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AMHERST HIGH PRESSURE STEEL DISTRIBUTION PIPELINE

REGISTRATION and ENVIRONMENTAL ASSESSMENT

DECEMBER 2004

Prepared by:

DILLON CONSULTING

REGISTRATION OF THE HERITAGE GAS AMHERST HIGH PRESSURE DISTRIBUTION STEEL PIPELINE PROJECT

This document represents formal registration of the Amherst High Pressure Distribution Steel Pipeline (the Project) by Heritage Gas to meet the requirements of the Nova Scotia *Environmental Assessment Regulations*, as defined under Section 9 of the Regulations.

Name of Undertaking

Amherst High Pressure Distribution Steel Pipeline.

Location of the Undertaking

The project includes plans to convey natural gas from the Maritimes & Northeast Pipelines (M&NP) main line near Amherst Head to Amherst, Nova Scotia.

Proponent

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Nature of the Undertaking

The term "undertaking" is defined in the *Environment Act* as:

> "...an enterprise, activity, project, structure, work or proposal and may include, in the opinion of the Minister, a policy, plan or program that has an adverse effect or an environmental effect and may include, in the opinion of the Minister, a modification, extension, abandonment, demolition or rehabilitation, as the case may be, of an undertaking".

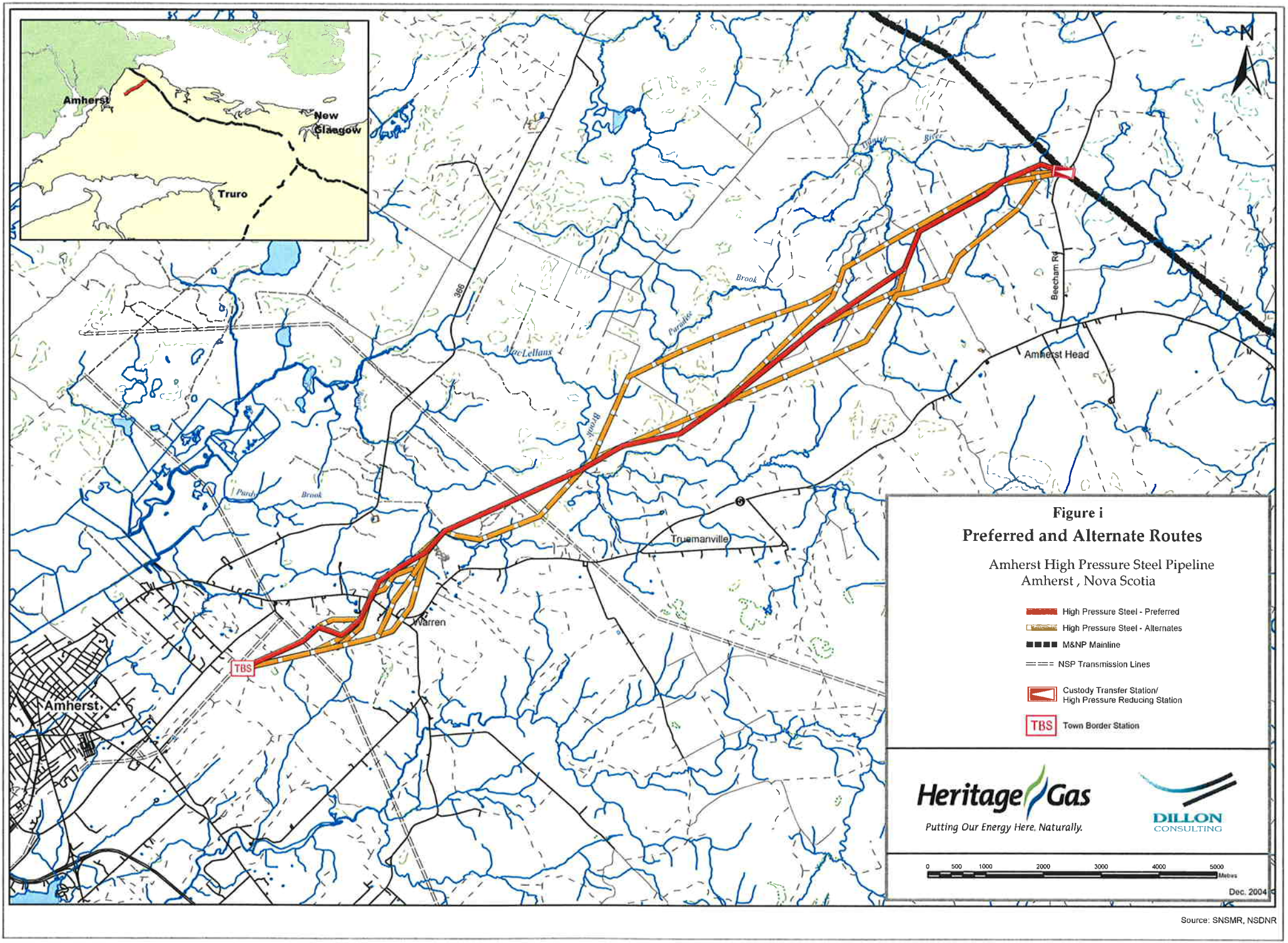
The project consists of construction and operation of a 17.6 km pipeline from a Custody Transfer Station (CTS) located at the M&NP pipeline in Amherst Head to a Town Border Station (TBS) located approximately 2 kms outside the limit of the Town of Amherst. The pipeline will be operated at a maximum operating pressure (MOP) of 4,965 kPa (720 psig) and will have an outside diameter of 114.3 mm (NPS 4).

