quantity:_____

5. Location: _____

6. Distance and Direction of Nearest: (attach site plan)

   Community: _____

   Municipal Service Building: _____Occupied ?: _____

   Walls/Dugouts:_____Use: _____

   Streams:_____Lakes:_____

Spill Report Form, continued

7. Spill Site Details:

   Ground Water Depth _____

   Soil Types _____

   Surface Drainage _____

8. Cause of Spill: _____

   _____

   _____

9. Clean-up Action Taken and/or Planned: _____

   _____

   _____

10. Describe all remedial action taken with respect to spill:

    Containment(describe)_____

    _____

    Volume Recovered for Reuse: _____

    Clean-up Method (describe) _____

    Further Clean-up Contemplated: _____

    Disposal Method:

    _____

    _____

Spill Report Form, continued

Location

_____

_____

12: List all persons notified of spill:

Name	Agency or Company	Phone Number	City-Town

13. Additional Comments: _____

_____

_____

_____

_____

To the best of my knowledge all information submitted on this form is True, Accurate and Complete.

Date_____Completed by:_____
Signature

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **DIESEL FUEL**	TDG Classification **3**	UN or PIN **UN 1202**
Concerns	Diesel is flammable. Flashpoint > +23^{o} C. Protective safety equipment is recommended (overalls, gloves and safety goggles). Wash with soap, degreaser and water to decontaminate.		
Immediate Action	Stop the flow and contain the spill. Prevent discharge into water streams, ponds, or lakes. Prevent from entering drainage systems. If volume is large (>200 litres), restrict access to site. Issue "FLAMMABLE warning. Use sorbents to contain and "soak up" free liquid.		
Clean Up	Small spills (i.e. 1 or 2 litres) on the ground do not have to be cleaned up. Small spills will biodegrade. Rake spill to increase rate of degradation. Use sorbents to soak up excess solvent. Collect free liquid and/or saturated waste into appropriate containers for disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment:>100 litres (22 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle free liquids if possible. Contaminated soil / material may be treaded at landfills if local authorities and Nova Scotia Environment and Labour allow. Waste material can be disposed of using approved waste contractors. Store waste material / contaminated soil in appropriate Hazardous Material containers.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **GASOLINE**	TDG Classification **3**	UN or PIN **UN 1203**
Concerns	Gasoline is VERY flammable. Flashpoint < -18^{o} C Gasoline may contain BTEX (Benzene, Toluene, Ethyl Benzene and Xylene). Protective safety equipment is recommended (overalls, gloves and safety goggles). Wash with soap, degreaser and water to decontaminate.		
Immediate Action	Stop the flow and contain the spill. Prevent discharge into water streams, ponds, or lakes. Prevent from entering drainage systems. Issue "FLAMMABLE warning and restrict access to site. Use sorbents to contain and "soak up" free liquid.		
Clean Up	Small spills (i.e. 1 or 2 litres) on the ground do not have to be cleaned up. Small spills will biodegrade. Rake spill to increase rate of degradation. Use sorbents to soak up excess solvent. Collect free liquid and/or saturated waste into appropriate containers for disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment:>100 litres (22 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle free liquids if possible. Contaminated soil / material may be treated at landfills if local authorities and Nova Scotia Environment and Labour allows. Waste material can be disposed of using approved waste contractors. Store waste material / contaminated soil in appropriate Hazardous Material containers.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **GASOLINE** **CONTAMINATED SOIL**	TDG Classification **4.1 -low flashpoint** **9.1 - metal / lead content**	UN or PIN: **TO BE DETERMINED**
Concerns	Gasoline contains benzene, toluene and xylene. These are carcinogenic agents. Flash point can be very low. Treat as extremely FLAMMABLE until known otherwise. Avoid inhaling vapors. Vapors can be nauseating. Use organic vapor canister apparatus. Protective safety equipment is recommended (overalls, gloves and safety goggles). Area contaminated may be very large. Qualified personnel/consultants will be required to determine the extent and degree of contamination. Source of contamination should be determined by qualified personnel/consultants. Legal and financial liability issues may arise. Consult with Manager, Engineering and Safety.		
Immediate Action	Eliminate ignition sources. Determine gasoline contamination if possible. Restrict access to site. Issue "FLAMMABLE" warning. If construction is to continue at site, consult the "Procedures Manual" for performing excavation in gasoline contaminated soils.		
Clean Up	Soil contaminated by a "small accidental" spill (< 2 litres) do not have to be cleaned up. Small spills will biodegrade. Collect free liquid and rake spill site to increase rate of degradation. For "bell holes" or main/service line construction remove only the soil that is required. The contaminated soil should not be used as "fill" when construction is complete. Use gravel, crushed rock or "non contaminated" soil. Contaminated soil should be disposed of using proper procedures or temporarily stored or stockpiled at a secured location until disposal procedures a known.		
Reportable Criteria And Notification	**All construction locations that encounter gasoline contaminated soil must be reported. The amount of contamination may be larger than estimated. This is especially true for locations near abandoned or operating service stations.** Soil contaminated by a "small accidental" spill (< 2 litres) do not have to be reported. ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Depending upon volume and degree of contamination soil may be treated at landfills, landfarmed incinerated or reclaimed by using a thermal adsorption process. Waste material can be placed in treated at landfills if local authorities and Nova Scotia Environment and Labour allow. Landfill disposal guidelines may apply. Waste material can also be disposed of using approved contractors.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **KEROSENE**	TDG Classification **3**	UN or PIN **UN 1223**
Concerns	Kerosene is flammable. Flashpoint > +23^{o} C. Protective safety equipment is recommended (overalls, gloves and safety goggles). Wash with soap, degreaser and water to decontaminate.		
Immediate Action	Stop the flow and contain the spill. Prevent discharge into water streams, ponds, or lakes. Prevent from entering drainage systems. If volume is large (>200 litres), restrict access to site. Issue "FLAMMABLE warning. Use sorbents to contain and "soak up" free liquid.		
Clean Up	Small spills (i.e. 1 or 2 litres) on the ground do not have to be cleaned up. Small spills will biodegrade. Rake spill to increase rate of degradation. Use sorbents to soak up excess solvent. Collect free liquid and/or saturated waste into appropriate containers for disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment: > 100 litres (22 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle free liquids if possible. Contaminated soil / material may be treated at landfills if local authorities and Nova Scotia Environment and Labour allow. Waste material can be disposed of using approved waste contractors. Store waste material / contaminated soil in appropriate Hazardous Material containers.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **MERCAPTAN (ODORANT)**	TDG Classification **3**	UN or PIN **UN 1993**
Concerns	Public hysteria. Small spill will result in public perception of a large leak, thus resulting in large number of odor calls. FLAMMABLE. Avoid skin contact. Use appropriate safety equipment. Refer to MSDS.		
Immediate Action	**Inform Manager/Supervisor of any size spill.** Make authority contacts ASAP if spill is classified as REPORTABLE. Stop leak and contain spill **when safe to do so.** Restrict access to site. Issue "FLAMMABLE" warning. If location and atmospheric conditions allow burn off spill. Follow all safety precautions. Vapors can be nauseating. Wear organic vapor canister apparatus. Large spills require SCBA equipment.		
Clean Up	Small spill (<1 litre) use approved neutralizing agent for use on mercaptans. Add sand or sorbent material. Cover spill with high expansion foam to retard rate of evaporation. Whenever possible, collect any pooled material and place in appropriate container for disposal.		
Reportable Volume Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment:> 5 L or > 5 kg ONSITE PERSON: notify Manager, Engineering and Safety (any size spill). Be prepared to provide additional info. (i.e. time, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Inform Manager, Engineering and Safety of any size spill. Cleanup as required. MANAGER, ENGINEERING and SAFETY: Inform Senior Management and public as required.		
Disposal	Waste material can be disposed of using approved contractors.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **METHANOL** **(METHYL ALCOHOL)**	TDG Classification **3**	UN or PIN **UN 1230**
Concerns	Extremely flammable. Flame may not be visible. TOXIC if ingested. Avoid skin contact. Use appropriate safety equipment. Refer to MSDS.		
Immediate Action	Eliminate ignition sources. Pure methanol evaporates quickly. Stop the flow and contain the spill **IF SAFE TO DO SO**. Prevent methanol spill from entering water streams, ponds or lakes. Methanol is toxic to fish and wildlife. Restrict access to site. Issue warning "FLAMMABLE and POISONOUS". An ABC fire extinguisher should be made available for emergency use.		
Clean Up	Small spills (1 to 2 litres) do not have to be cleaned up. Methanol biodegrades quickly. Wherever possible collect any pooled methanol and place in container for recycling or disposal.		
Reportable Volume Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment >100 litres (22 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle methanol waste if possible. Small amounts of saturated material can be spread out and allowed to biodegrade. Waste material can be placed in treated at landfills if local authorities and Nova Scotia Environment and Labour allow. Use waste contractors if necessary.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **NEW GLYCOL**	TDG Classification **N/A**	UN or PIN **N/A**
Concerns	Glycol is toxic if ingested by humans or animals. Livestock and wildlife are attracted to the taste of glycol. Avoid skin contact. Wear protective clothing and gloves. Refer to MSDS. Wash with soap and water to decontaminate.		
Immediate Action	Stop the flow and contain the spill. Use sorbents to contain and "soak up" free liquid. Prevent the glycol spill from entering water streams, ponds or lakes.		
Clean Up	Small spills (1 to 2 litres) do not have to be cleaned up. Rake soil to increase the rate of degradation. Glycol biodegrades rapidly. Wherever possible, collect any pooled glycol and saturated material in containers for recycling or disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada): N/A Glycol is non-regulated Nova Scotia Environment: > 5 L or > 5 kg ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact Environmental Coordinator..		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle waste if possible. Small amounts of waste material can spread out and allowed to biodegrade. Waste material can be treated at landfills if local authorities and Nova Scotia Environment and Labour allows. Small amounts of liquid glycol or contaminated soil can be stored in HazMat Drum until disposal is arranged. Use waste contractors if necessary.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **NEW OIL**	TDG Classification **9.1**	UN or PIN **UN 1270**
Concerns	No major health concerns under normal operating conditions. Protective safety equipment is recommended (overalls, gloves and safety goggles). Refer to MSDS of specific oil. Do not wash hands with GASOLINE.		
Immediate Action	Stop the flow and contain the spill. Prevent discharge into water streams, ponds, or lakes. Prevent from entering drainage systems. Restrict access to site. Use sorbents to contain and "soak up" free liquid.		
Clean Up	Small spills (i.e. 1 or 2 litres) on the ground do not have to be cleaned up. Small spills will biodegrade. Rake spill to increase rate of degradation. Use sorbents to soak up excess oil. Collect free liquid and/or saturated waste into appropriate containers for recycling or disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment: >100 litres (22 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle if possible. Waste material can be disposed of using approved contractors.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **PIPELINE LIQUIDS**	TDG Classification **3**	UN or PIN **UN 1993**
Concerns	Pipeline liquids may contain PCBs. Flash point extremely variable. Treat as FLAMMABLE. Avoid skin contact. Use appropriate safety equipment and clothing.		
Immediate Action	Stop the flow ASAP. Contain the spill using appropriate containers or berms. Prevent the spill from entering water streams, pond or lakes. Eliminate ignition sources. Restrict access to site and issue "FLAMMABLE" warning. Wear protective clothing to protect against PCB contamination.		
Clean Up	For small spills use dirt, sand or sorbents to soak up liquid. Wherever possible, collect any pooled liquid and saturated material into appropriate containers for disposal. Rake area when complete. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) > 200 litres (44 gal) during transport. Nova Scotia Environment:> 100 litres (22 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info.i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Testing for PCB's must be done if required to determine disposal process. If < 50 ppm PCB's pipeline liquids may be recycled as used hydrocarbon (oil) product. Use an approved waste contractor. ***If > 50 ppm PCB's then the P/L liquid is considered a PCB waste material and must be disposed of using high temperature incineration or by placing the waste at the secured storage facility. PCB waste containing more than 50ppm PCBS is classified as waste polychlorinated Biphenyls, class: 9.1, 9.2, P.I.N: UN2315, Packing Group: II.***		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **SOLVENTS (VARSOL)**	TDG Classification **3**	UN or PIN **UN 1263**
Concerns	Solvents may be flammable. Protective safety equipment is recommended (overalls, gloves and safety goggles). Wash with soap, degreaser and water to decontaminate. Varsol is also considered to be Petroleum Spirits - FLAMMABLE		
Immediate Action	Stop the flow and contain the spill. Prevent discharge into water streams, ponds, or lakes. Prevent from entering drainage systems. If volume is large (>100 litres), restrict access to site. Issue "FLAMMABLE warning. Use sorbents to contain and "soak up" free liquid.		
Clean Up	Small spills (i.e. 1 or 2 litres) on the ground do not have to be cleaned up. Small spills will biodegrade. Rake spill to increase rate of degradation. Use sorbents to soak up excess solvent. Collect free liquid and/or saturated waste into appropriate containers for disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment: > 100 litres (22 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Waste material can be disposed of using approved contractors. Store waste material in appropriate Hazardous Material containers.		

Title:	**Spill Response**	Section: **26.0**

Section No.	Product **USED GLYCOL**	TDG Classification **N/A**	UN or PIN **N/A**
Concerns	Used glycol may contain hazardous contaminants (from engine or line heater). Glycol is toxic if ingested by humans or animals. Livestock and wildlife are attracted to the taste of glycol. Avoid skin contact. Wear protective clothing and gloves. Wash with soap and water to decontaminate.		
Immediate Action	Stop the flow and contain the spill. Use sorbents to contain and "soak up" free liquid. Prevent the glycol spill from entering water streams, ponds or lakes.		
Clean Up	Small spills (1 to 2 litres) do not have to be cleaned up. Rake soil to increase the rate of degradation. Glycol biodegrades rapidly. Wherever possible, collect any pooled glycol and saturated material in containers for recycling or disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada): N/A Glycol is non-regulated Nova Scotia Environment:: > 5 L or > 5 kg ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact Environmental Coordinator.		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle waste if possible. Small amounts of waste material can spread out and allowed to biodegrade. Waste material can be treated at landfills if local authorities and Nova Scotia Environment and Labour allow. Small amounts of liquid glycol or contaminated soil can be stored in HazMat Drum until disposal is arranged. Use waste contractors if necessary.		

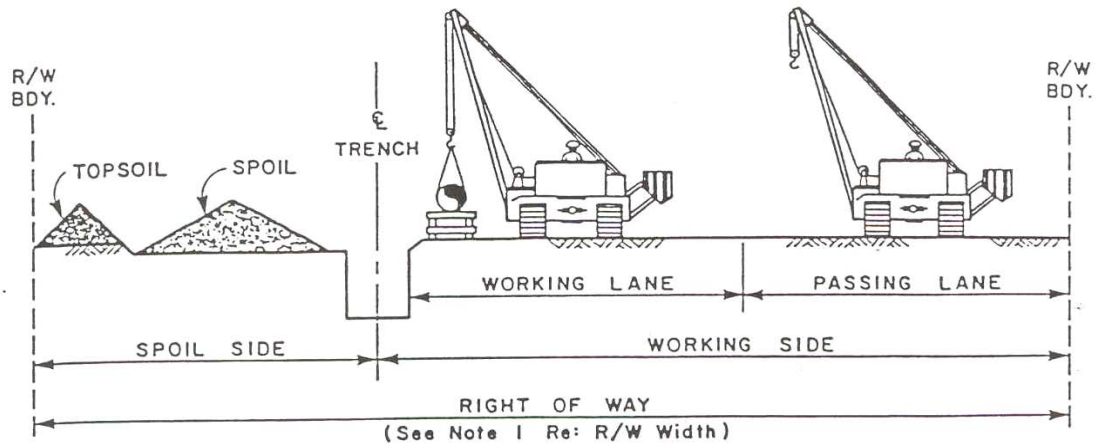
Title:	**Spill Response**	Section: **26.0**

Section No.	Product **USED OIL**	TDG Classification **9.3**	UN or PIN **UN 1270**
Concerns	Used oil may contain engine contaminants. Protective safety equipment is recommended (overalls, gloves and safety goggles). Wash with soap, degreaser and water to decontaminate. Do not wash hands with GASOLINE.		
Immediate Action	Stop the flow and contain the spill. Prevent discharge into water streams, ponds, or lakes. Prevent from entering drainage systems. Restrict access to site. Use sorbents to contain and "soak up" free liquid.		
Clean Up	Small spills (i.e. 1 or 2 litres) on the ground do not have to be cleaned up. Small spills will biodegrade. Rake spill to increase rate of degradation. Use sorbents to soak up excess oil. Collect free liquid and/or saturated waste into appropriate containers for recycling or disposal. For large spills use Vac Truck if available.		
Reportable Criteria And Notification	**REFER TO Heritage Gas Emergency Procedure Manual for detailed instructions.** TDG (Transport Canada) >200 litres (44 gal) during transport. Nova Scotia Environment: Not Contaminated >100 litres (22 gal) Contaminated >5 litres (1 gal) ONSITE PERSON: notify Manager, Engineering and Safety. Be prepared to provide additional info. (i.e. time of spill, location, volume, and distance to property and water) MANAGER, ENGINEERING and SAFETY: contact authorities as required		
Non Reportable	ONSITE PERSON: Cleanup spill as required. Contact Manager, Engineering and Safety if warranted. MANAGER, ENGINEERING and SAFETY: No further action required.		
Disposal	Recycle if possible. Waste material can be disposed of using approved contractors.		

APPENDIX

STANDARD DRAWINGS

Title:	**Pipeline Right of Way**	Figure: **1.0**



PROFILE
N.T.S.

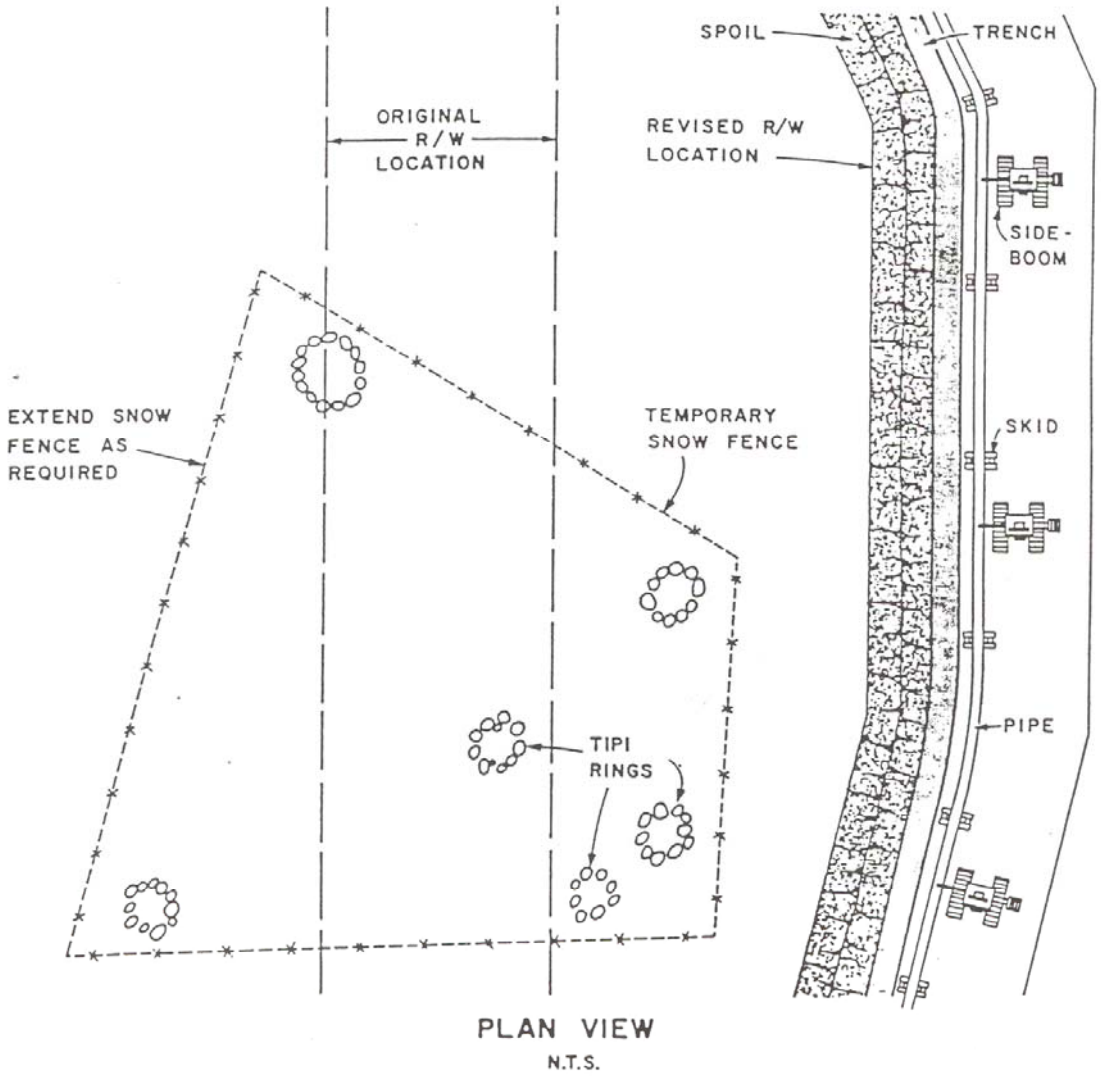
Notes

1. Prior to construction, determine standard right of way width and locations requiring additional right of way. Merchantable timber can then be cleared and salvaged, and topsoil can be stripped and stockpiled separately from spoil.