The high-pressure pipelines depicted in Figure *i* represent the preferred and alternate alignments selected for transmission of natural gas to Amherst. The selection of the preferred alignment was based on the evaluation process that is described in this document.

Background

Heritage Gas plans to construct and operate a high pressure distribution steel pipeline to provide access to natural gas for residential and for industrial, commercial and institutional customers in Amherst and surrounding areas. In February 2003, the Government of Nova Scotia awarded Heritage Gas a 25-year franchise for the right to construct and operate a natural gas distribution system. In June 2003, Heritage Gas accepted the natural gas franchise and began operations. The franchise commitment includes a commitment to construct serving five counties and the Halifax Regional Municipality within a 10-year timeframe, Heritage Gas intends to complete construction of the Amherst pipeline in 2005.

The proposed system comprises approximately 17.6 km of high-pressure distribution steel pipeline connecting the existing Maritimes & Northeast Pipeline (M&NP) mainline to Amherst. The undertaking includes two regulator stations, valves, and control systems.


Amherst
New Glasgow
Truro
N
Beecham Rd
366
Brook
Parlee
MacLellans
Brook
Tidnish
River
Amherst Head
Parlee
Brook
Truemanville
Warren
TBS
Amherst
Figure i
Preferred and Alternate Routes
Amherst High Pressure Steel Pipeline
Amherst , Nova Scotia
High Pressure Steel - Preferred
High Pressure Steel - Alternates
M&NP Mainline
NSP Transmission Lines
Custody Transfer Station/
High Pressure Reducing Station
TBS
Town Border Station
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CONSULTING
0 500 1000 2000 3000 4000 5000
Metres
Dec. 2004
Source: SNSMR, NSDNR

The construction of the system proposed by Heritage Gas falls within the definition of a Class I undertaking under the *Environmental Assessment Regulations* pursuant to the Nova Scotia *Environment Act*. An undertaking of this type requires the submission of a Registration to the Minister of Environment for Nova Scotia, upon which the project will be evaluated under the review requirements set out in the *Environmental Assessment Regulations*. Heritage Gas believes that the undertaking poses no significant risk of adverse environmental impacts that cannot be mitigated, and that it should be approved by the Minister of Environment, subject to applicable and appropriate Conditions of Approval. In order to support this position, Heritage Gas has prepared an Environmental Assessment (EA) to accompany its Registration, and has also conducted a stakeholder and public consultation program in order to obtain comments from the public and stakeholder groups concerning environmental aspects of the proposed project.

Purpose and Need for the Undertaking

The purpose of the undertaking is to convey natural gas to residential, industrial, commercial and institutional customers in Amherst and surrounding areas. The activities of the franchisee, Heritage Gas, are regulated by the Nova Scotia Utility and Review Board (UARB).

On February 21, 2003, the Governor in Council, on the report and recommendation of the Minister of Energy, approved the granting of the franchise. In June 2003, Heritage Gas accepted the natural gas franchise and began operations.

Heritage Gas intends to construct a natural gas delivery system where there is a market demand and where it is economically feasible to do so. In order to do so, Heritage Gas has successfully completed a natural gas awareness and marketing campaign. As a result, sufficient commitments have been received to enable the project to proceed. In order to meet these commitments to customers and the community of Amherst, Heritage Gas seeks environmental approval to begin construction of the high-pressure pipeline in 2005, and proposes to fulfil its obligation to provide services to Amherst by September 2005.

Alternatives

Alternative means of conveying natural gas to consumers to the Amherst area are not economically viable. Alternative means of conducting the project itself are addressed when considering preferred and alternate alignments for pipelines.

Proposed Construction and Operation Schedules

When the required approvals and permits are received, Heritage Gas plans to begin construction early in June 2005, with the intent to begin operations and delivery of natural gas in September 2005. The proposed schedule of construction for the pipeline is presented graphically in Figure *ii*.

Description of the Undertaking

The project includes the construction and operation of high-pressure distribution pipeline that will convey natural gas from the Maritimes and Northeast Pipelines (M&NP) mainline to the local distribution system of lower pressure distribution pipelines and service lines in and around Amherst.

Heritage Gas will construct, operate, and maintain distribution pipelines and service lines for the distribution of natural gas to residential, industrial, commercial and institutional customers. The undertaking does not include these lower pressure distribution pipelines and service lines.

The undertaking does not include the Tap and Custody Transfer Station, which will be the responsibility of M&NP. Nor does the project include the installation and operation of natural gas piping and end use equipment and facilities inside structures owned by customers.

The physical aspects of the undertaking are as follows:

- approximately 17.6 kilometres (km) of high-pressure distribution pipeline, which will be 114.3 millimetres (mm) in outside diameter; and
- two pressure regulating stations within the system to regulate the flow of natural gas and reduce pressures where gas is transferred between components of the system.

Approvals Required and Other Forms of Authorization

The following approvals and other forms of authorization are anticipated for the project.

- Permit to Construct, UARB – prior to construction; requires filing of detailed engineering and construction plans.

- License to Operate, UARB – post-construction and prior to operation; various requirements, including compliance with conditions attached to Permit to Construct.

Year 2004 to 2005
Amherst High Pressure Distribution Pipeline
Implementation Schedule

114.3 mm diameter (NPS 4)	2003				2004												2005								
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Initial Route Planning																									
Environmental Screening and Field Studies																									
Stakeholder Consultation																									
Environmental Assessment																									
Review of EA by Province																									
Geotechnical & Topographic Surveys																									
Detailed Design Pipeline																									
Detailed Design Stations																									
Land Acquisition																									
Permit Approvals																									
Materials Procurement																									
Construction Contracting																									
Clearing																									
Construction Pipeline																									
Construction Stations																									
Commissioning and Start-up																									
M&NP Custody Transfer Station																									

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DILLON CONSULTING	TITLE **Amherst High Pressure Steel Pipeline Design and Permitting Schedule**	PROJECT No. **04-3265**
DATE **Dec. 2004**	PROJECT **Amherst High Pressure Steel Pipeline**	FIGURE No. **i i**

- Federal Environmental Assessment – A potential trigger for CEAA exist where Fisheries and Oceans Canada (DFO), Habitat Management Branch, may require an authorization that will trigger CEAA for any destruction of fish habitat. However, there are currently no plans to affect fish habitat for the project.

- Approval to construct or alter work on, over, under, through or across any navigable water, Navigable Waters Protection Branch of Coast Guard. Approvals will not be required for the crossings.

- Permit to Transport Explosives, Energy Mines and Resources, administered through the Nova Scotia Department of Labour – may be required during construction for any blasting operations.

- Approval to cross a watercourse, Nova Scotia Department of the Environment (NSDEL) - Required for a pipeline crossing of a watercourse.

- Soil Breaking Permit, Nova Scotia Department of Transportation and Public Works (NSTPW) - required for any crossing or excavation of provincial public highway.

- Notification and Approval for works affecting sulphide-bearing material, NSDEL - construction activities that will disturb sulphide-bearing bedrock over the regulated thresholds will require approval.

- License of driver to transport dangerous goods, NSTPW - required for certain materials used in construction that fall within the definition of dangerous goods.