Right of Way Width Considerations

	Less R/W	More R/W
a) No. of Pipelines		
— Single	x	
— Multiple		x
b) Pipe Diameter		
— Small Inch	x	
— Big Inch		x
c) Working Space		
— Crossings		x
— Expansion Loops		x
— Passing Lane		x
d) Slash Disposal		
— Burning	x	
— Total Rollback		x
e) Topsoil Stripping		
— Width — None	x	
— Full R/W		x
— Depth — 6 cm	x	
— Depth — 30 cm		x
f) Grading		
— None	x	
— Extensive		x
g) Trench Material		
— Clay	x	
— Sand		x
— Rock (Blasting)		x
h) Depth Of Cover		
— 1 m	x	
— 3 m		x
i) Water Table		
— Low	x	
— High		x
j) Trenching Equipment		
— Wheel	x	
— Hoe		x

Title:	**Protection of Archeological Sites Adjacent to ROW**	Figure: **Figure 2.0**

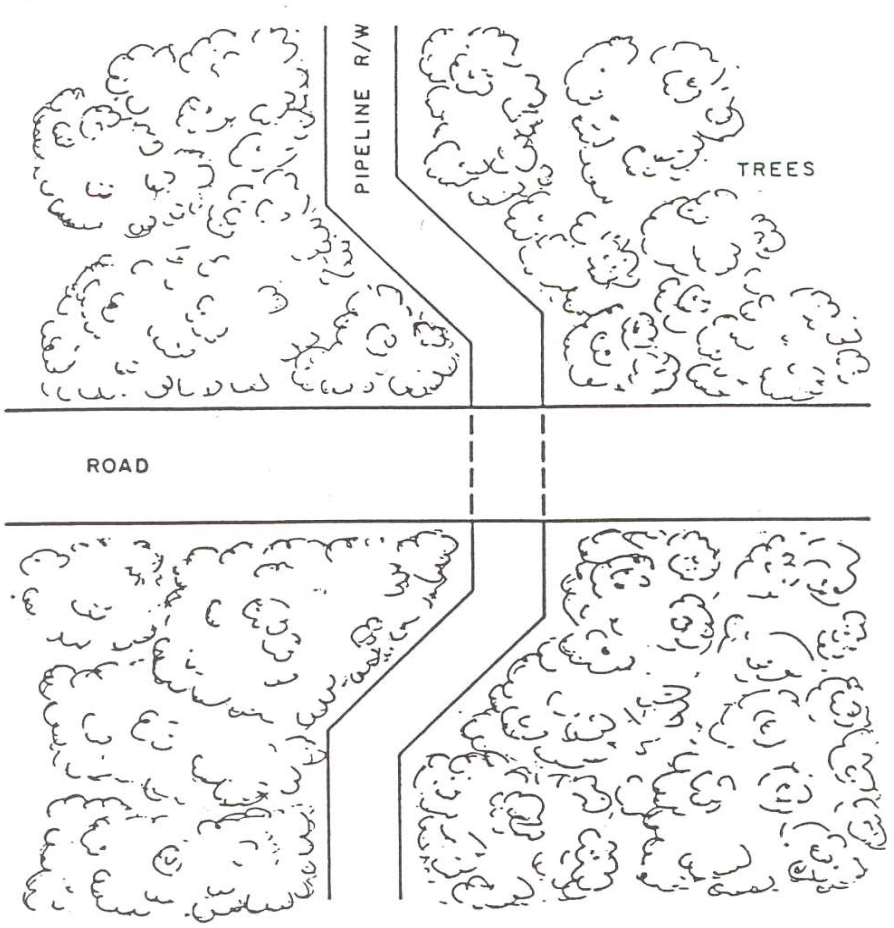


Notes

1. Fence known archaeological or heritage resource sites adjacent to or in proximity to the right of way to protect them from inadvertent off right of way damage. Erect fence during survey and take down after final clean-up.
2. Use fencing procedure for preservation of shelterbelts, shade trees, dugouts, and other significant features.

Source: Adapted from Fedirchuk McCullough & Associates Ltd., 1982.

Title:	**Dog-Legged Road Crossing**	Figure: **3.0**



PLAN VIEW

N.T.S.

Notes

1. Deflect the right of way at a sufficient angle to block line of sight at road and trail crossings in forested areas of high aesthetic or wildlife value.
2. Take additional right of way as required.

Source: Adapted from Mutrie-Wishart Environmental Consultants, 1983.

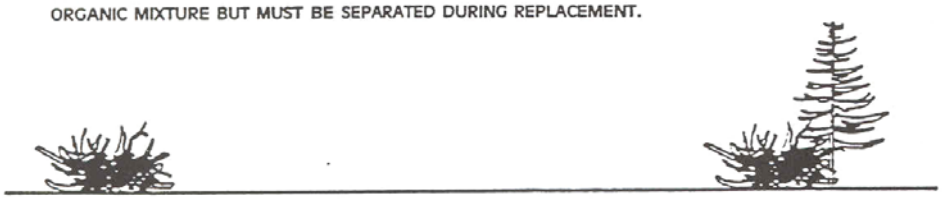
Title:	**Green Area Grubbing**	Figure:: **4.0**

1) - CLEAR TIMBER FROM R.O.W.

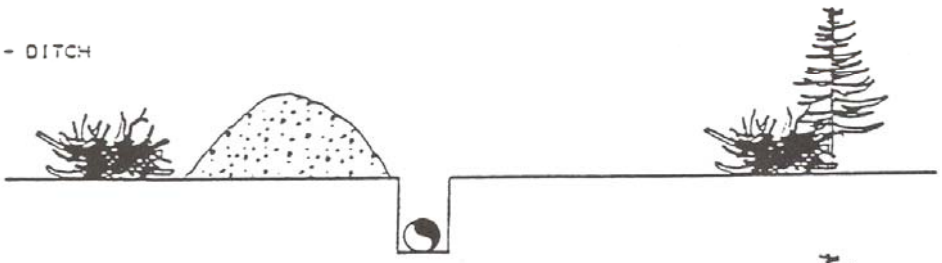
2A) - WHERE NO GRADING IS REQUIRED TO CREATE A SUITABLE WORKING SURFACE, USE BRUSH RAKE TO GRUB STUMPS AND ROOTS.
- PLACE STUMPS AND ROOTS ON BOTH SIDES OF R.O.W. INCLUDE AS LITTLE ORGANIC MATERIAL AS POSSIBLE.
- IF DUFF ORGANIC LAYER IS TOO THICK (>15 CM) FOR RE-VEGETATION SEED BED, RIP R.O.W. TO A DEPTH THAT WILL INCORPORATE 50-70% MINERAL SOIL WITH ORGANIC MATERIAL. MUSKEGS ARE EXEMPT FROM THIS REQUIREMENT.
- AREAS TO BE RIPPED WILL BE IDENTIFIED ON THE ALIGNMENT SHEET.
- IN SUMMER CONSTRUCTION, RIPPING MAY BE DONE DURING CLEANUP.
- BLADE ORGANIC MATTER TO FORM WORK SURFACE AND LEAVE ON R.O.W.

2B) - WHERE GRADING IS REQUIRED TO CREATE A SUITABLE WORKING SURFACE, THE GRUBBING MATERIAL REMOVED FROM THE R.O.W. MUST CONTAIN 50-70% MINERAL SOIL. THESE MATERIALS WILL BE PLACED ON BOTH SIDES OF THE R.O.W. (UNLESS OTHERWISE SPECIFIED) WITHOUT ENTERING TREE LINE.

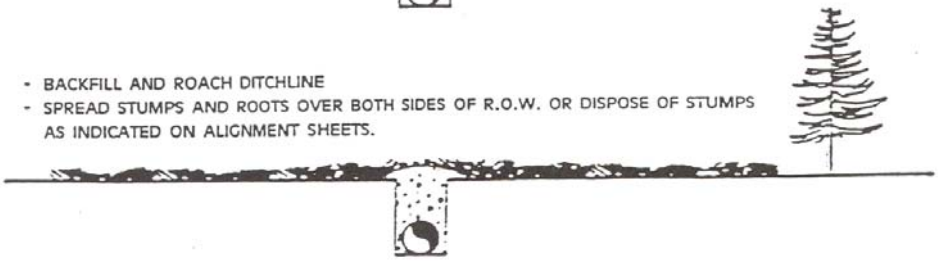
2C) - WHERE GRADE CUTS ARE REQUIRED, THE ORGANIC LAYER CONTAINING 50-70% MINERAL SOIL WILL BE REMOVED FIRST AND PLACED ON EDGE OF THE WORKSPACE WITHOUT ENTERING TREE LINE. GRADE CUT MATERIAL MAY OVERLAP THE ORGANIC MIXTURE BUT MUST BE SEPARATED DURING REPLACEMENT.



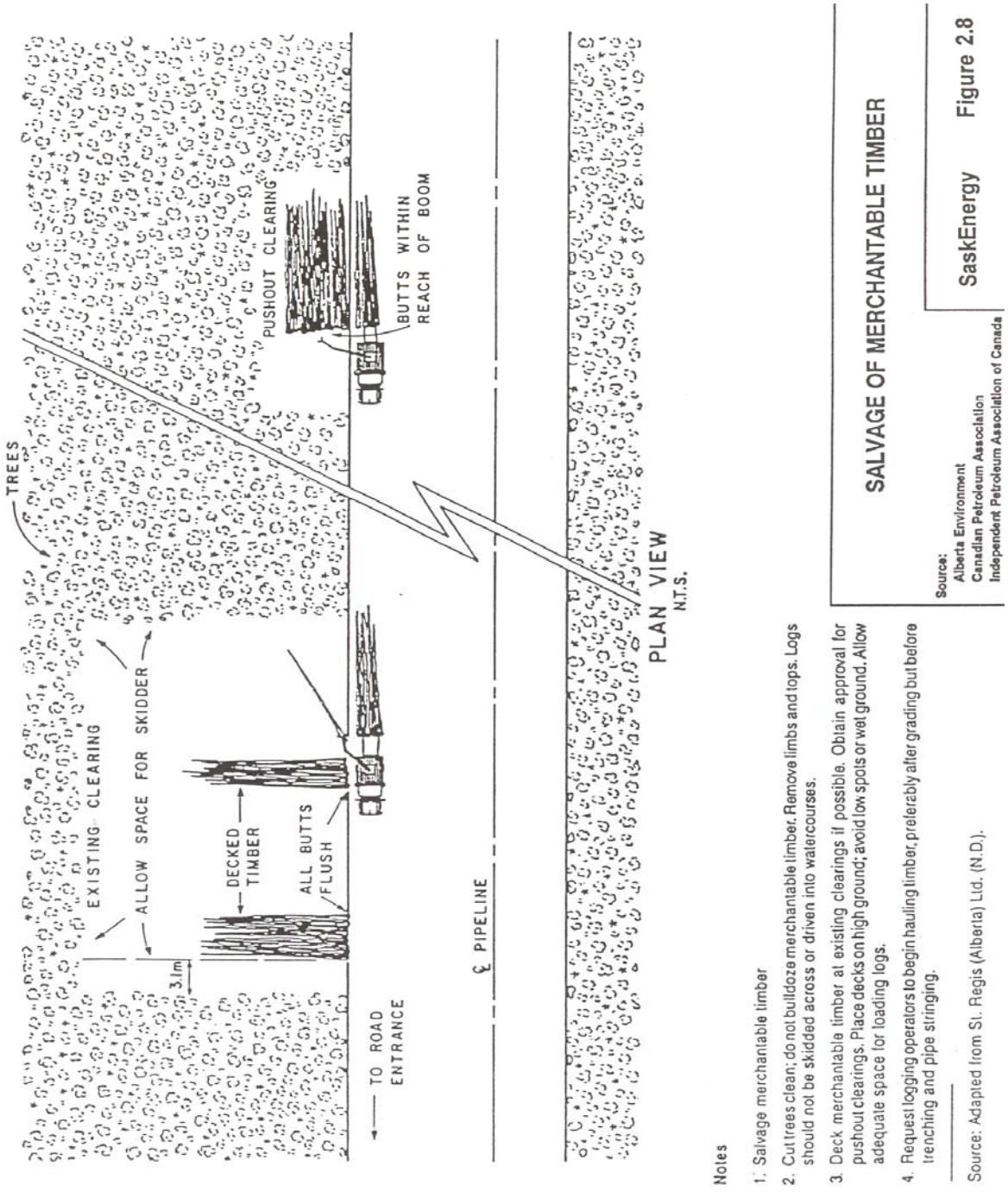
3) - DITCH



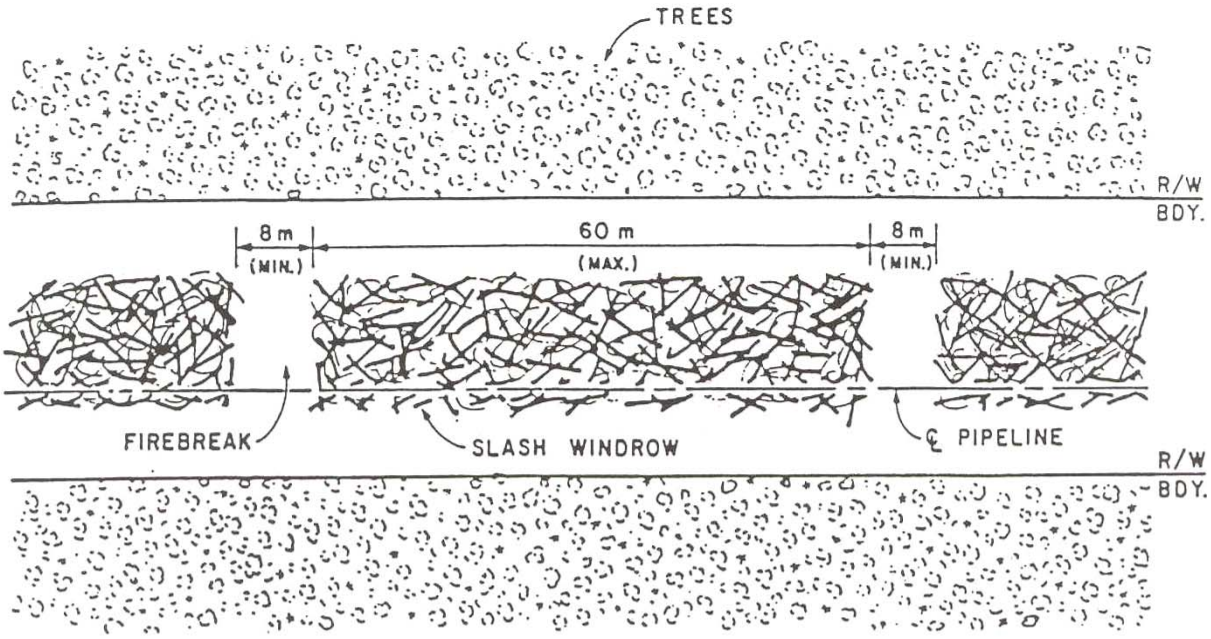
4) - BACKFILL AND ROACH DITCHLINE
- SPREAD STUMPS AND ROOTS OVER BOTH SIDES OF R.O.W. OR DISPOSE OF STUMPS AS INDICATED ON ALIGNMENT SHEETS.



Title:	**Salvage of Merchantable Timber**	Figure: **5.0**



Title:	**Slash Disposal by Burning**	Figure: **6.0**

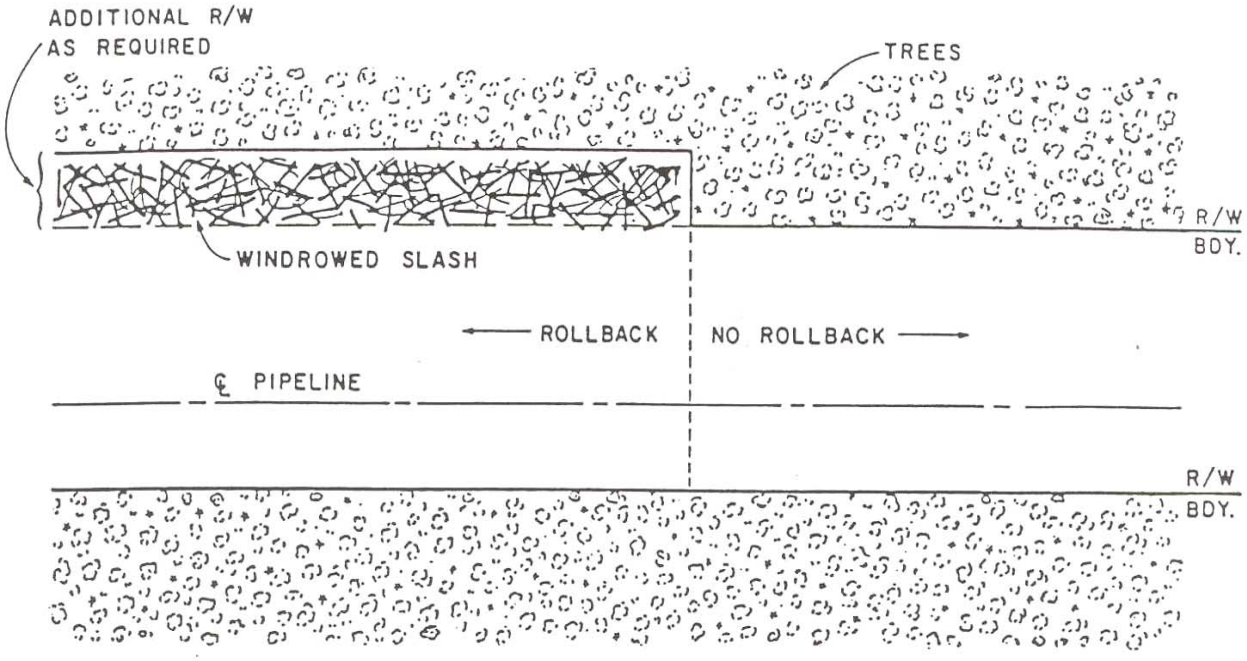


PLAN VIEW
N.T.S.

Notes

1. Obtain burning permit.
2. Maintain fire fighting equipment on site.
3. Push slash into windrows or piles along centre of right of way and separate by firebreaks. Locate burn areas more than 100 m from waterbodies.
4. Attend fires and prevent from spreading off right of way. Extinguish burning embers before leaving site.
5. Spread ashes over right of way. Windrow any remaining stumps along edge of working side.

Title:	**Slash Disposal by Rollback**	Figure: **7.0**

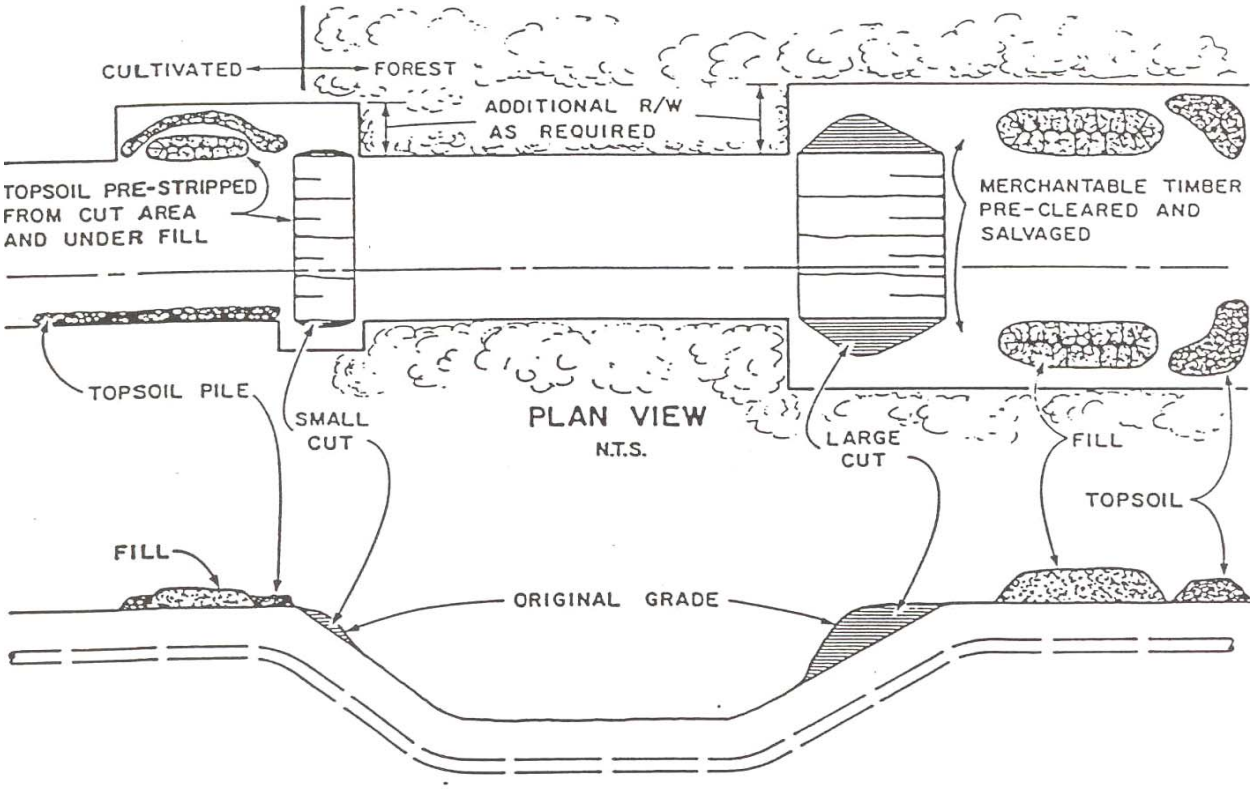


PLAN VIEW
N.T.S.

Notes

1. Rollback method is used on erodible terrain or where access control is desired. Additional right of way is required.
2. Windrow slash on edge of working side.
3. Rollback slash during clean-up. Do not damage adjacent trees.
4. Walk slash down with bulldozer to minimize fire hazard.

Title:	**Grading the Right of Way**	Figure: **8.0**



PROFILE
N.T.S.

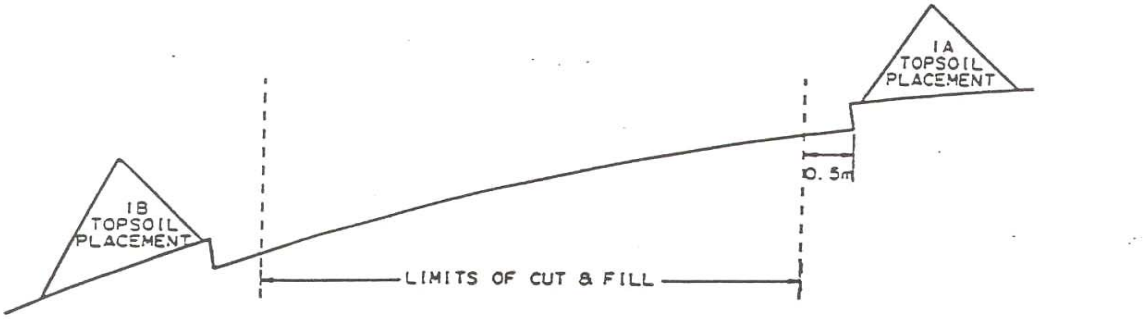
Notes

1. Grade only as necessary to provide adequate surface for construction equipment and to allow overbends and sagbends to be made within permissible bending limits. On winter projects, use snow to smooth out the working side if possible.
2. Identify areas where additional right of way is required to accommodate cuts and fills. Salvage merchantable timber and topsoil. Maintain a minimum 1 m separation between topsoil and spoil piles.
3. Slope cuts sufficiently to minimize instability and resultant erosion and pipe integrity problems.
4. Stockpile fill in areas where it can be easily recovered (usually uphill) and where natural drainage is not blocked.
5. Do not stockpile fill in a manner which overloads slopes causing slope failure. Obtain advice from a geotechnical engineer.
6. Replace cuts and recontour slopes to maximum 1:3 grade unless otherwise directed by geotechnical engineer.
7. Employ erosion control measures such as breakers, cross ditches and berms, and revegetation

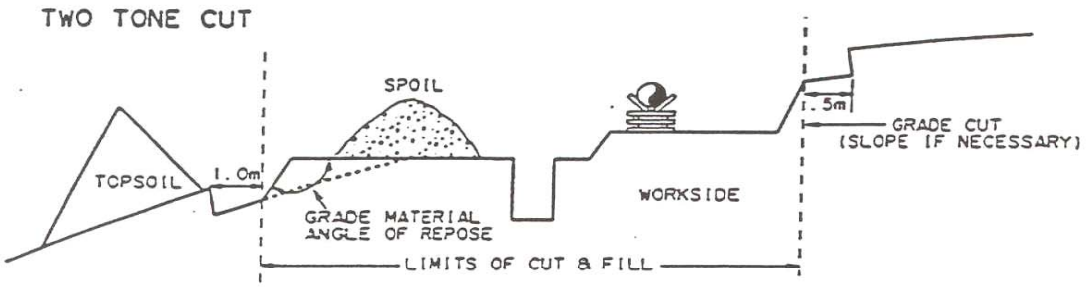
Title:	**Top Soil Conservation in Side-Hill Grading, Agricultural**	Figure: **9.0**

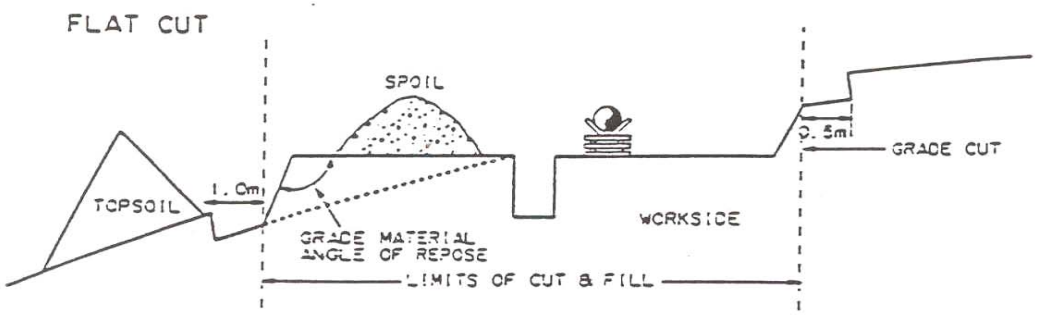
1) A. WHENEVER POSSIBLE STRIP TOPSOIL OVER THE FULL WIDTH OF THE RoW PLUS EXTRA SPACE ON THE DOWNHILL AND UPHILL EDGES TO ALLOW FOR THE GRADE MATERIAL ANGLE OF REPOSE AND TOPSOIL GRADE CUT SEPARATION. PLACE TOPSOIL ON THE HIGH SIDE OF THE GRADE CUT IN TEMPORARY WORKSPACE. DO NOT PLACE TOPSOIL ON BOTH SIDES OF THE RoW.

B. IN SITUATIONS WHERE TOPSOIL MUST BE PLACED ON THE LOWSIDE OF THE CUT. STRIP TOPSOIL FULL WIDTH PLUS EXTRA SPACE TO ALLOW FOR THE ANGLE OF REPOSE OF THE GRADE MATERIAL ON THE LOWSIDE. AND CUT REPLACEMENT ON THE HIGH SIDE. PLACE TOPSOIL IN TEMPORARY WORKSPACE ON THE LOWSIDE OF THE CUT. DO NOT PLACE TOPSOIL ON BOTH SIDES OF THE RoW.



2) MAKE GRADE CUT (FLAT OR TWO TONE) STAYING 0.5M AWAY FROM TOPSOIL EDGE CUT OF PILE ON HIGHSIDE AND MAINTAINING 1.0M OF SEPARATION BETWEEN GRADE MATERIAL AND TOPSOIL EDGE CUT OR PILE ON LOW SIDE. PLACE EXCESS GRADE SPOIL IN APPROVED PUSHOUTS ON ACQUIRED TEMPORARY WORK SPACE. PUSHOUTS MUST BE STRIPPED OF TOPSOIL. EXCAVATE DITCH AND MAINTAIN SEPARATION.





3) REPLACE GRADE CUT AND TOPSOIL TO ORIGINAL CONTOUR USING APPROVED HOTLINE RETRIEVAL METHODS AS REQUIRED.

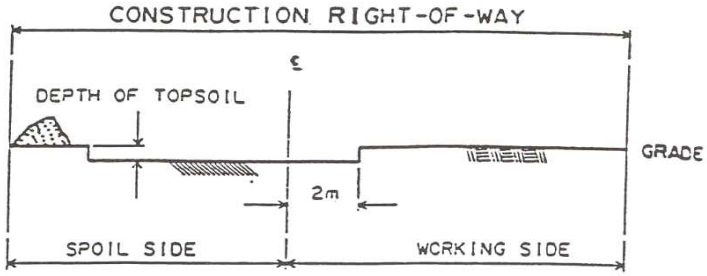
Heritage Gas

Putting Our Energy Here. Naturally.

Title:	**Topsoil Conservation, Ditchline and Side-Spoil**	Figure: **10.0**

GRADE

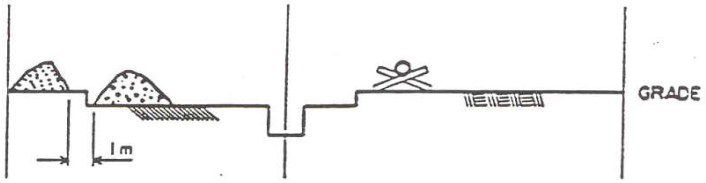
STRIP TOPSOIL AND STOCKPILE AT EDGE OF RIGHT-OF-WAY.



SPECIAL ATTENTION IS NECESSARY TO ENSURE SEPARATION OF TOPSOIL AND SUBSOIL AT SIDE BENDS AND FOREIGN PIPELINE CROSSINGS.

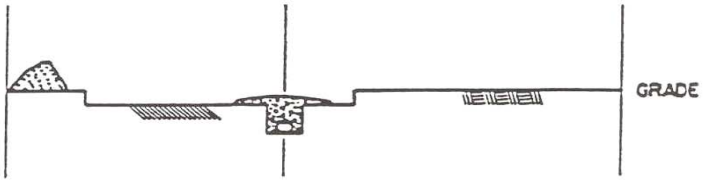
DITCH

AS SUBSOIL IS STOCKPILED. MAINTAIN 1m CLEARANCE BETWEEN TOPSOIL & SUBSOIL PILES.



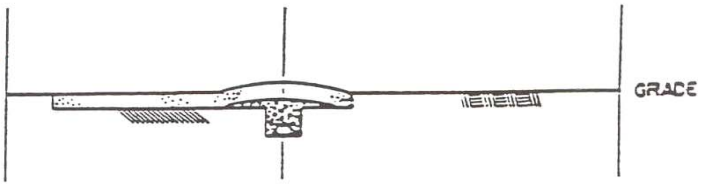
BACKFILL & MACHINE CLEAN-UP

REPLACE SUBSOIL. SCRAPE SUBSOIL INTO ROACH OVER DITCHLINE & COMPACT.



FINAL CLEAN-UP

REPLACE TOPSOIL. AND CULTIVATE ENTIRE RIGHT-OF-WAY.



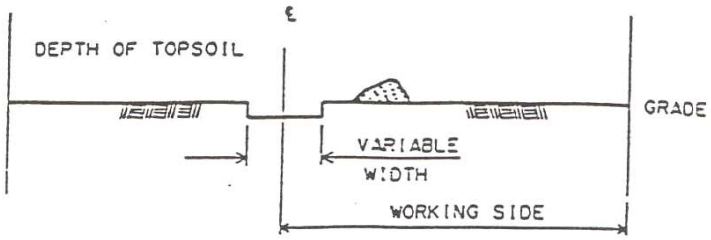
APPLICATION :

1) CULTIVATED LAND AND WHERE DIRECTED ON ALIGNMENT SHEETS.
2) AT SIDE BENDS AND FOREIGN PIPELINE CROSSINGS IN CULTIVATED LAND.

Title:	**Topsoil Conservation – Ditchline (Summer)**	Figure: **11.0**

GRADE

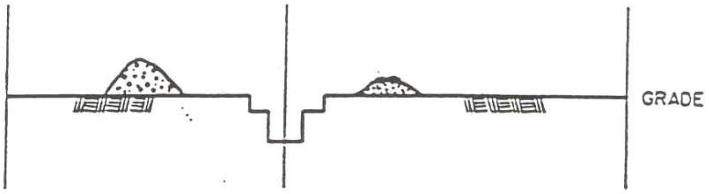
STRIP TOPSOIL OVER DITCHLINE AND STOCKPILE ON WORKING SIDE.



NOTE: WIDTH STRIPPED OVER DITCHLINE MUST BE SUFFICIENT TO ACCOMODATE DITCHER BUCKET.

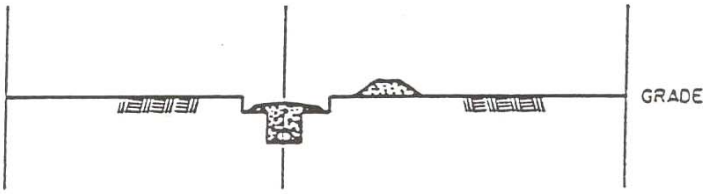
DITCH

SUBSOIL TO BE STOCKPILED ON SPOIL SIDE. PIPE MAY BE STRUNG ON TOPSOIL.



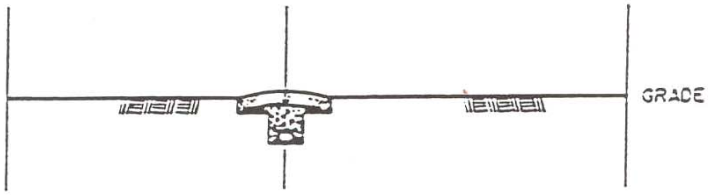
BACKFILL & MACHINE CLEAN-UP

REPLACE SUBSOIL. SCRAPE SUBSOIL INTO ROACH OVER DITCHLINE & COMPACT.



FINAL CLEAN-UP

REPLACE TOPSOIL.



APPLICATION :

1) PASTURE AND WHERE DIRECTED ON ALIGNMENT SHEETS.

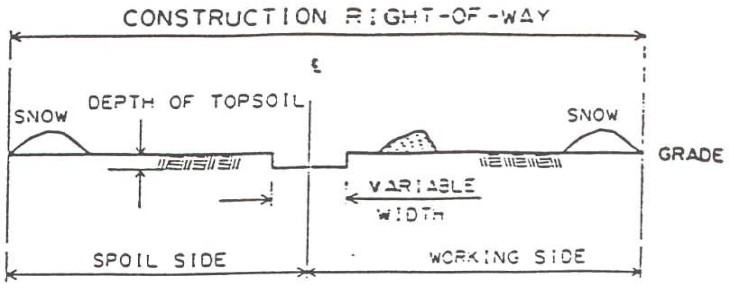
Heritage Gas

Putting Our Energy Here. Naturally.

Title:	**Topsoil Conservation – Ditchline (Winter)**	Figure: **12.0**

GRADE

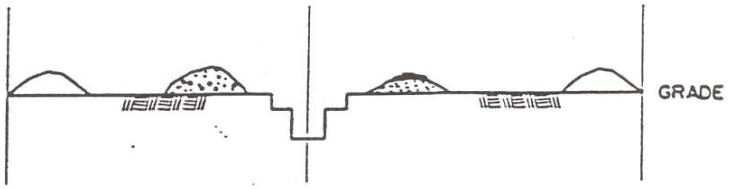
STRIP TOPSOIL OVER DITCHLINE AND STOCKPILE ON WORKING SIDE.



NOTE: WIDTH STRIPPED OVER DITCHLINE MUST BE SUFFICIENT TO ACCOMODATE DITCHER BUCKET.

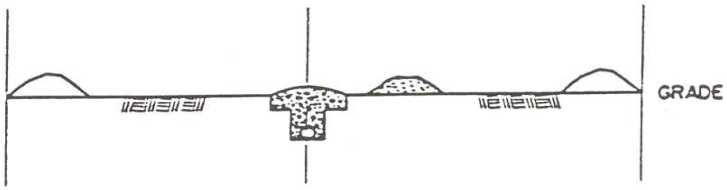
DITCH

SUBSOIL TO BE STOCKPILED ON SPOIL SIDE. PIPE MAY BE STRUNG ON TOPSOIL.



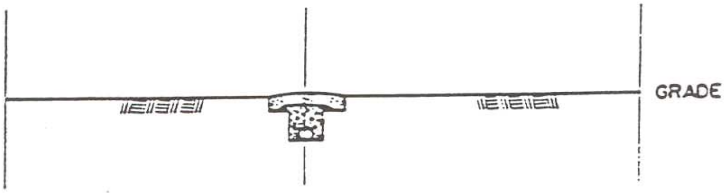
BACKFILL & MACHINE CLEAN-UP

REPLACE SUBSOIL. SCRAPE SUBSOIL INTO ROACH OVER DITCHLINE.



FINAL CLEAN-UP (SUMMER)

REFORM DITCH BACKFILL.
REPLACE TOPSOIL.
CULTIVATE AS DIRECTED ON ALIGNMENT SHEETS.

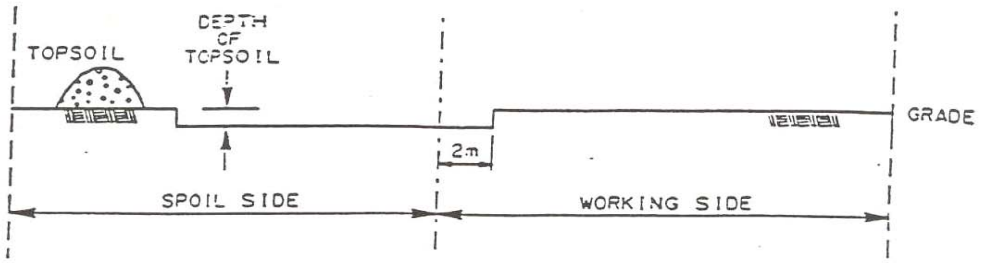


APPLICATION :

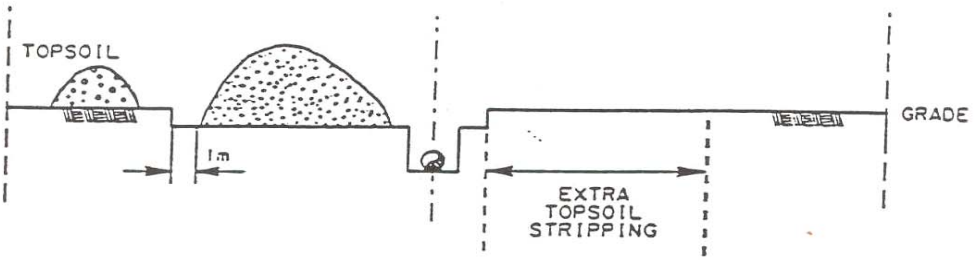
1) AGRICULTURAL LAND AND WHERE DIRECTED ON ALIGNMENT SHEETS.
2) WHERE NECESSARY, BLADE SPOIL STORAGE AREA TO A SMOOTH SURFACE. TOPSOIL DISPLACED SHALL BE STORED IN PIPE LAY-UP LOCATION.

Title:	**Secondary Stripping for Topsoil Displacement**	Figure: **13.0**

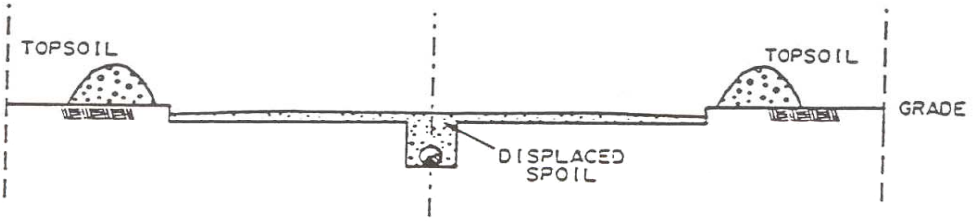
1) STRIP TOPSOIL AND STOCKPILE AT EDGE OF RIGHT-OF-WAY. AT FOREIGN CROSSINGS TOPSOIL MAY BE USED FOR RAMPING.