- Permit to generate, carry or receive dangerous waste goods, NSDEL - depending on volumes and characteristics, approval may be required for wastes that will be generated during construction.

- Temporary Magazine License, Department of Labour, on behalf of the Explosives Regulatory Division - required for the temporary storage of explosives used for blasting during construction.

- Registration of, and Installation of, Petroleum Storage Tanks, NSDEL - required where petroleum storage tanks are installed and used with capacity greater than 4000 litres (L).

- Approval to burn cleared vegetation, NSDEL/NSDNR - required for burning of slash and cleared vegetation during construction.

- Approval for the use and disposal of water, NSDEL - required for withdrawal and discharge of water used in hydrostatic pressure testing of pipes and pipelines.

- Municipal road opening permits - procedures vary between municipalities for obtaining these permits.

Issues of Concern

Issues of concern have been scoped by the Heritage Gas EA study team through:

- reviewing applicable provincial and federal environmental laws and regulations;
- meeting with regulatory agencies at provincial and federal levels;
- conducting consultation meetings with stakeholders and documenting concerns;
- considering available environmental literature and references;
- incorporating the experience of the EA study team in conducting environmental assessments in Nova Scotia and elsewhere in Canada; and,
- considering the experience and suggestions about pipeline installation, operation and maintenance elsewhere in Canada and from other knowledgeable team members and associates.

The Issues of Concern identified by the study team and addressed in the accompanying EA include:

- fine grained soils;
- wetlands;
- fish and aquatic habitat;
- environmentally sensitive areas;
- species at risk;
- groundwater supplies;
- air quality;
- land use;
- accidents and malfunctions; and
- cultural heritage resources.

Sources of Public Funding

Heritage Gas is a private company and does not plan to use any public funding for this project.

Summary of Concordance With Factors Relevant to the Minister's Decision

This section presents the concordance of the following EA with the factors that the Minister of the Environment must consider when formulating a decision following the registration of a Class I Undertaking. It is intended to provide a summary of the EA, as a convenience to the Minister in making that decision, and is based on the registration document and the specific commitments of, and studies and consultations carried out by Heritage Gas

The following is an extract from the *Environmental Assessment Regulations* made under Section 49 of the *Environment Act*, S.N.S. 1994-95, c.1, O.I.C. 95-220, N.S. Reg. 26/95, as amended by O.J.C. 2003-67 (February 28, 2003), N.S. Reg. 44/2003.

Factors relevant to the Minister's decision.

The following information shall be considered by the Minister in formulating a decision following review of the registration documents for a Class I undertaking:

(a) *The location of the proposed undertaking and the nature and sensitivity of the surrounding area;*
(b) *The size and scope of the proposed undertaking;*
(c) *Concerns expressed by the public about the adverse effects or the environmental effects of the proposed undertaking;*
(d) *steps taken by the proponent to address environmental concerns expressed by the public;*
(e) *potential and known adverse effects or environmental effects of the technology to be used in the proposed undertaking;*
(f) *project schedules where applicable;*
(g) *planned or existing land use in the area of the undertaking;*
(h) *other undertakings in the area; and*
(i) *such other information as the Minister may require.*

Each of the nine factors listed has been addressed below. The notes following each of the nine factors provide both a summary of key points detailed in the EA and the sections that address these factors in the EA.

1. The location of the proposed undertaking and the nature and sensitivity of the surrounding area:

The project is located between the M&NP crossing of Beecham Road in Amherst Head and the TBS near the Town of Amherst (Figure i). The lands crossed by the project are primarily forested, with ongoing forestry operations, or, closer to Amherst, are agricultural.

Heritage Gas has carefully selected a preferred route that avoids watershed management areas, sensitive habitat and wetlands and minimizes watercourse crossings.

2. The size and scope of the proposed undertaking:

The project consists of construction and operation of a 17.6 km pipeline from a Custody Transfer Station (CTS) located at the M&NP pipeline to a Town Border Station (TBS) at Amherst. The pipeline will be operated at a maximum operating pressure (MOP) of 4,965 kPa (720 psig) and will have an outside diameter of 114.3 mm.

Nominal easement for the project is expected to be 20 m.