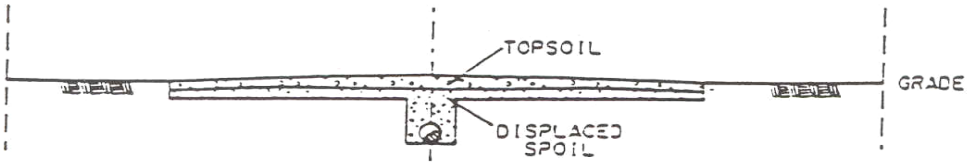
2) AS SUBSOIL IS STOCKPILED, MAINTAIN 1m CLEARANCE BETWEEN TOPSOIL AND SUBSOIL PILES.



3) PERFORM BACKFILL. IF AMOUNT OF DISPLACED SPOIL IS TOO THICK OVER PRESTRIPPED AREA. STRIP ADDITIONAL SPACE ON WORK SIDE OF THE ROW. FEATHER DISPLACED SPOIL OVER ENTIRE STRIPPED AREA.



4) REPLACE TOPSOIL, AND CULTIVATE ENTIRE RIGHT-OF-WAY.



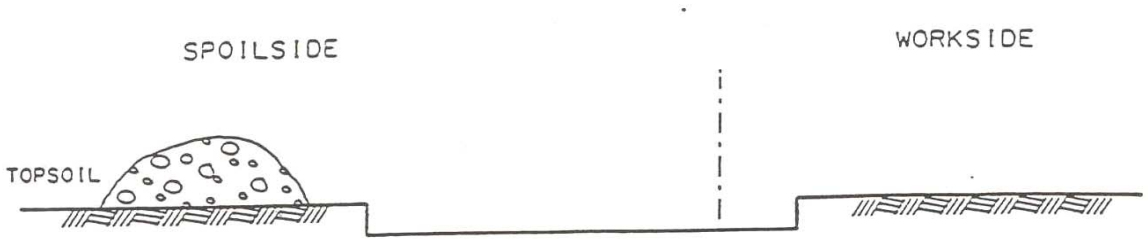
APPLICATION

1) CULTIVATED LAND AND WHERE DIRECTED ON ALIGNMENT SHEETS.
2) AT SIDE BENDS AND FOREIGN PIPELINE CROSSINGS IN CULTIVATED LAND.

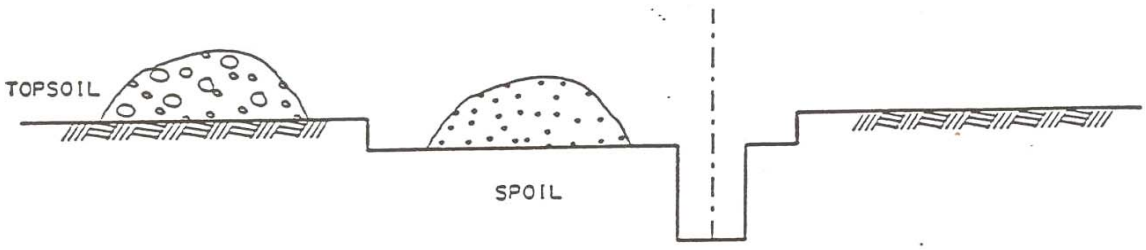
NOT TO SCALE

Title:	**Two Lift Spoil Replacement for Rocky Subsoils**	Figure: **14.0**

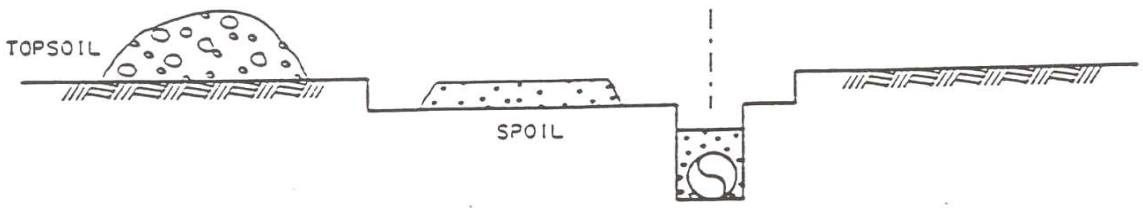
1) STRIP TOPSOIL FROM DITCH AND SPOIL SIDE



2) EXCAVATE TRENCH

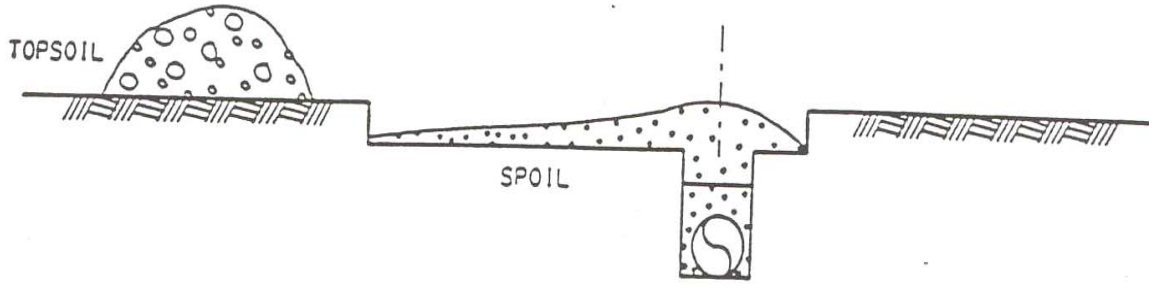


3) IF TRENCHING HAS INCLUDED AN UNACCEPTABLE AMOUNT OF LARGE ROCKS THESE WILL BE REMOVED DURING BACKFILL USING THE FOLLOWING PROCEDURE. PRIOR TO BACKFILLING THE LAST 25% OF SPOIL MATERIAL ALL ROCKS OF GREATER THAN 15cm DIAMETER MUST BE HAND PICKED

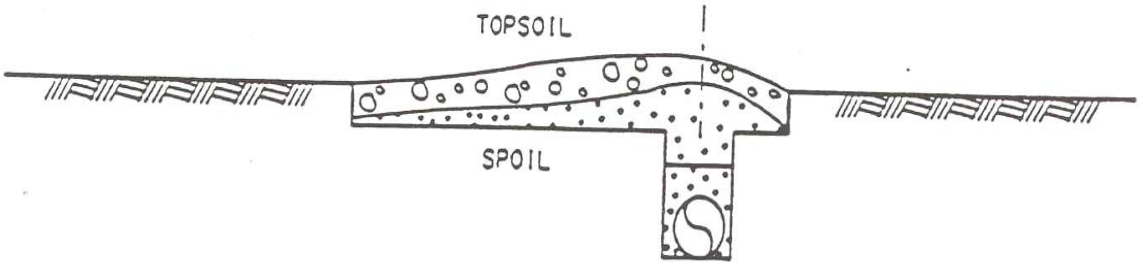


Title:	**Two Lift Spoil Replacement for Rocky Subsoils**	Figure: **14.0**

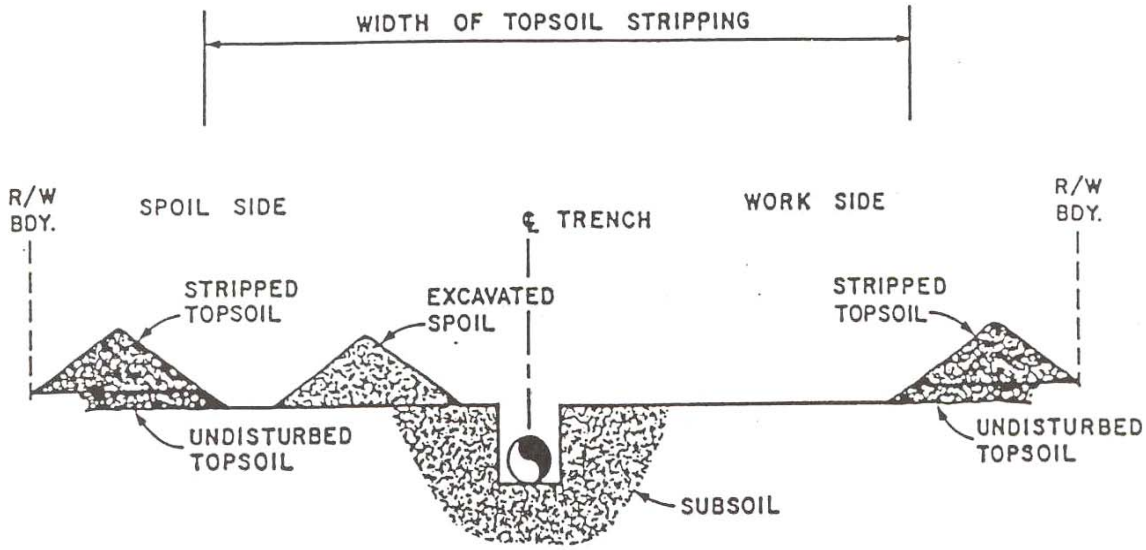
4) REPLACE REMAINING SPOIL AND CREATE A SPOIL ROACH OVER DITCHLINE. PACK THE TRENCH THEN FEATHER THE DISPLACED MATERIAL OVER THE STRIPPED AREA. HAND PICK ROCKS PRIOR TO TOPSOIL REPLACEMENT



5) REPLACE TOPSOIL AND THEN HAND PICK ROCK TO A LEVEL BETTER OR EQUAL TO THE SURROUNDING FIELD



Title:	**Trench, Spoil and Work Area Topsoil Stripping**	Figure: **15.0**

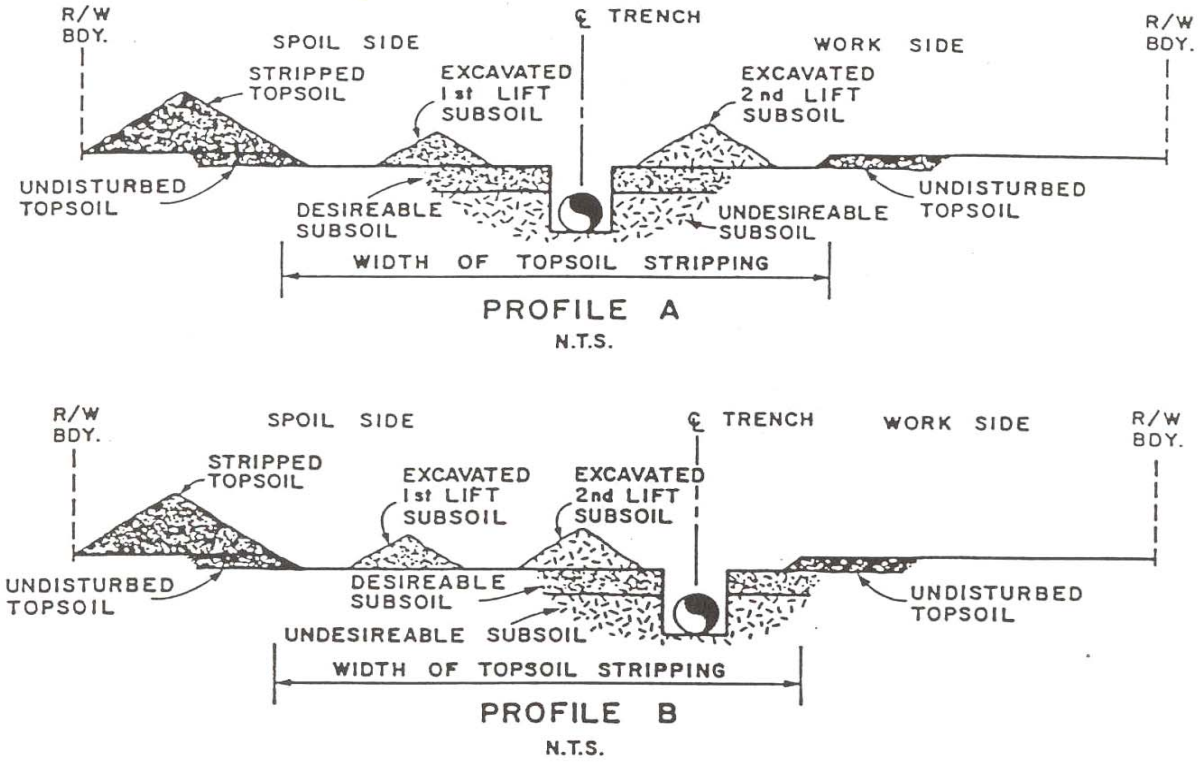


PROFILE
N.T.S.

Notes

1. Remove topsoil from the trench, spoil storage, and work areas. Store topsoil on both sides of the right of way adjacent to the stripped area.
2. Excavate trench subsoil and store on spoil side adjacent to the trench. Allow for a 1 m separation between the topsoil pile and the trench spoil.
3. Return trench spoil to trench and compact. Feather out excess spoil over stripped area leaving a low roach centered over the trench. Rip or cultivate to reduce compaction and restore soil permeability capacity of clay rich subsoils.
4. Return topsoil evenly over the stripped area after trench has sufficiently settled or has been compacted.
5. Restore topsoil to seedbed condition, over entire right of way.

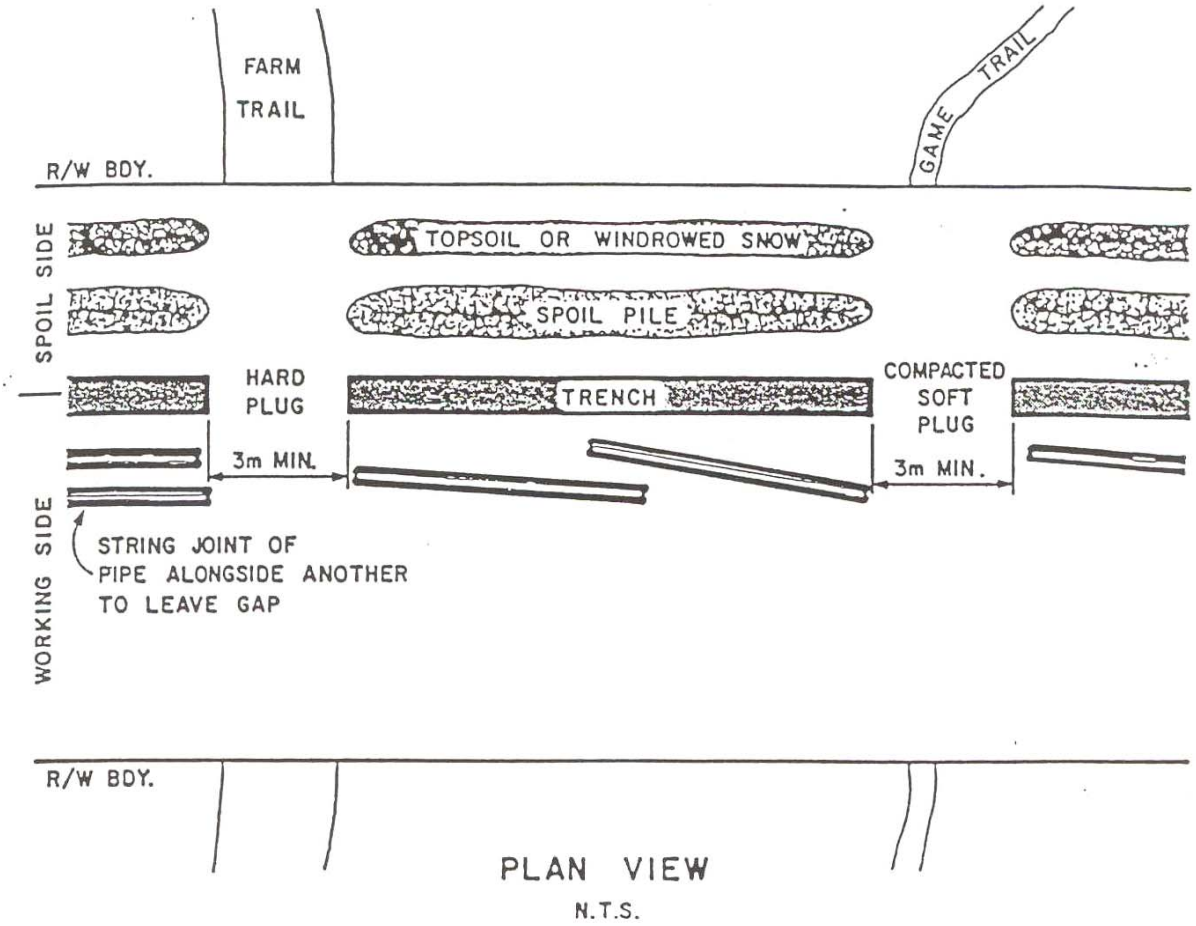
Title:	**Three Phase Soil Handling**	Figure: **16.0**



Notes (Potential Application Under Certain Circumstances)

1. Remove topsoil from over the trench and under the spoil piles. Stripped width will be approximately 7-9 m. Store topsoil on spoil side adjacent to stripped area.
2. Excavate first lift of desireable trench subsoil and store on spoil side either adjacent to the trench (a) or back far enough to accommodate storage of second subsoil lift (b). Allow for a 1 m separation between the topsoil pile and the trench spoil.
3. Excavate second lift of undesireable trench subsoil and store adjacent to the trench either on the work side (a) or the spoil side (b). Allow for a 1 m separation between the two trench spoil piles (b) or the second lift spoil pile and the undisturbed topsoil on the work side (a).
4. Return second lift trench spoil to the trench and compact.
5. Return first lift trench spoil to the trench and compact. Feather out excess first lift spoil over the stripped area. Alleviate compaction of clay rich subsoils over the stripped area.
6. Return topsoil evenly over the stripped area after trench has sufficiently settled or has been compacted.
7. On cultivated lands, alleviate compaction of topsoil over entire right of way.

Title:	**Gaps in Pipe Stringing**	Figure: **17.0**

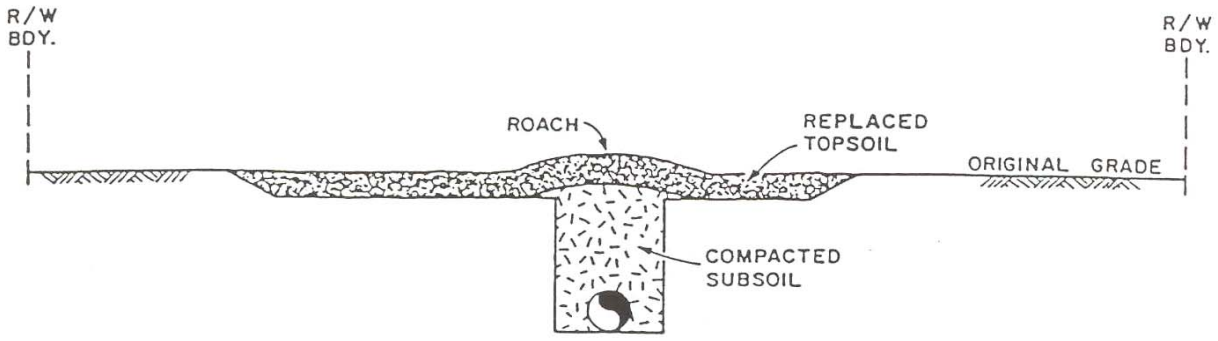


Notes

1. Leave gaps in pipe stringing to permit vehicular access or movement of livestock and wildlife across the right of way.

2. Gaps in strung pipe should coincide with gaps left in snow berms, topsoil, and spoil piles, and with hard and soft plugs in trench.

Title:	**Roaching the Trench**	Figure: **18.0**



PROFILE

N.T.S.

Notes

1. Roach the trench to compensate for settlement and changes in natural drainage patterns. The height of the roach depends upon land use, the degree of compaction achieved, and soil frost. Frozen soils required higher roached than non-frozen soils. In agricultural lands, including forested lands in the yellow ares, the roach should be low and wide (unfrozen case) to facilitate topsoil replacement. A higher roach is acceptable on forested land provided drainage and wildlife are unaffected. Typical values for roaching of representative soil types are presented below. The higher numbers in the range represent the worst case (frozen or clods).

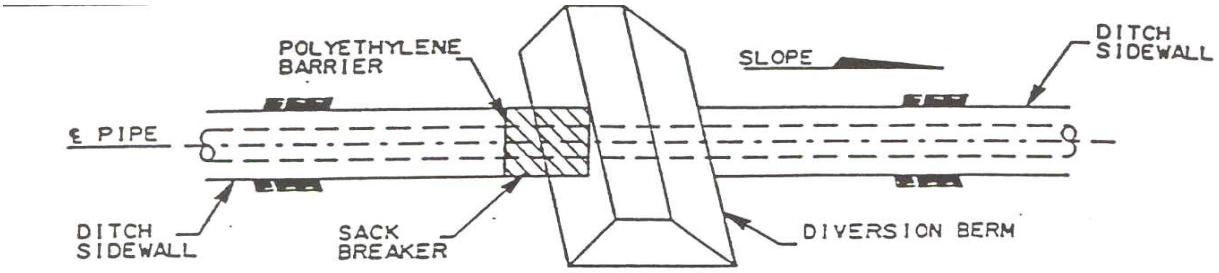
Type of Backfill	Swell Coefficient (r)
blasted rock	.00 - .05
sand & gravel	.05 - .10
sand	.08 - .15
silty sand	.10 - .15
silt	.10 - .20
clay	.10 - .25
organic (muskeg)	.50 - 1.00

$R = r \times D$ where R = height of roach
r = swell coefficient
D = depth of trench

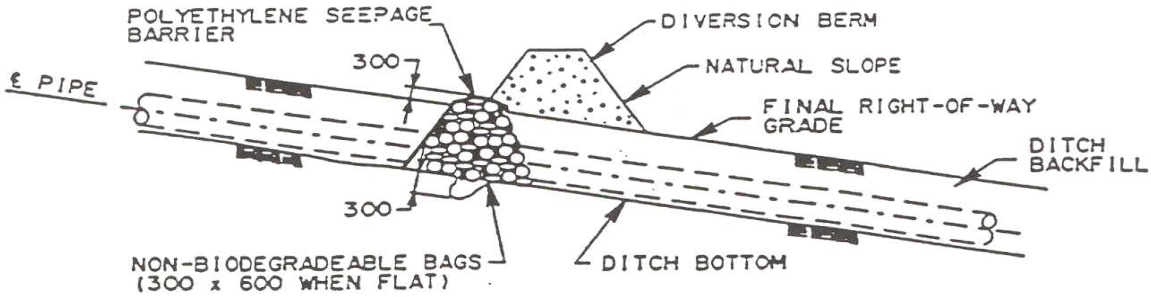
2. Leave periodic gaps in roach (eg., 250 m), at all obvious drainage courses and at trench breakers. These gaps may require maintenance the following year to fill in settled areas.
3. Replace topsoil evenly after trench has settled of has been compacted.

Source: Formula adapted from Transcanada Pipelines, 1979.

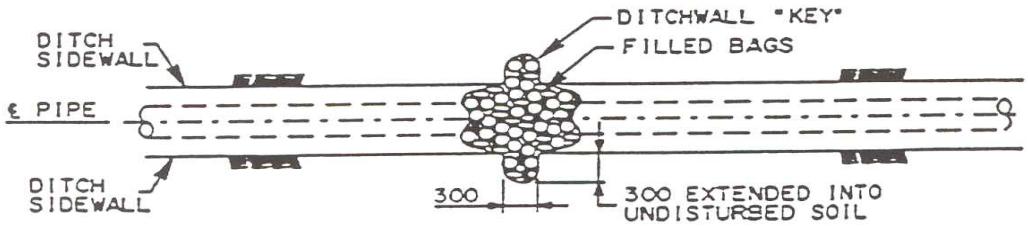
Title:	**Typical Sack Breaker**	Figure: **19.0**



PLAN
N.T.S.



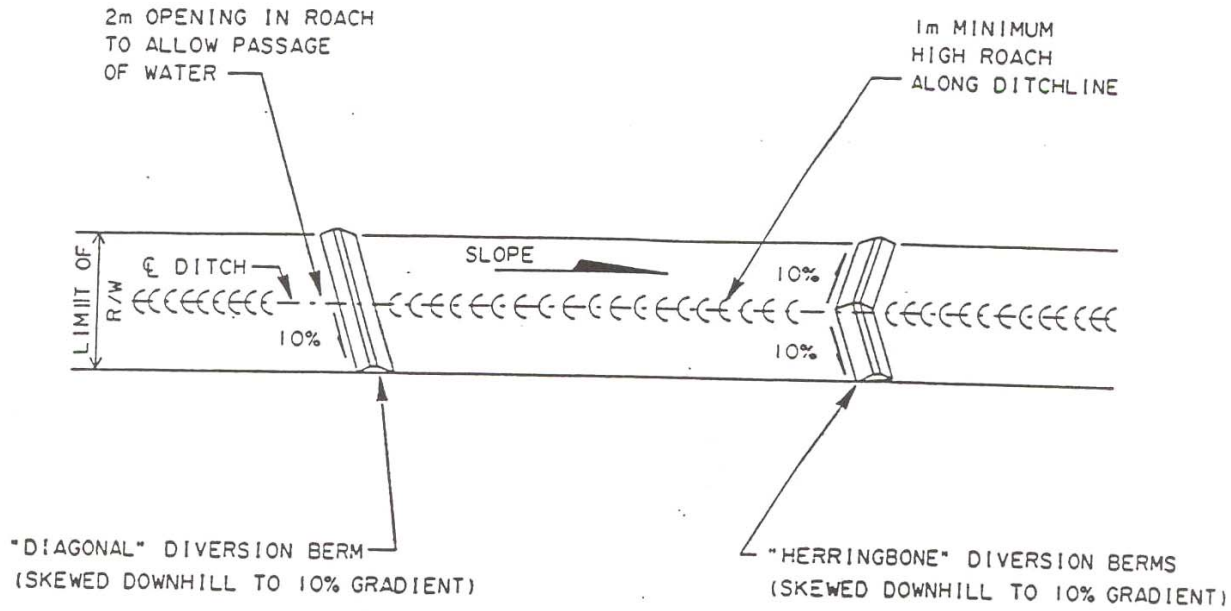
TYPICAL SECTION
N.T.S.



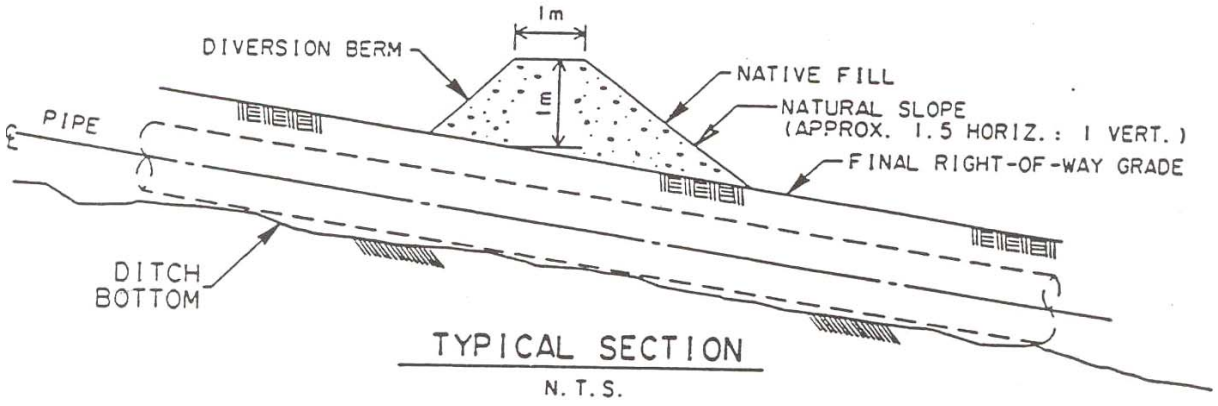
INSTALLATION DETAIL
N.T.S.

1) ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2) SACK BREAKERS ARE TO BE INSTALLED ONLY AT LOCATIONS WHERE STANDARD BENTONITE DITCH PLUGS ARE NOT AVAILABLE OR WHERE EXCESSIVE WATER FLOW DOWN THE DITCH LINE MAKES BENTONITE DITCH PLUG INSTALLATION DIFFICULT.
3) BAGS ARE TO BE MADE OF A NON-BIODEGRADABLE MATERIAL AND FILLED WITH MINERAL SOIL (CLAY, SILT, AND SAND), THEN FITTED TOGETHER IN SUCH A WAY AS TO PRODUCE A STABLE IMPERVIOUS BARRIER. A SHEET OF 12 MIL. POLYETHYLENE PLASTIC SHOULD BE PLACED ON THE UPHILL FACE OF THE SACK BREAKER TO ENSURE SEEPAGE IS FORCED TO THE SURFACE.

Title:	**Typical Diversion Berms**	Figure: **20.0**



PLAN
N.T.S.



TYPICAL SECTION
N.T.S.

Title:	**Typical Diversion Berms**	Figure: **20.0**

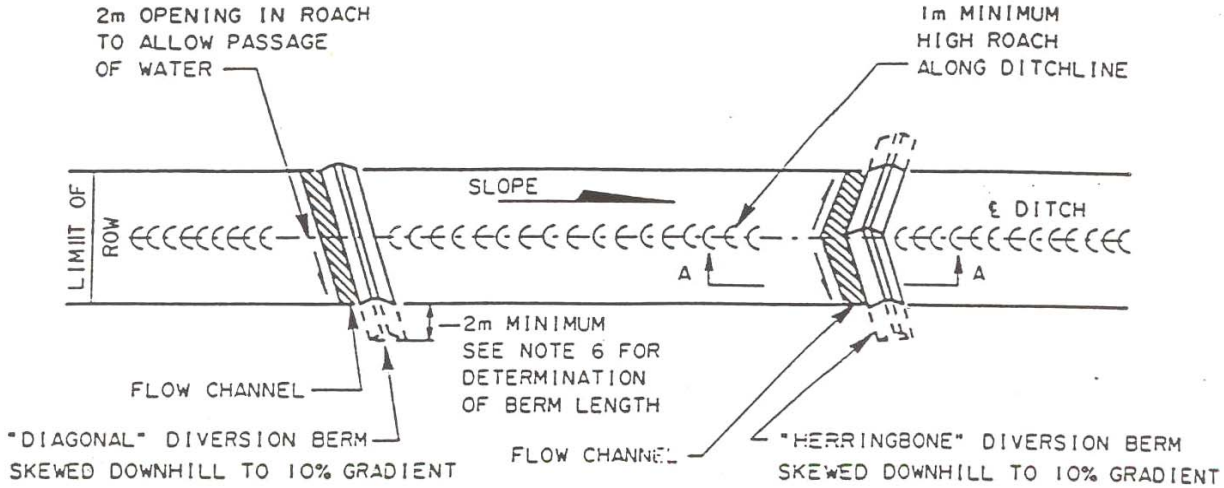
NOTES:

1) ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2) "DIAGONAL" DIVERSION BERMS ARE USED:
   -WHERE THE EXISTING TOPOGRAPHY AND SLOPE DRAINAGE SUGGEST A PREFERRED DIRECTION OF SURFACE WATER MOVEMENT.
3) "HERRINGBONE" DIVERSION BERMS ARE TO BE USED:
   -WHERE THERE IS NO APPARENT PREFERRED DIRECTION OF SURFACE WATER MOVEMENT OR WHERE THE BERM IS LOCATED ACROSS A SLOPE WITH SIDE CUTS ON BOTH SIDES OF THE RIGHT-OF-WAY.
4) ALL BERMS SHALL BE CONSTRUCTED OF NATIVE MINERAL SOIL NOMINALLY COMPACTED IN LIFTS. NO ORGANICS, SNOW, ICE OR OTHER DELETERIOUS MATERIAL SHALL BE INCORPORATED IN THE BERM FILL.
5) THE LENGTH OF THE BERMS SHALL EXTEND ACROSS THE FULL WIDTH OF THE DISTURBED RIGHT-OF-WAY OR TO THE TOE OF THE CUT SLOPE.
6) THE FINAL LOCATION, SPACING AND DIRECTION OF THE BERMS ARE TO BE DETERMINED DURING CONSTRUCTION BY THE FIELD INSPECTOR BASED ON LOCAL TOPOGRAPHY AND DRAINAGE PATTERNS.

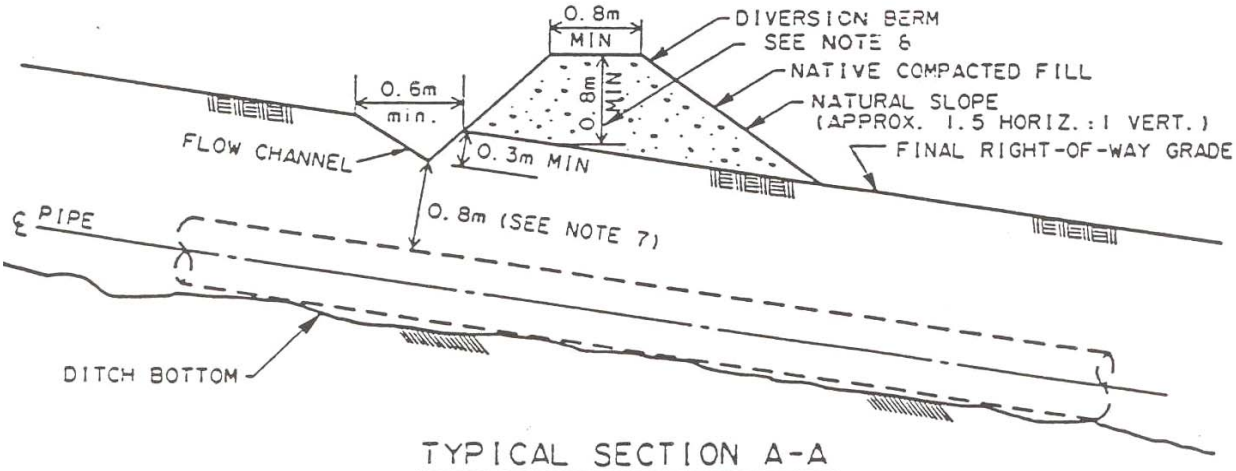
TYPICAL DIVERSION BERM SPACING

SLOPE	SOIL EROSION POTENTIAL		
	HIGH (FINE SANDS AND SILTS)	MODERATE (CLAYS AND COARSE SANDS)	LOW (GRAVEL AND EXPOSED BEDROCK)
GENTLE (UNDER 5%)	45m	60m	NO WATERWAYS NECESSARY
MODERATE (5%-10%)	30m	45m	60m
STEEP (OVER 10%)	$\frac{305}{\%\ GRADE}$ = ____m	$\frac{305 \times 1.5}{\%\ GRADE}$ = ____m	$\frac{305 \times 2}{\%\ GRADE}$ = ____m

Title:	**Diversion Berm With Flow Channel**	Figure: **21.0**



PLAN
N.T.S.



TYPICAL SECTION A-A
N.T.S.

Title:	**Diversion Berm With Flow Channel**	Figure: **21.0**

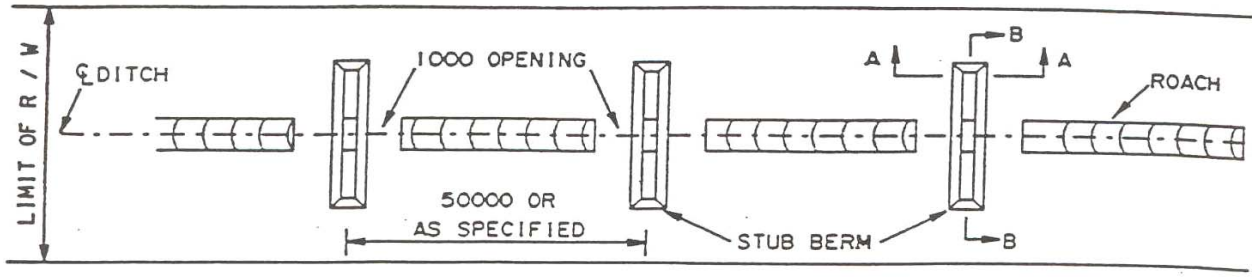
NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.
2. DIVERSION BERMS WITH FLOW CHANNELS ARE APPROPRIATE TO USE ON STEEP SLOPES DURING SUMMER CONSTRUCTION
3. "DIAGONAL" DIVERSION BERMS ARE USED WHERE THE EXISTING TOPOGRAPHY AND SLOPE DRAINAGE SUGGEST A PREFERRED DIRECTION OF SURFACE WATER MOVEMENT.
4. "HERRINGBONE" DIVERSION BERMS ARE USED WHERE THERE IS NO APPARENT PREFERRED DIRECTION OF SURFACE WATER MOVEMENT ACROSS A SLOPE WITH SIDE CUTS ON BOTH SIDES OF THE RIGHT-OF-WAY.
5. ALL BERMS SHALL BE CONSTRUCTED WITH NATIVE MINERAL SOIL NOMINALLY COMPACTED IN LIFTS. NO ORGANICS, SNOW, ICE OR OTHER DELETERIOUS MATERIAL SHALL BE INCORPORATED IN THE BERM.
6. BERMS SHALL EXTEND ACROSS THE FULL WIDTH OF THE DISTURBED RIGHT-OF-WAY OR TO THE TOE OF THE CUT SLOPE. IN ORDER TO PREVENT WATER FROM FLOWING BACK ONTO THE RIGHT-OF-WAY, THE BERMS SHALL BE EXTENDED A MINIMUM DISTANCE OF 2 METRES BEYOND THE EDGE OF THE CLEARED RIGHT-OF-WAY PROVIDED NECESSARY LAND APPROVALS HAVE BEEN OBTAINED.
7. A 0.3 METRE DEEP FLOW CHANNEL SHALL BE EXCAVATED ALONG THE BASE OF THE UPHILL FACE OF THE DIVERSION BERM ONLY IF A MINIMUM OF 1.1 METRES OF PIPE COVER EXISTS PRIOR TO EXCAVATION. IF INSUFFICIENT COVER EXISTS, INSTALL TYPICAL DIVERSION BERM SK-1390.
8. THE BERM HEIGHT SHALL BE INCREASED TO 1.0 METRE AT DITCHLINE.
9. THE FINAL LOCATION, SPACING, AND DIRECTION OF THE BERMS SHALL BE DETERMINED DURING CONSTRUCTION BASED ON LOCAL TOPOGRAPHY AND DRAINAGE PATTERNS.

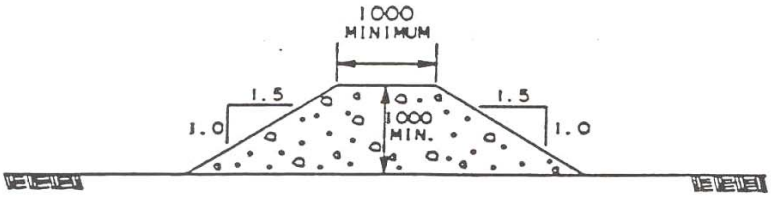
TYPICAL DIVERSION BERM SPACING

SLOPE	SOIL EROSION POTENTIAL		
	HIGH (FINE SANDS AND SILTS)	MODERATE (CLAYS AND COARSE SANDS)	LOW (GRAVEL AND EXPOSED BEDROCK)
GENTLE (UNDER 10%)	NO DIVERSION BERM NECESSARY	NO DIVERSION BERM NECESSARY	NO DIVERSION BERM NECESSARY
MODERATE (10%-20%)	30m	45m	60m
STEEP (OVER 20%)	$\frac{600}{\%\ \text{GRADE}}$ = _____m	$\frac{900}{\%\ \text{GRADE}}$ = _____m	$\frac{1200}{\%\ \text{GRADE}}$ = _____m

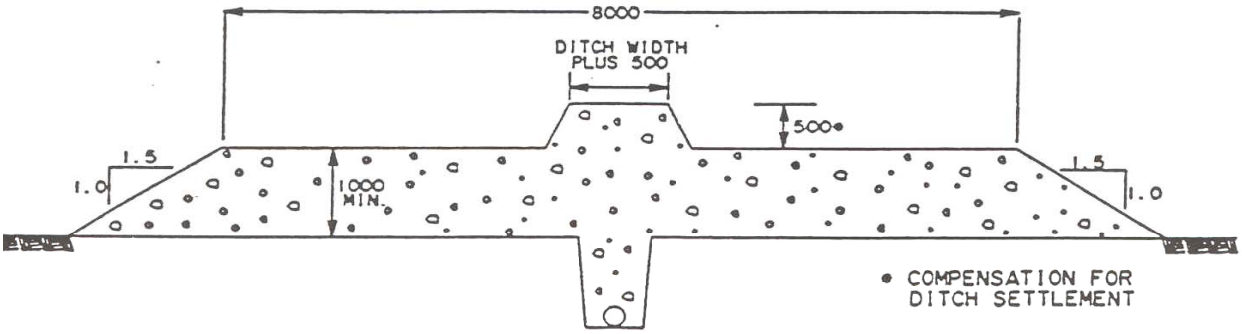
Title:	**Typical Stub Berm**	Figure: **22.0**



PLAN (NTS)



SECTION A NTS



SECTION B NTS

NOTES:

1) ALL DIMENSIONS ARE IN MILLIMETRES.