3. Concerns expressed by the public about the adverse effects or the environmental effects of the proposed undertaking:

Heritage Gas has made considerable effort to identify public and stakeholder concerns about the potential adverse environmental effects of the project. A summary of consultation activities is provided in Section 3 of the accompanying EA. In addition, the expert knowledge and experience of the authors of this report have been focused on identifying potential environmental effects, particularly adverse ones, which may result from the project. As documented herein, public concerns regarding adverse effects have been minimal, and are largely related to land use concerns. These concerns are considered mitigable.

Heritage Gas has consulted with provincial and federal regulatory agencies and government scientific specialists to identify issues that might not be identified through other means. Heritage Gas has also requested input from the Confederacy of Mainland Mi'kmaq regarding traditional use and knowledge.

4. Steps taken by the proponent to address environmental concerns expressed by the public:

As summarized in Section 4 of the accompanying EA, the environmental effects of the project are minimal, and are mitigable. The open house, direct landowner contact and stakeholder meetings have elicited many comments, the majority of these related to land use issues. Furthermore, the environmental issues that have been raised are addressed fully in the EA and the environmental protection approach adopted by Heritage Gas.

5. Potential and known adverse effects or environmental effects of the technology to be used in the proposed undertaking:

The potential adverse and beneficial environmental effects of the technology to be used in this project are well known. Construction of the project will comply with the technical requirements of the Canadian Standard for Oil and Gas Pipeline Systems (CSA Z662), which have been established through experience elsewhere in Canada as suitable for the safe and reliable design, construction and operation of natural gas distribution systems. Construction methods for pipeline installation are also well known. There are potential environmental impacts associated with these construction activities and these are addressed in Sections 2.4, 2.5 and 4.6 of the EA.

Plans for the project also include the use of horizontal directional drilling (HDD) for non-intrusive watercourse crossings at the most sensitive crossings, and the potential use of trenching machines for pipe installation. Both of these technologies are of benefit in enhancing construction efficiency and in reducing the potential for environmental impacts. Section 2.4 provides an overview of the application of these technologies to this project.

6. Project schedules where applicable:

Project scheduling is addressed in Section 2.3. From an environmental perspective, scheduling is a particularly important consideration. In cases where watercourse crossings may disrupt fish passage or fish spawning, construction will be completed between June and September. This topic and other schedule-related issues are identified in Section 2.3.3.

7. Planned or existing land use in the area of the undertaking:

Existing land use in the project area consists predominantly of forestry and agriculture, with residential (both existing and planned) at the Amherst terminus of the pipeline. The pipeline also crosses lands used by both Rogers Wireless and Central Cable TV for telecommunications towers.

8. Other undertakings in the area:

Heritage Gas is not aware of any other undertakings as defined by the Environmental Assessment Regulations, in the area.

9. Such other information as the Minister may require:

Heritage Gas has planned the project and prepared this document and the accompanying EA in recognition of the environmental issues particular to natural gas pipelines in Nova Scotia. Through its discussions with regulatory and other stakeholders, Heritage Gas does not anticipate that the Minister will require additional information. However, Heritage Gas is prepared to provide more information should it be required by the Minister.

LIST OF ACRONYMS

ACCDC	Atlantic Canada Conservation Data Centre
ATV	all terrain vehicle
CEAA	Canadian Environmental Assessment Act
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSA	Canadian Standards Association
CTS	Custody Transfer Station
DFO	Fisheries and Oceans (Federal)
DRS	District Regulator Station
DU	Ducks Unlimited
EA	Environmental Assessment
ECP	Environmental Construction Plan
EPP	Environmental Protection Plan
GIS	geographic information system
ha	hectare
HDD	horizontal directional drilling
HPRS	High Pressure Reducing Station
km	kilometre
kPa	kilopascal
L	litre
M&NP	Maritimes and Northeast Pipelines
m	metre
mm	millimetre
MPI	Magnetic Particle Imaging
MOP	maximum operating pressure
NS	Nova Scotia
NSDEL	Nova Scotia Department of Environment and Labour
NSDNR	Nova Scotia Department of Natural Resources
NSTPW	Nova Scotia Department of Transportation and Public Works
NSM	Nova Scotia Museum
NTS	National Topographic Survey
NWPA	Navigable Waters Protection Act (or) Navigable Waters Protection Agency
O&M	operations and maintenance
OH&S	occupational health and safety
PE	polyethylene