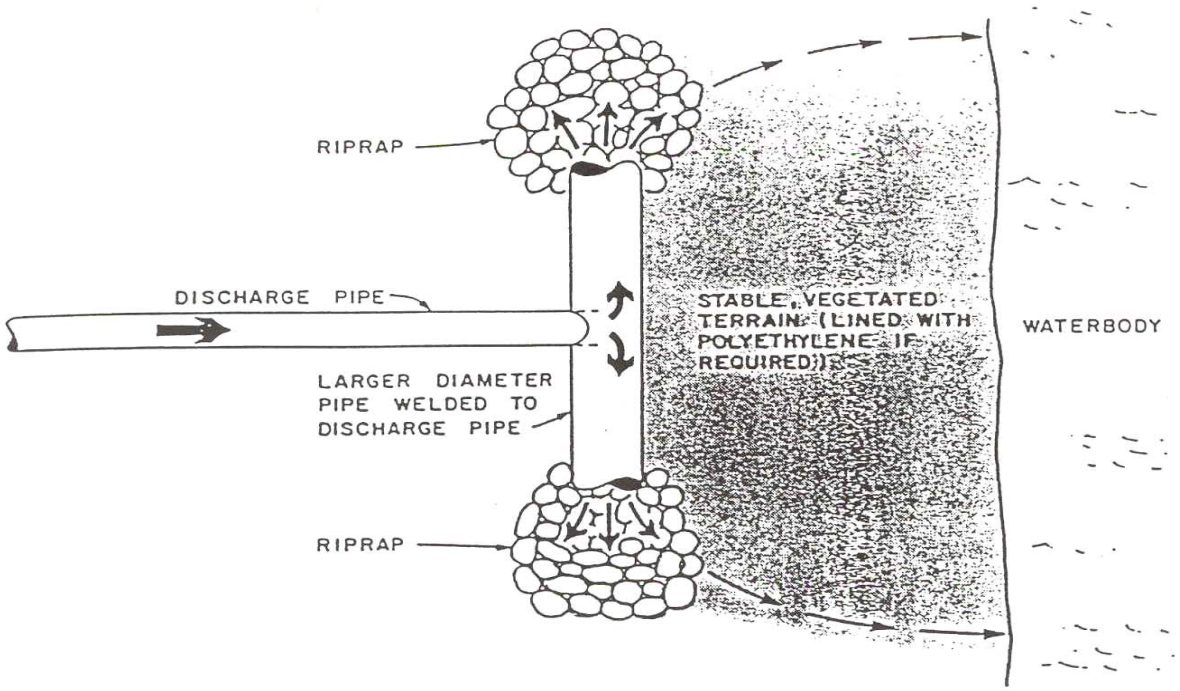
2) STUB BERMS SHALL CONSIST OF NATIVE MINERAL SOIL NOMINALLY COMPACTED IN 300mm LIFTS USING HEAVY CONSTRUCTION EQUIPMENT. ORGANICS, SNOW, ICE OR OTHER DELETERIOUS MATERIAL SHALL NOT BE INCORPORATED IN THE BERM FILL.

3) STUB BERMS SHALL BE PLACED PERPENDICULAR TO THE PIPE CENTERLINE.

4) AREAS OF APPLICATION FOR STUB BERMS:
STUB BERMS ARE USED FOR THE CONTROL OF SURFACE FLOWS ALONG PIPELINE RIGHT-OF-WAY IN LOW LYING SWAMPY TERRAIN.

5) THE FINAL LOCATION AND SPACING OF THE STUB BERMS WILL BE DETERMINED AT THE TIME OF CONSTRUCTION.

Title:	**Energy Dissipator**	Figure: **23.0**

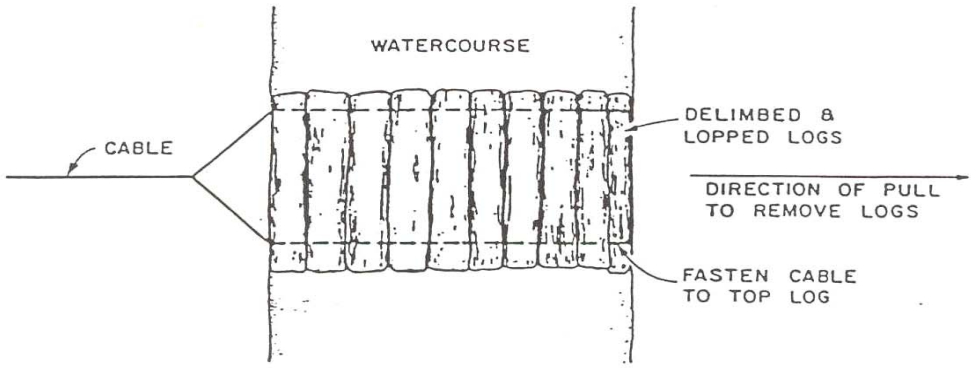


PROFILE
N.T.S.

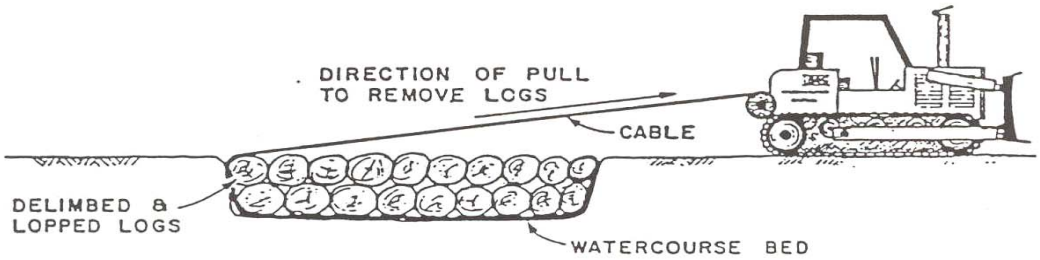
Notes

1. Dissipate the energy of water discharge during dewatering to prevent soil erosion and damage to the beds and banks of waterbodies. Erosive energy can be dissipated as shown above or by other methods including: arcing pipe into the air; using a muffler-style energy dissipator; directing the flow at swamp mats, plywood or rock riprap. Choice of the most appropriate method depends upon volume and pressure of discharge water. Many kilometres of large diameter pipe will necessitate a more robust method than a short length of small diameter pipe. If surging is anticipated, utilize a robust method.
2. Ensure that discharge pipe is free of leaks.
3. Dewater at rate used to withdraw water. If erosion control measures are found to be inadequate, lower the dewatering rate or stop operations until satisfactory measures are in place.
4. Anchor the discharge pipe to prevent bouncing or snaking during surging.

Title:	**Vehicle Crossing - Logfill**	Figure: **24.0**



PLAN VIEW
N.T.S.



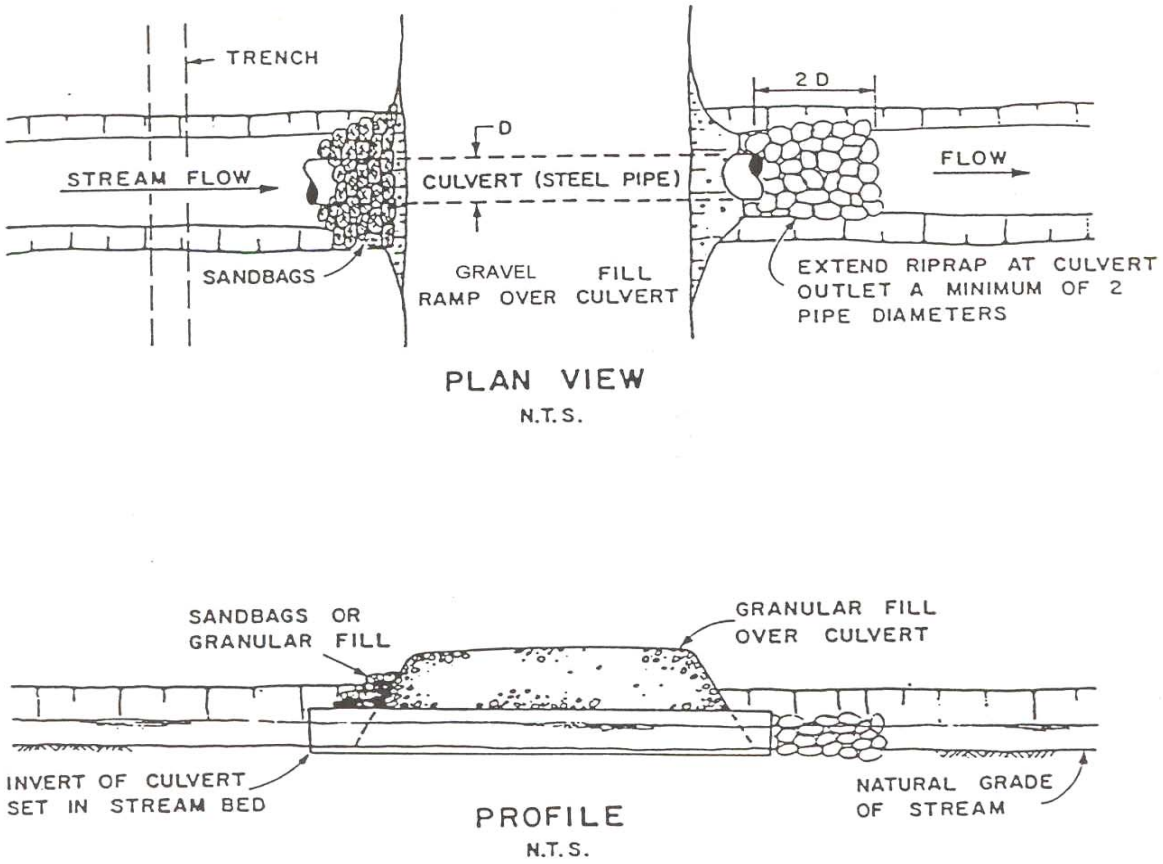
PROFILE
N.T.S

Notes

1. Utilize logfill to provide vehicular access across small watercourses with square or v-shaped channels to minimize sedimentation and stream bed disturbance. Logfills are not appropriate where fish passage is required. Logfill should not impede flow or cause flooding. A variation of the logfill method use is of a pre-fabricated swamp mat.
2. Install cable under the logs or cable logs together to facilitate removal.
3. Add compacted snow if necessary to bring up to grade. If soil is used, install a filter fabric or equivalent to prevent soil from entering watercourse.
4. Remove crossing at completion of construction and prior to spring break-up.

Source: Adapted from Peace Pipe Line Ltd., 1983.

Title:	**Vehicle Crossing – Culvert**	Figure:: **25.0**



Notes

1. Use culverts to allow vehicles to cross relatively narrow watercourses where sedimentation must be minimized or fish passage allowed.
2. The following guidelines apply to culverts where fish passage (i.e., spawning migration) is required while culverts are in place: minimum water depth of 0.2 m; maximum average water velocity of 0.5 m/s for warm water species and 0.9 m/s for cold water species; culvert sized to handle 1:25 year peak flow and to ensure that maximum allowable water velocities are not exceeded for more than 3 days during 1:10 year design flood; and minimum culvert diameter is 1 m.
3. Place culvert inverts below the natural grade line of stream at an angle which does not exceed normal stream gradient. Depth of placement is dependent upon bed type, culvert size and expected flow conditions.
4. Remove temporary culverts and ramp material as soon as no longer required; remove culvert and ramp prior to spring break-up.
5. Restore and stabilize stream bed and banks.

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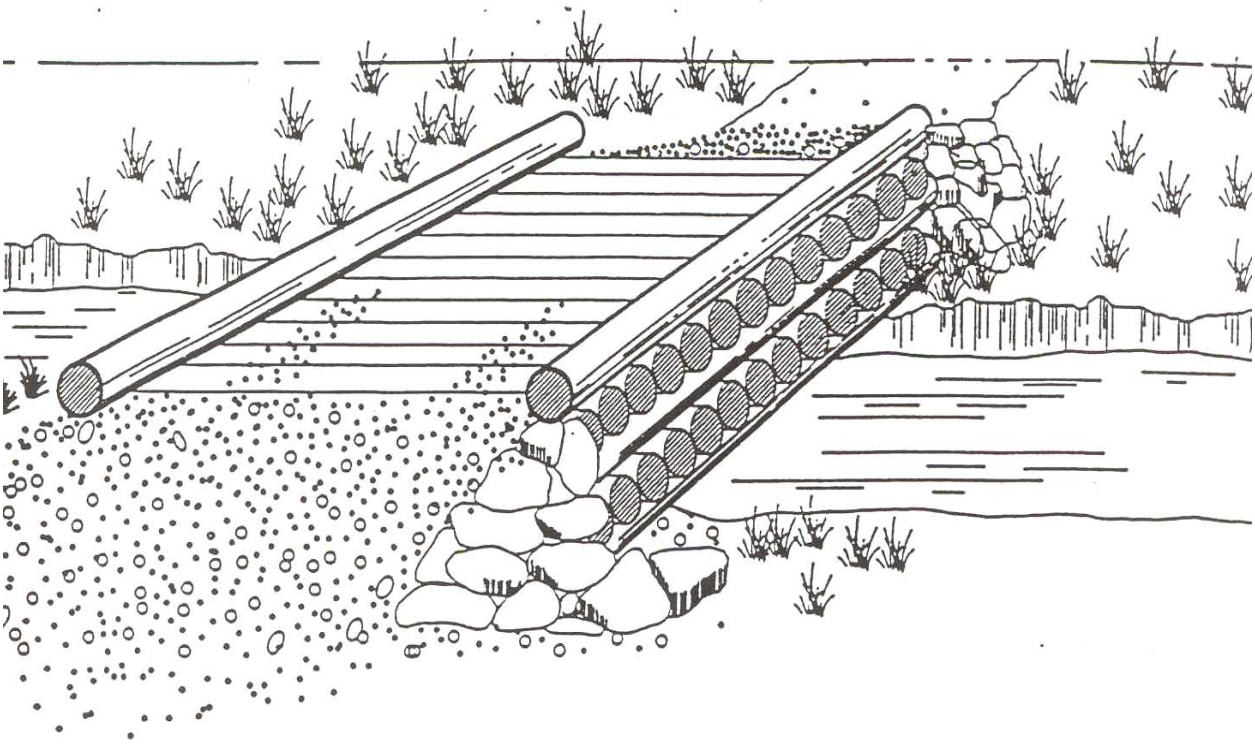
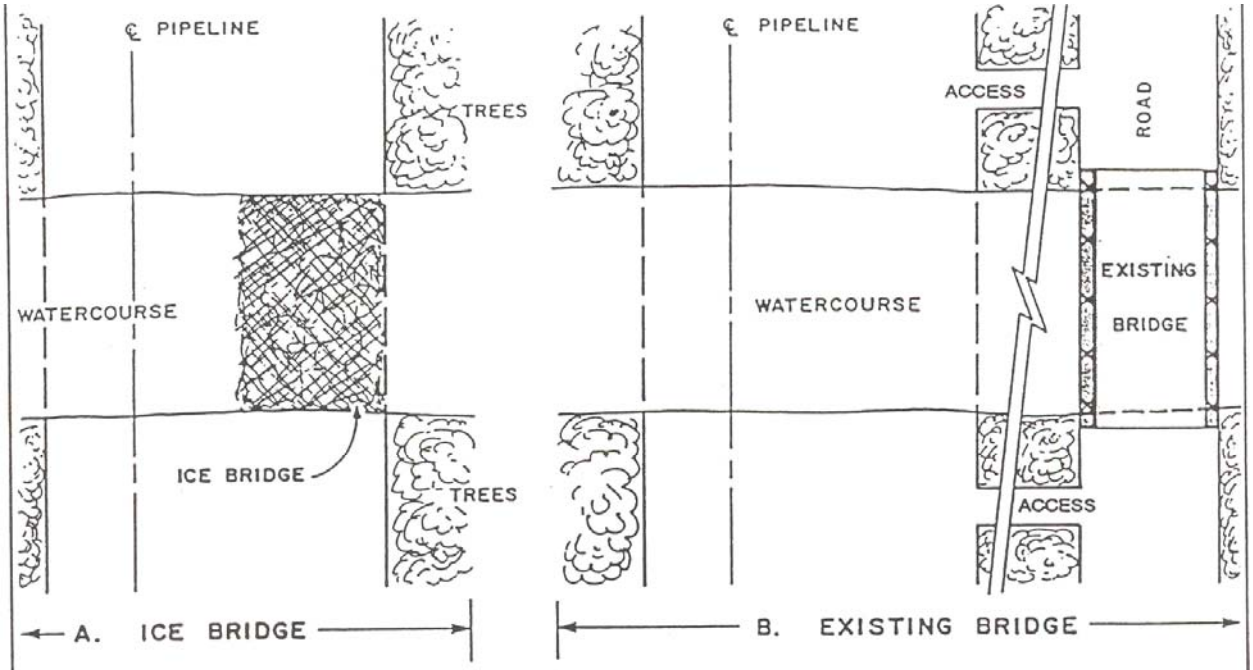
Title:	**Timber Bridge for Small Streams**	Figure: **26.0**



NOTES:

1) CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF THE TIMBER OR PORTABLE BRIDGE OR OTHER STRUCTURE CONSISTENT WITH REGULATORY CONDITIONS OF APPROVAL. CONSTRUCTION OF THE BRIDGE MUST BE DONE IN A SAFE AND APPROPRIATE MANNER.
2) CARE MUST BE TAKEN TO MINIMIZE DISTURBANCE TO STREAM BANK AND VEGETATION WHEN INSTALLING AND USING THE BRIDGE.
3) AN IMPERMEABLE MEMBRANE SUCH AS PLASTIC SHEETING OR PLYWOOD MAY BE REQUIRED TO PREVENT DIRT AND DEBRIS ENTERING INTO THE STREAM.
4) CLEAN GRAVEL WILL BE USED FOR RAMPING

Title:	**Ice Bridge and Existing Bridge**	Figure: **27.0**



PLAN VIEW
N.T.S.

Notes

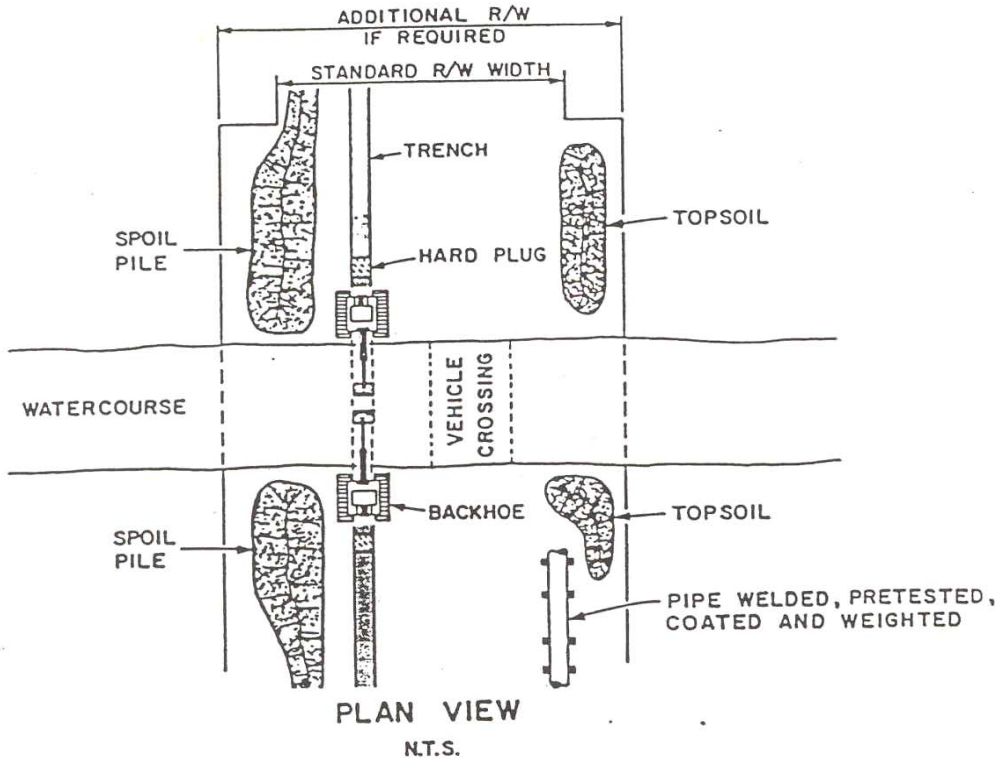
a. Ice Bridge

1. Use ice bridges on winter projects when a safe ice thickness can be maintained.
2. Locate ice bridges at sites with gently sloping banks to minimize cuts in watercourse banks. Use snow and ice to slope approaches, rather than cut banks.
3. Flood ice surface with water and cover with snow to increase load bearing capacity. Logs may be used as a base to strengthen the bridge. Ice bridge should not impede flow. Remove logs and breach ice bridge by physical means prior to spring break-up.
4. Restore and stabilize stream banks and approaches.

b. Existing Bridges

1. Use existing bridge to prevent sedimentation of watercourse, bank disturbance, and alteration of stream beds caused by vehicles crossing the watercourse.
2. Locate access roads as far from watercourse as practical to minimize clearing and grading in proximity to watercourse.
3. Restore access roads as part of the main right of way clean up.

Title:	**Wet Crossing**	Figure: **28.0**



Notes

1. Use a wet crossing when control of sedimentation is not a major concern.
2. Schedule construction during low flow period and the appropriate timing window to minimize fisheries impacts. Check the weather forecast and postpone construction if it is probable that heavy rains or run-off will occur over the proposed crossing period.
3. Obtain permission and stake extra right of way if required. Keep vehicles within stakes.
4. Install vehicle crossing if required during clearing so that no vehicles need ford the watercourse.
5. Stop trenching activities short of watercourse banks. Retain hard plugs as long as possible.
6. Pipe should be welded, pre-tested, coated and weighted prior to initiating pipe installation.
7. Trench through watercourse, maintaining hard plugs at each bank until just prior to pipe installation. If necessary to control water flow and trench sloughing, install temporary soft plugs and dewater trench onto stable vegetated land, not directly to watercourse. Work from both banks and pile spoil on land if possible. Lower in pipe and backfill immediately. Trenching and backfilling should be completed in the same day if possible. Utilize two backhoes if necessary to expedite the crossing.
8. Remove vehicular crossing, restore banks to original condition, and stabilize as required.

Title:	**Dam and Pump Procedures for Stream Crossings**	Figure: **29.0**

PROCEDURE:

1) INSTALL THE VEHICLE CROSSING ON THE WORK SIDE EDGE OF THE ROW TO ALLOW FOR A WIDE EXCAVATION.

2) STOCKPILE ALL REQUIRED MATERIALS AND EQUIPMENT ON THE SITE PRIOR TO BEGINNING INSTREAM WORK.

3) PERFORM THE BANK GRADE AND PREPARE SPOIL CONTAINMENT SUMPS AS CIRCUMSTANCES DICTATE.

4) COMPLETE WELDING, COATING, AND WEIGHTING OF THE RIVER PIPE SECTION.

5) BEGIN THE OPERATION IN THE EARLY MORNING TO ALLOW FOR SAME DAY INSTALLATION IF POSSIBLE.

6) INSTALL PUMPS AND CHECK OPERATION TO EQUALIZE FLOW.

7) CONSTRUCT THE SPOIL SIDE DAM USING TECHNIQUES SPECIFIED ELSEWHERE IN THIS MANUAL. DAM SHOULD BE CONSTRUCTED ON THE SPOIL SIDE EDGE OF THE ROW TO ALLOW FOR A WIDE EXCAVATION.

8) PLUG THE VEHICLE CROSSING CULVERT OR CONSTRUCT THE DOWNSTREAM DAM USING SASKENERGY TECHNIQUES. WHERE A BRIDGE IS USED, THE DAM SHOULD BE CONSTRUCTED AS CLOSE TO THE SPOIL SIDE OF THE BRIDGE AS POSSIBLE TO ALLOW FOR A WIDE EXCAVATION.

9) EXCAVATE TRENCH AS RAPIDLY AS POSSIBLE.

10) INSTALL PIPE.

11) BACKFILL THE STREAM CHANNEL FIRST PUSHING THE SILTED WATER BACK INTO THE BANK EXCAVATIONS. PUMP OR DRAIN THE BANK EXCAVATIONS WHILE PROGRESSIVELY BACKFILLING FROM THE STREAM CHANNEL OUTWARD. CONSTRUCT WATER CONTAINMENT SUMPS IF NECESSARY.

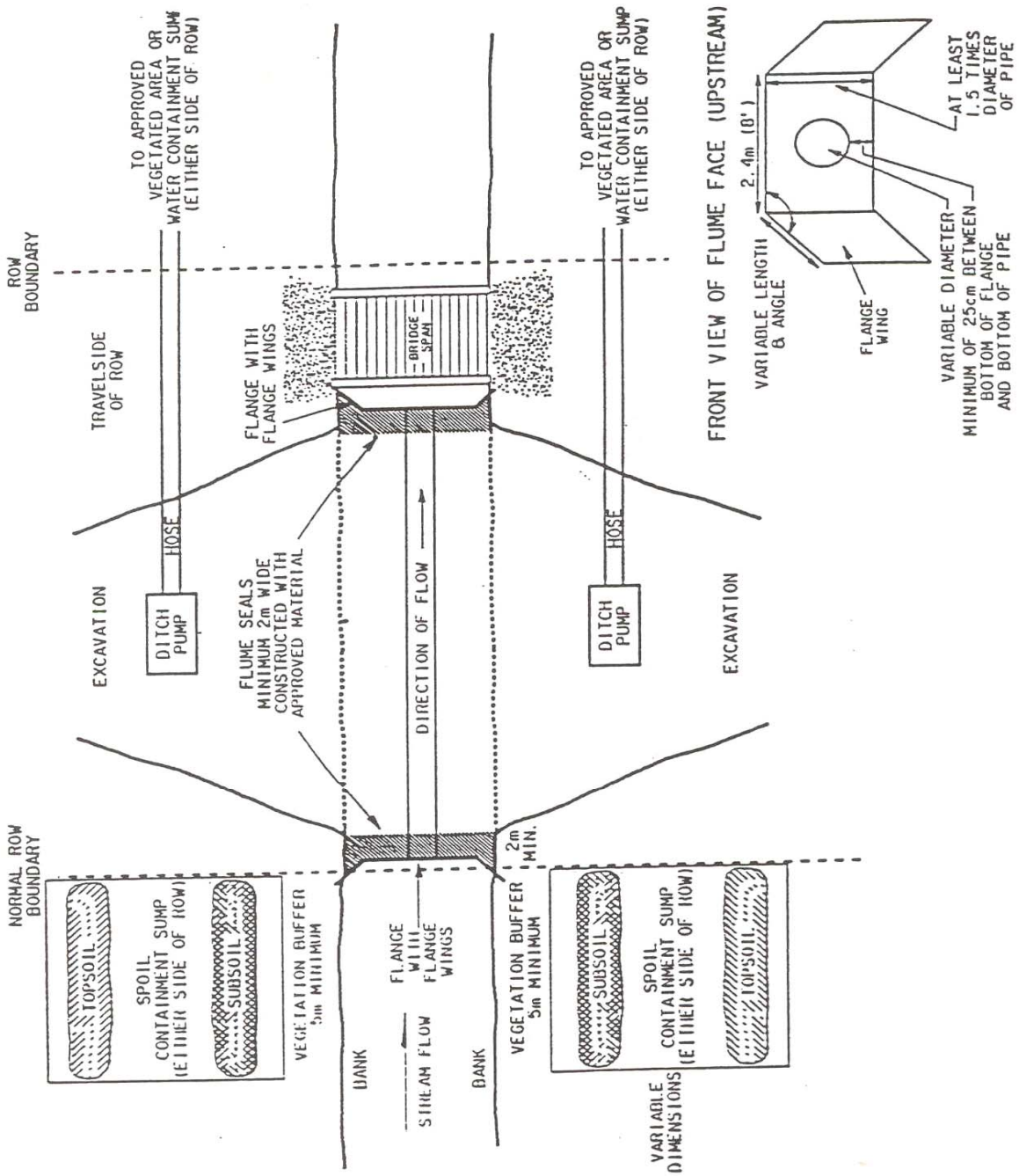
12) RESTORE BED AND BANKS OF THE STREAM CHANNEL.

13) REMOVE THE DOWNSTREAM DAM OR VEHICLE CROSSING PLUG.

14) REMOVE UPSTREAM DAM OR VEHICLE CROSSING PLUG.

15) REMOVE BYPASS PUMPS.

Title:	**Flume Watercourse Crossing**	Figure: **30.0**



Title:	**Flume Watercourse Crossing**	Figure: **30.0**

APPLICATION:

FLUME OPERATIONS WILL BE REQUIRED ON STREAMS WHERE FLOW MUST BE MAINTAINED AND SILTATION MUST BE MINIMIZED TO PREVENT IMPACT ON FISH POPULATIONS AND DOWNSTREAM USERS. FLUME INSTALLATIONS WILL ALSO BE CONSIDERED WHERE MAINTENANCE OF FLOW IS THE ONLY REQUIREMENT.

THE FOLLOWING SPECIFICATION AND PROCEDURES ARE GENERAL REQUIREMENTS FOR INSTALLATION OF FLUMED WATER COURSE CROSSINGS.

SPECIFICATIONS:

1) FLUMING OPERATIONS WILL BE COMBINED WITH A BRIDGED VEHICLE CROSSING. CULVERT AND GRADE INSTALLATIONS WILL BE CONSIDERED FOR STREAMS HAVING A LOWER SENSITIVITY.

2) FLUME LENGTH WILL BE SPECIFIED BY SASKENERGY TO SPAN FROM THE SPOIL SIDE EDGE OF THE ROW TO THE SPOIL SIDE EDGE OF THE VEHICLE CROSSING OR TO THE WORK SIDE EDGE OF THE ROW IN THE CASE OF A GRADE MATERIAL VEHICLE CROSSING.

3) FLUME CAPACITY WILL BE SPECIFIED BY SASKENERGY FOR DIAMETER AND NUMBER OF PIPES REQUIRED. THE REQUIREMENTS MAY BE ADJUSTED IN THE FIELD TO ACCOUNT FOR CONDITIONS IN CONSULTATION WITH THE CONTRACTOR AND GOVERNMENT.

4) FLANGES WILL BE REQUIRED ON BOTH ENDS OF THE FLUME. THE FLANGES WILL BE CONSTRUCTED OUT OF 1/4" STEEL AND MUST BE A MINIMUM OF 4' HIGH BY 8' WIDE. REQUIREMENTS FOR LARGER FLANGES OR FLANGE WINGS WILL BE PRE-SPECIFIED OR DETERMINED BY SASKENERGY IN THE FIELD DURING CONSTRUCTION. CONTRACTOR MUST BE PREPARED TO CONSTRUCT THE FLUME ON SITE.

5) FLUMES MUST BE CONSTRUCTED OF STEEL PIPELINE TYPE PIPE OR OTHER MATERIAL APPROVED BY SASKENERGY. CORRUGATED CULVERT IS UNACCEPTABLE.

6) BOTH ENDS OF THE FLUME WILL BE SEALED USING COMBINATIONS OF INSTREAM MATERIAL, CLEAN GRAVEL MATERIAL, WASHED ROCK, PLASTIC SHEETING, FILTER CLOTH, AND SANDBAGS. IF LOOSE MATERIALS ARE USED TO CREATE THE SEALS, THE DAMS MUST BE A MINIMUM OF 2 METERS THICK AND EXTEND FROM BANK TOP TO BANK TOP OR A MINIMUM OF 1 METER ABOVE WATER LEVEL. IF SANDBAGS ARE USED TO CREATE THE SEALS, THE DAMS MUST BE A MINIMUM OF 1 METER THICK AND EXTEND FROM BANK TOP TO BANK TOP. IF PLASTIC SHEETING OR FILTER CLOTH ARE SPECIFIED, THEY MUST BE LAID OVER BOTH SIDES OF BOTH DAMS. THE CONCEPT IS TO PREVENT CLEAN SURFACE WATER FROM ENTERING THE EXCAVATION AND TO PREVENT SILTED WATER FROM LEAVING THE EXCAVATION.

7) THE CONTRACTOR MUST HAVE PUMPS OF SUFFICIENT SIZE TO PREVENT THE DOWNSTREAM FLOW OF SILTED WATER ON SITE TO PUMP THE EXCAVATION AS REQUIRED. MORE PUMPS MUST BE SUPPLIED BY THE CONTRACTOR IF NECESSARY. CONTRACTOR MUST HAVE ON SITE SUFFICIENT LEAK FREE HOSE TO PUMP THE EXCAVATION WATER TO ANY LOCATION IN PROXIMITY TO THE FLOODPLAIN OF THE CROSSING AS SPECIFIED BY SASKENERGY. THIS IS TO FACILITATE SETTLEMENT AND FILTRATION OF THE SILTED WATER BEFORE IT RE-ENTERS THE STREAM. CONTRACTOR MUST ALSO BE PREPARED TO CREATE SUMPS FOR THIS PURPOSE AS DIRECTED BY SASKENERGY. FLOW DISSIPATORS WILL BE REQUIRED AT THE DISCHARGE END OF ALL HOSES TO PREVENT FURTHER SILTATION AND EROSION.

8) CONTRACTOR WILL BE RESPONSIBLE FOR SUPPLY AND DELIVERY OF ALL MATERIALS TO THE SITE.

Title:	**Flume Watercourse Crossing**	Figure: **30.0**

PROCEDURE:

1) INSTALL THE VEHICLE CROSSING ON THE WORK SIDE EDGE OF THE ROW TO ALLOW FOR A WIDE EXCAVATION.

2) GRADE THE BANKS OF THE WATER CROSSING AND PREPARE THE SPOIL CONTAINMENT AREAS.

3) CONSTRUCT THE FLUME WITH CORRECT FLANGES AND FLANGE WINGS, AS PER THE SPECIFICATIONS.

4) STOCKPILE ALL REQUIRED MATERIALS PRIOR TO BEGINNING INSTREAM WORK.

5) COMPLETE CONSTRUCTION OF PIPE SECTION.

6) INSTALL THE FLUME IN THE STREAM CHANNEL USING SASKENERGY SPECIFIED SEALING TECHNIQUES.

7) BEGINNING IN THE EARLY MORNING, EXCAVATE THE TRENCH AS QUICKLY AS POSSIBLE PLACING SPOIL OUT OF THE STREAM CHANNEL. CREATE SPOIL CONTAINMENT SUMPS IF NECESSARY TO KEEP SPOIL FROM FLOWING BACK INTO THE STREAM CHANNEL.

8) PUMP EXCAVATION AS REQUIRED TO PREVENT DOWNSTREAM FLOW OF SILTED WATER. DIRECT THE PUMPED WATER INTO VEGETATED AREAS WELL BACK FROM THE WATERCOURSE. CONSTRUCT WATER CONTAINMENT SUMPS IF NECESSARY.

9) INSTALL PIPE.

10) BACKFILL THE STREAM CHANNEL FIRST, SQUEEZING THE SITED WATER INTO THE BANK EXCAVATIONS. PUMP OR DRAIN THE BANK EXCAVATIONS WHILE PROGRESSIVELY BACKFILLING FROM THE STREAM CHANNEL OUTWARD.

11) COMPLETE BACKFILL.

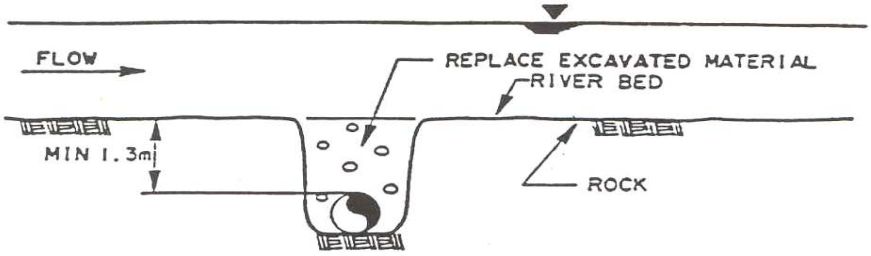
12) RE-ESTABLISH THE BED AND BANKS OF THE STREAM CHANNEL.

13) REMOVE THE DOWNSTREAM SEAL MATERIALS.

14) REMOVE UPSTREAM SEAL MATERIALS.

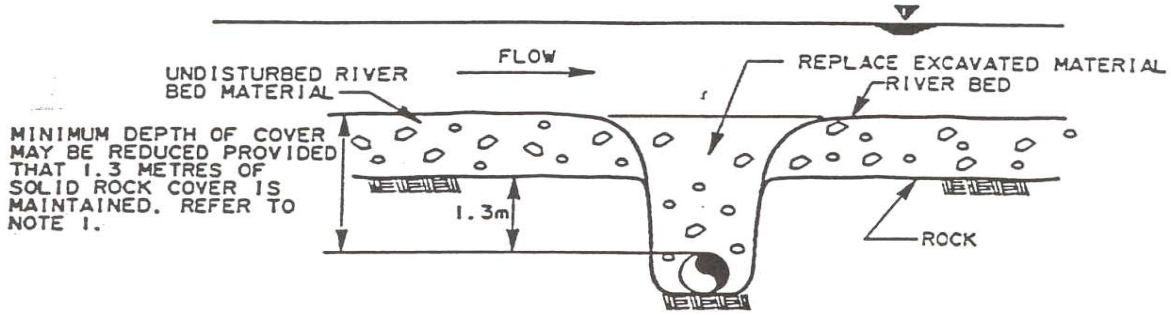
15) REMOVE THE FLUME.

Title:	**Pipeline Burial In Active Streams**	Figure: **31.0**



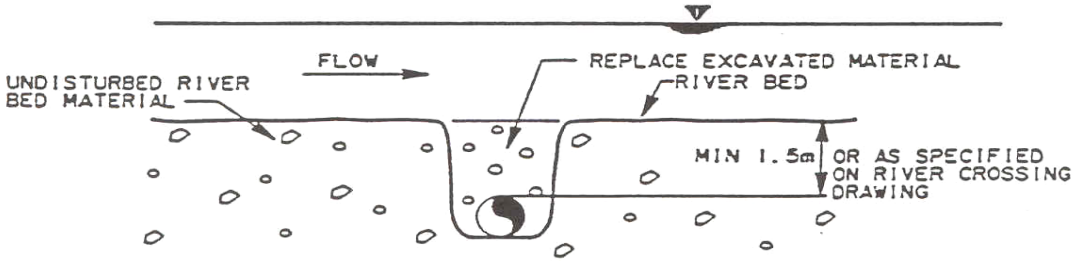
CASE A - ROCK AT RIVER BED

N.T.S.



CASE B - ROCK BELOW RIVER BED

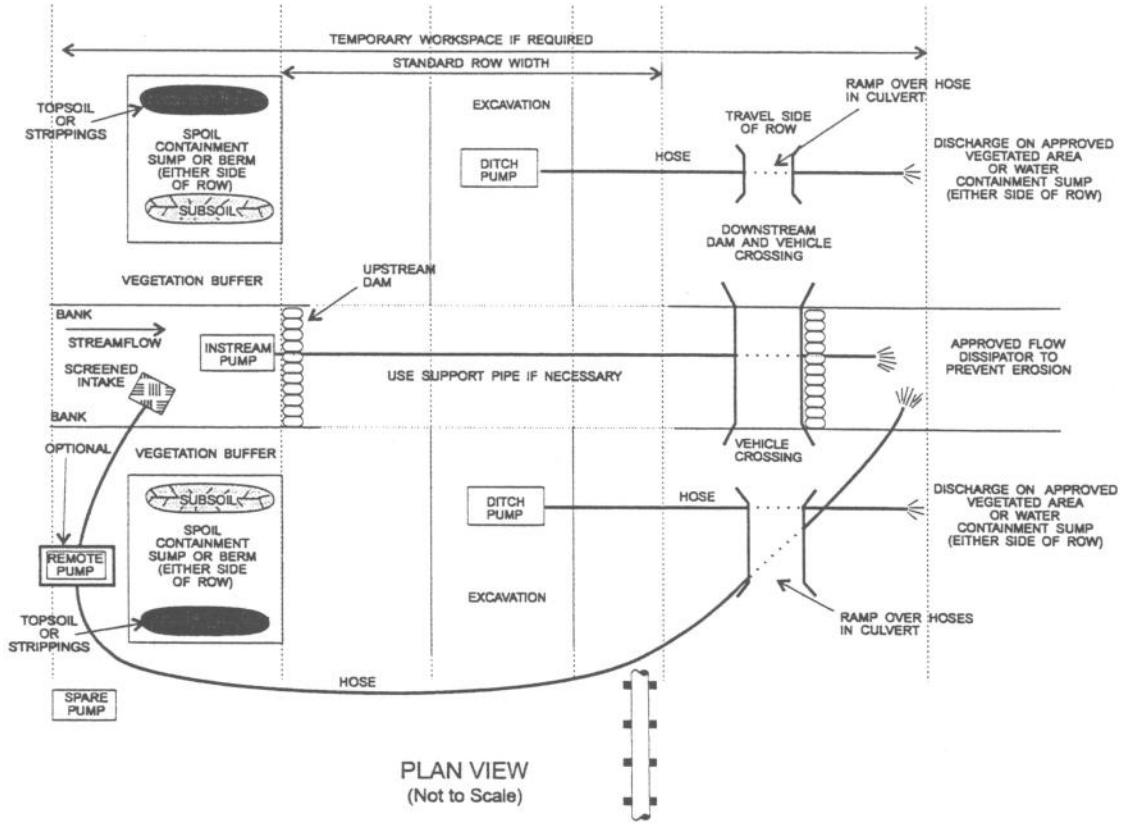
N.T.S.