PPE	personal protective equipment
psig	pounds per square inch gauge
RA	Responsible Authority
RCMP	Royal Canadian Mounted Police
ROW	right-of-way
SCADA	supervisory control and data acquisition system
TBS	town border station
UARB	Nova Scotia Utility and Review Board

GLOSSARY

abandonment	terminating use of facilities at the end of project life.
abiotic	non-biological; a process not mediated by or resulting from the activity of organisms. Weather is an example of an abiotic process.
acid generating	
bedrock	means aggregate having a sulphide sulphur content equal or greater than 0.4% (12.51 kg H_2SO_4/tonne).
alluvial	sediments deposited in rivers.
alternate alignments	refers to routes that have been identified by environmental and engineering factors as viable alternatives for routing of the distribution system.
aquifer	any geologic unit capable of supplying a significant amount of groundwater.
archaeological resource	archaeological sites consisting of pre-contact and historical, in ground, resources.
bedrock	the more or less solid rock in place either at or beneath the surface of the earth.
buffer zone	an area which is not grubbed until 24 hours prior to construction.
cathodic protection	protecting a metal from electrochemical (galvanic) corrosion by one of two methods: sacrificial anode or impressed current.
channel	a natural stream that conveys waters; a ditch excavated to control the flow of water.
cofferdam	an enclosure built in a body of water so that construction may be carried out in the dry.
COSEWIC status	the status or rank (*e.g.*, extinct, extirpated, threatened, endangered or rare) given to species of wildlife by the Council on the Status of Endangered Wildlife in Canada (COSEWIC).
decommissioning	preparing facilities for abandonment at the end of project life.
deposition	the accumulation of material which settles or is dropped due to slower movement of the transporting agent, water.
discharge	the process by which groundwater feeds into surface water bodies, or the general flow of water from a source to a receiving body of water.

drainage	the removal of excess surface water or groundwater from land by means of surface or subsurface flow.
easement	a parcel of land that an entity has the right to use for specially approved purposes.
Environmental Construction Plan	a document that identifies location specific environmental protection measures to be used during construction (*i.e.*, construction drawings illustrating placement of sediment fences adjacent to a watercourse).
endangered	descriptive of a species threatened with imminent extinction or extirpation.
Environmental Protection Plan	identifies construction activities and mitigation strategies common to the construction of the natural gas system and may contain contingency plans.
erodible	susceptible to erosion.
erosion	detachment of soil particles by agents such as water, wind, and ice.
extinct	a species that no longer exists on the planet.
extirpated	a species that is locally extinct for a specific location, but that may exist elsewhere.
fauna	animals.
field truthing	on-site verification of information gathered from primary and secondary sources.
fine-grained texture	generally refers to the silt- and clay-size particles in soil.
fish habitat	the spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes (federal definition).
flora	plants.
fugitive emission	a gas, liquid, solid, vapour, fume, mist, fog, or dust that escapes from process equipment, or work areas.
geotextile	a flexible fabric that can be used to filter sediment from water or that can be placed over the soil surface to prevent germination and growth of weeds or to temporarily prevent soil erosion.
geotextile filter bag	a bag constructed of geosynthetic fabric used to filter sediment out of water.

grading	any ROW stripping, cutting, filling, stockpiling, or any combination thereof, including the land in its cut-and-filled condition.
gravel	rock or mineral pieces larger than two mm and up to 76 mm, in diameter, may include larger diameter cobbles.
habitat	the environment in which the life needs of a plant or animal are supplied.
hazardous materials	any prohibited, restricted, or controlled product.
heritage resources	archaeological resources, heritage structures, designated historic sites, sacred sites, burial sites, and areas of historical importance.
heritage structure	standing structure meeting Canadian Inventory of Historic Building (CIHB) criteria.
herpetiles	a category of animal consisting of amphibians and reptiles.
historic	after European arrival.
hydroseeding	application of a mixture of seed, fertilizer, mulch, binder, and water on foreslopes, backslopes, ditches, and other prepared areas to produce a uniform cover of grasses.
impact	an observable and measurable response of a population, individual or abiotic factor to an external source of disturbance.
loam	a type of soil consisting of a mixture of clay, silt, sand and organic material.
migration (fish)	movement of fish, usually in large numbers, with the purpose of reaching areas used for spawning.
mitigation measures	measures applied to eliminate or minimize the potential adverse effects of an activity on the environment.
mudstone	a fine-grained sedimentary rock consisting mainly of clay mineral particles.
mulch	material such as baled hay, straw, or shredded straw mixed with newsprint and raw cotton fibres, which covers the surface of the soil and protects against the impact of erosion.
mulching	the application of mulch on slopes and other exposed ground as a temporary measure to prevent erosion of the exposed ground and siltation of watercourses.