CASE C - NON - ROCK EXCAVATION

N.T.S.

NOTE 1: MINIMUM DEPTH OF COVER SHALL BE EQUAL TO THE THICKNESS OF UNDISTURBED RIVER BED MATERIAL +1.3 METRES SOLID ROCK OR TO THE MINIMUM COVER SPECIFIED IN CASE C-NON-ROCK EXCAVATION, WHICHEVER IS LESS.

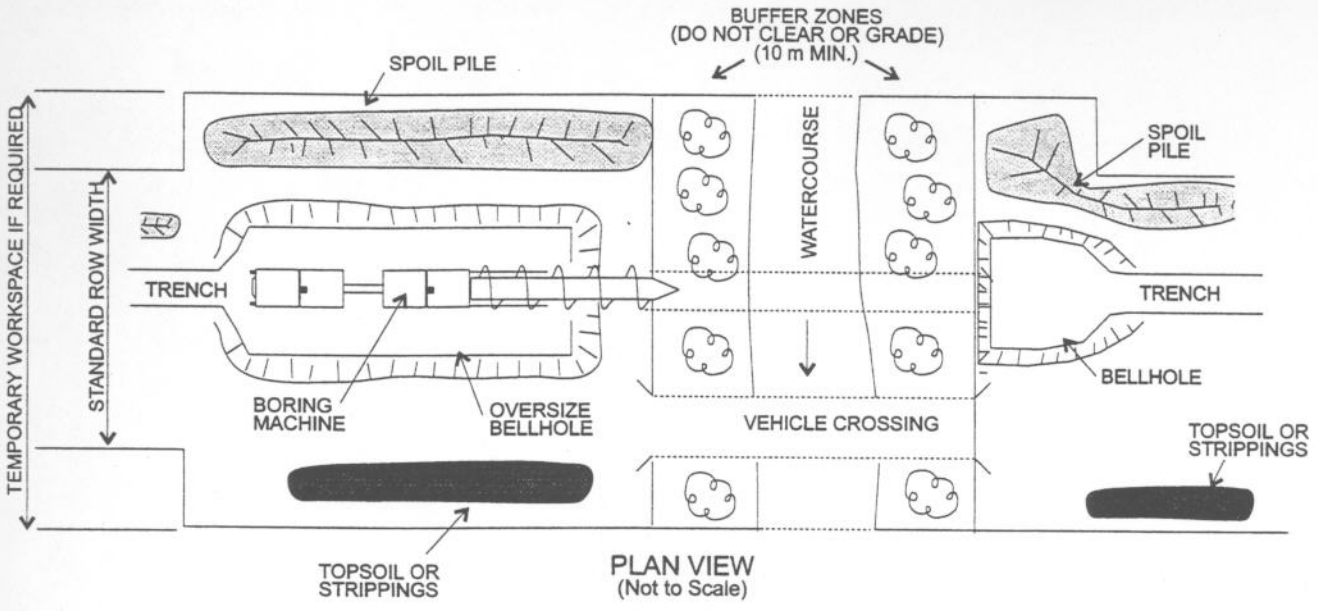


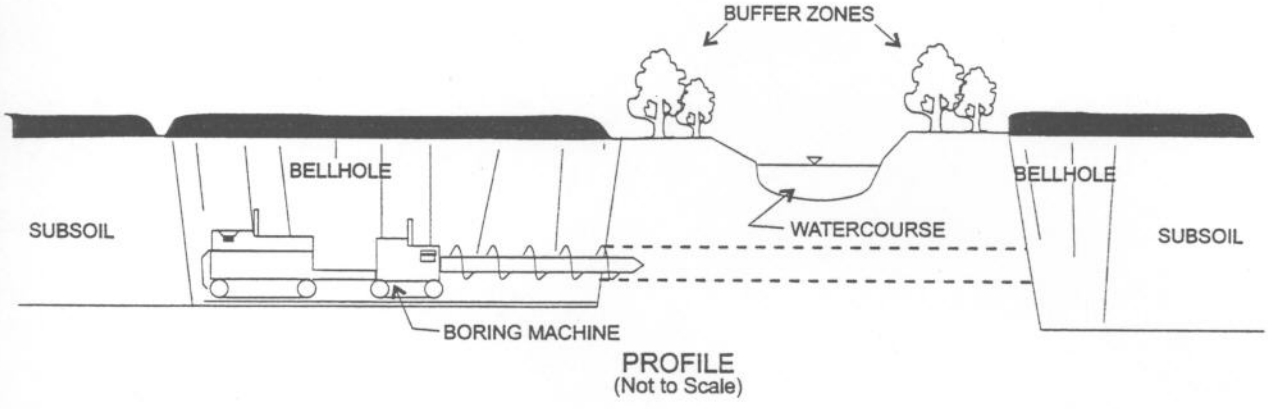
PLAN VIEW
(Not to Scale)

Notes:

1. Install the vehicle crossing on the work side edge of the right-of-way to allow for a wide excavation.
2. Stockpile all required materials and equipment onsite prior to beginning instream work.
3. Complete construction of the instream pipe section. Weight, coat and pretest pipe, if warranted, prior to commencement of instream activity.
4. Begin the operation in the early morning to allow for same day installation if practical.
5. Install pumps and check operation to equalize flow.
6. Construct the upstream dam. Dam should be constructed on the edge of the temporary workspace to allow for a wide excavation. Ensure dam is impermeable by installing a polyethylene liner. Dam may be constructed with sand bags, aquadam, sheet piling or other approved material that ensures a tight seal of the bed and banks.
7. Plug the vehicle crossing culvert or construct the downstream dam. Where a bridge is used, the bridge and dam should be installed as close to the edge of the temporary workspace as practical to allow for a wide excavation.
8. Excavate trench as rapidly as possible. Create spoil containment sumps, if warranted, to keep spoil from flowing back into the stream channel.
9. Install pipe.
10. Backfill the stream channel first pushing the silted water back into the bank excavations. Pump or drain the bank excavations while progressively backfilling from the stream channel outward. Construct water containment sumps if warranted.
11. Restore bed and banks of stream channel to preconstruction profiles.
12. Remove the downstream dam or vehicle crossing plug.
13. Remove the upstream dam or vehicle crossing plug.

Source: Adapted from TERA 1998





Notes:

1. Acquire and mark additional temporary workspace.
2. Set up equipment a minimum of 10 m from the edge of the watercourse; do not clear or grade within 10 m zone except along the work side, if temporary vehicle crossing is installed.
3. Excavate bellhole. Store spoil on opposite side of right-of-way.
4. Complete boring and tie-in to mainline.
5. Pump bellhole dry if seepage becomes a problem. Dewater bellholes onto stable, vegetated land, not directly back into watercourse.
6. Backfill and compact. Leave a crown to allow for subsidence.

Source: Adapted from TERA 1998

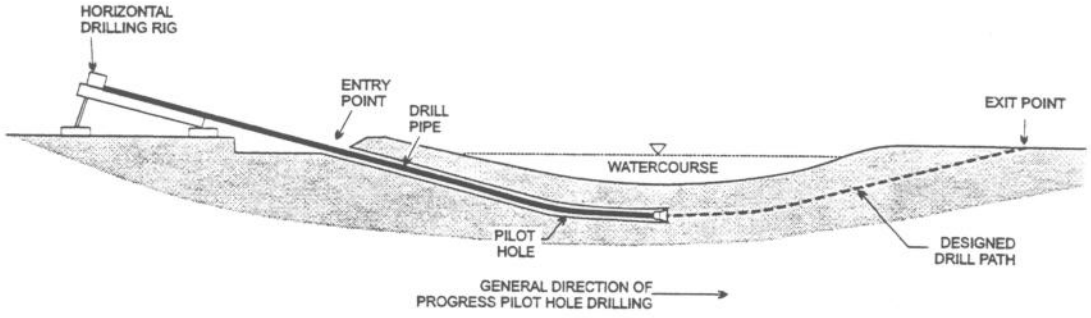
CPWCC WATERCOURSE CROSSINGS

CONSTRUCTION TECHNIQUE – TYPICAL BORE OR PUNCH

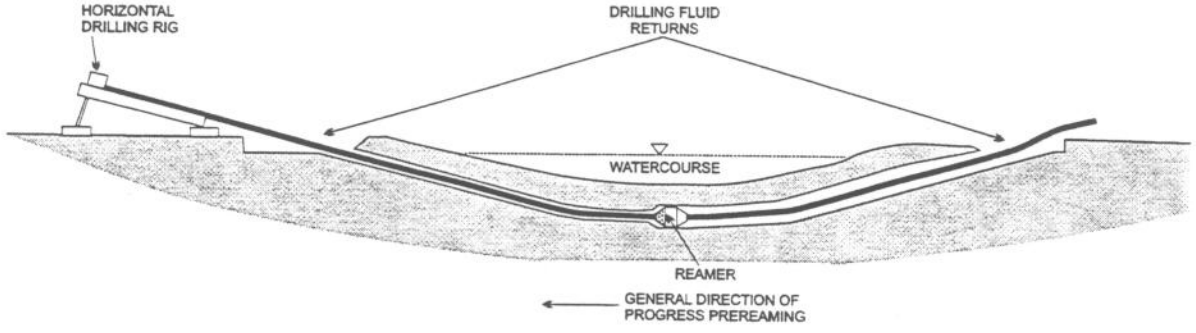
Second Edition

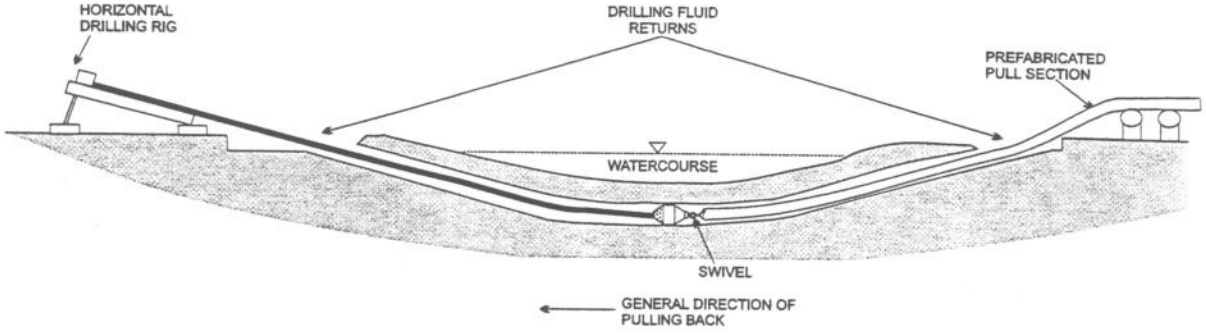
DWG. NO. 10

STAGE 1: PILOT HOLE DIRECTIONAL DRILLING



STAGE 2: REAMING AND PULLING BACK





PROFILE
(Not to Scale)

Notes:

1. Obtain geotechnical data prior to initiating drilling. Drilling may not be feasible in some materials such as unconsolidated gravels.
2. Prepare a drilling mud release contingency plan.
3. Set up drilling equipment a minimum of 10 m from the edge of the watercourse; do not clear or grade within 10 m zone.
4. Employ full time inspectors to observe for an inadvertent mud release into the watercourse.
5. Ensure that only bentonite based drilling mud is used. Do not allow the use of any additives to the drilling mud without the approval of appropriate regulatory authorities.
6. Install suitable drilling mud tanks or sumps to prevent contamination of watercourse.
7. Install berms downslope from the drill entry and anticipated exit points to contain any release of drilling mud.
8. Dispose of drilling mud in accordance with the appropriate regulatory authority requirements.

Source: Adapted from ASCE 1996, TERA 1998

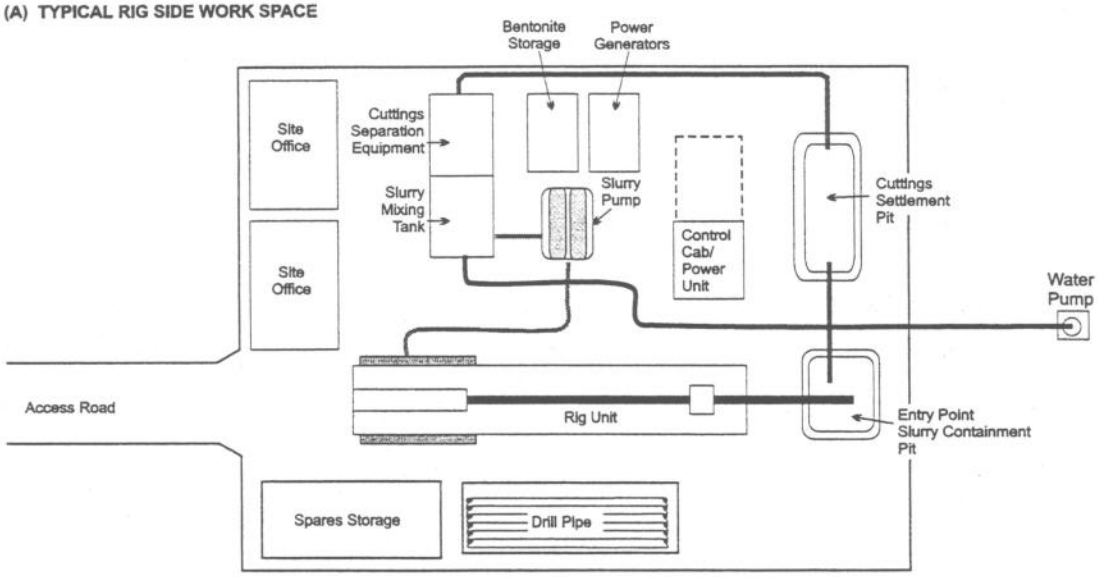
CPWCC WATERCOURSE CROSSINGS

CONSTRUCTION TECHNIQUE – TYPICAL HORIZONTAL DIRECTIONAL DRILL

Second Edition

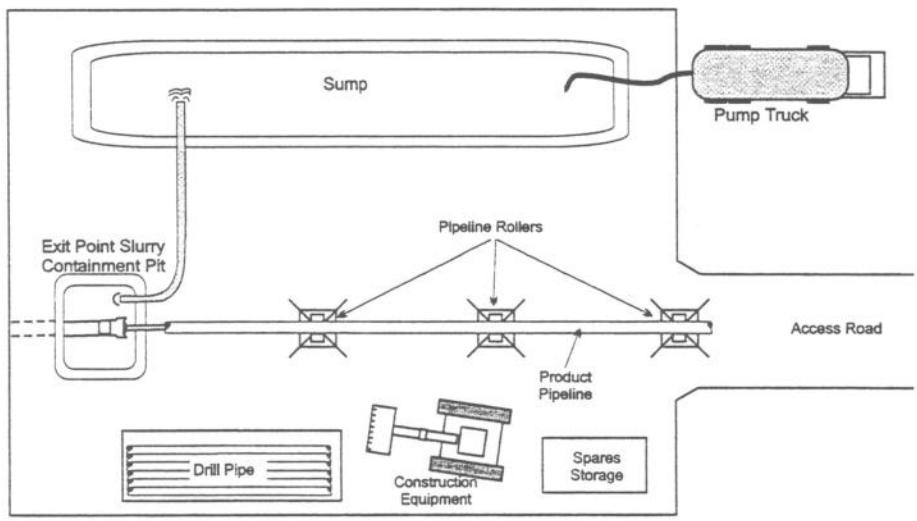
DWG. NO. 11(a)

(A) TYPICAL RIG SIDE WORK SPACE



PLAN VIEW
(Not to Scale)

(B) TYPICAL PIPE SIDE LAYOUT



PLAN VIEW
(Not to Scale)

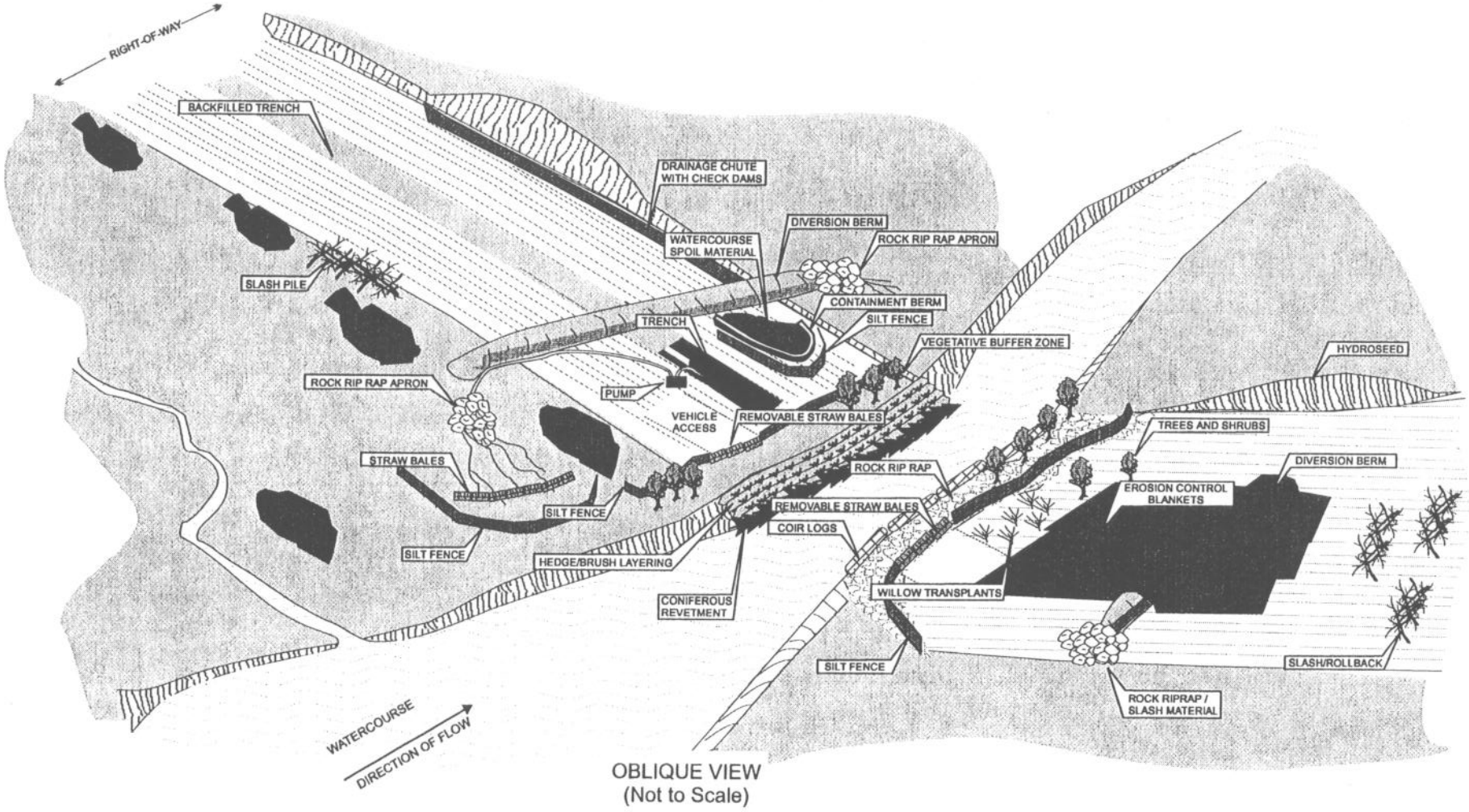
Source: Adapted from ASCE 1996

CPWCC WATERCOURSE CROSSINGS

CONSTRUCTION TECHNIQUE – TYPICAL HORIZONTAL DIRECTIONAL DRILL

Second Edition

DWG. NO. 11(b)



OBLIQUE VIEW
(Not to Scale)

Note: The above drawing indicates the usage and locations of various erosion and sediment control measures.

Source: Adapted from TransCanada PipeLines 1994

CPWCC WATERCOURSE CROSSINGS

TYPICAL EROSION AND SEDIMENT CONTROL MEASURES

Second Edition

DWG. NO. 36