natural gas	a gaseous form of hydrocarbon consisting predominantly of mixtures of hydrocarbon gases, the more common of which are methane, ethane, propane, butanes, pentanes, hexanes and heptanes. When carried in gas transmission pipelines, methane makes up most of the gas.
organisms	any life forms.
passerine	perching birds.
perennial	a plant which lives for more than two growing seasons.
petroleum product	includes aviation fuel, asphalt, bunker 'C' oil, diesel fuel, engine oil, gasoline, kerosene, lubricants, mineral spirits, naphtha, petroleum-based solvents, transformer oil, and water/petroleum products (exclusive of paint and propane).
pH	a quantitative measure from 0 to 14 of the acidity or alkalinity of a solution. Low pH indicates acidity, high pH indicates alkalinity, pH7 indicates neutrality.
pig	a spherical or cylindrical device inserted in a pipe or pipeline to clean, clear or inspect the inside of the pipe.
pre-contact	an event that predates European arrival, typically referring to First Nations peoples and their activities before contact with Europeans.
preferred alignment	a route chosen from among alternatives as the selected route for construction of the distribution system.
project, the	The Heritage Gas Nova Scotia Gas Distribution Project.
rare species	species which occur in low numbers in a given area, but which are in little danger of extinction.
riparian zones	landscape features associated with water bodies such as lakes, rivers, streams, and wet areas, consisting of terrestrial and aquatic components that influence each other, the banks or shores of water bodies.
ROW	right-of-way, legal right of passage over land, including lands owned by the Province and municipalities.
runoff	portion of the precipitation on a drainage area that is discharged from the area in the stream channels. Includes surface runoff, groundwater runoff, or seepage.
sandstone	a sedimentary rock consisting of sand-sized particles cemented by silica or clay.
sediment fence	fence constructed of geosynthetic fabric and installed in a special manner to collect sediments in surface runoff.

sediment pond/trap	a depression formed from the construction of a barrier or dam built to retain sediment or debris.
sediment	fine soil material that is generated by erosion and deposited from water.
sedimentary rock	rock formed by the accumulation of sediment in water (aqueous deposits) or from air (eolian deposits).
sedimentation	deposition of soil particles or other solids.
seepage	water escaping through, or emerging from, the ground; usually considered to occur along an extensive line or surface, as contrasted with a spring, where the water emerges from a localized spot.
sensitive	descriptive of a species that normally exhibits a well-defined response to an external source of disturbance when measured under controlled conditions. However, population characteristics of sensitive species may render them non-susceptible to disturbance under field conditions (see vulnerable).
silt	soil particles from 1/256 mm to 1/16 mm in diameter.
siltation	see also sedimentation. Denotes sediment pollution of a watercourse.
slate	a fine-grained metamorphic rock that originated as shale, easily split into flat smooth plates.
species	a self-perpetuating population of animals or plants which is more or less genetically isolated.
stream bank	the usual boundaries, not the flood boundaries, of a stream channel.
streambed	bottom of channel carrying streamflow.
study area	refers to the EA study area for the Amherst High Pressure Steel Pipeline (refer to Figure *i*).
study team	Heritage Gas and Dillon Consulting Limited.
surface runoff	see runoff.
surface water	all water, the surface of which is exposed to the atmosphere.
surficial	characteristic of, pertaining to, formed on, situated at, or occurring on the earth's surface; especially, consisting of unconsolidated residual, alluvial, or glacial deposits lying on the bedrock.

suspended solids	particles either floating or suspended in water.
threatened	descriptive of a species likely to become endangered.
till	non-sorted, non-stratified sediment carried or deposited by a glacier.
topography	the configuration of the Earth's surface, including the shape, elevation and position of its natural and man-made features.
turbidity	condition of water when it becomes cloudy due to sediment in suspension in the water column.
undertaking, the	as described in the Registration Document and defined by the Nova Scotia *Environment Act* and *Environmental Assessment Regulations.*
vulnerable	descriptive of a species at risk because of low numbers or restricted occurrence.
watercourse	the full width and length, including the bed, banks, sides and shorelines, or any part of a river, creek, stream, spring, brook, lake, pond, reservoir, canal, ditch or other natural or artificial channel open to the atmosphere, the primary function of which is the conveyance or containment of water whether the flow be continuous or not (provincial definition).
watercourse approval	approval of a watercourse crossing or related designated activities required from NSDEL.
watershed	an area of land draining to a common collection system such as stream or lake.
wetland	land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, wetlands vegetation, and various kinds of biological activity which are adapted to a wet environment. Includes bogs, fens, marshes, swamps, and shallow waters.

Table of Contents

Page

1.0 Introduction 1
1.1 Project Overview 1
1.1.1 Need for the Project 1
1.1.2 Elements of the Project 1
1.1.3 Role of Environmental Planning 3
1.2 Alternatives 3
1.2.1 Alternatives to the Project 3
1.2.2 Alternative Means of Carrying Out the Project 3
1.3 Approvals and Permits Required 4
1.3.1 Permitting Plan Summary 4
1.3.2 Permitting Process 4

2.0 Project Description 11
2.1 Introduction 11
2.1.1 System Overview 11
2.1.2 Environmental Protection 12
2.1.3 Presentation of this Section 12
2.2 System Components 13
2.3 Management, Schedule, Design and Pre-construction Activities 15
2.3.1 Management 15
2.3.2 Construction Schedule 19
2.3.3 System Planning and Design 21
2.3.4 Pre-construction Activities 30
2.4 Construction Methods 31
2.4.1 Construction Equipment 31
2.4.2 Construction Sequence 32
2.5 Environmental Protection Methods 42
2.5.1 Purpose of Providing Environmental Protection Methods 42
2.5.2 Management of Wood 43
2.5.3 Management of Soils and Bedrock 43
2.5.4 Management of Sediment, Erosion and Construction Drainage 45
2.5.5 Cultural Heritage Resource Protection During Construction 49
2.5.6 Construction of the High Pressure Regulating Station 51
2.5.7 Construction of the Town Border Station 52
2.5.8 System Commissioning and Activation 53
2.6 Operations 53

2.6.1 Overview *53*
2.6.2 Operations Documentation *54*
2.6.3 Facilities Operations *56*
2.6.4 Telemetry *57*
2.6.5 Inspections of Pipelines and Facilities *57*
2.6.6 Maintenance of Pipelines and Facilities *58*
2.6.7 Call Before You Dig Program *59*
2.6.8 Emergency Response *59*
2.7 Decommissioning, Closure and Abandonment *60*

3.0 Public Consultation Summary 61
3.1 Consultation *61*
3.2 Open House *61*
3.3 Regulatory Meeting *62*
3.4 Other Stakeholders and Landowners *63*
3.5 Integration of Consultation Input in Environmental Planning *65*

4.0 Description of the Environment and Environmental Impact Evaluation 68
4.1 Introduction *68*
4.2 Setting and Boundaries *68*
4.2.1 Environmental and Socio-economic Setting *68*
4.2.2 Spatial Boundaries *68*
4.2.3 Temporal Boundaries *69*
4.2.4 Regulatory Boundaries *69*
4.3 Issue Scoping *69*
4.4 Method of Assessment *70*
4.4.1 Impact Significance *70*
4.4.2 Issues of Concern *71*
4.5 Environmental Impact Evaluation *71*
4.5.1 Fine Grained Soils *71*
4.5.2 Wetlands *75*
4.5.3 Fish and Aquatic Habitat *77*
4.5.4 Environmentally Sensitive Areas *80*
4.5.5 Species At Risk (Flora and Fauna) *84*
4.5.6 Land Use *86*
4.5.7 Air Quality *90*
4.5.8 Groundwater Supplies *92*
4.5.9 Use of Easement by Off-Highway Vehicles *93*
4.5.10 Accidents and Malfunctions *94*
4.5.11 Cultural Heritage Resources *96*
4.6 Environmental Impact Summary *98*
4.7 Follow-up *100*

4.7.1 Additional Field Studies 100
4.7.2 Environmental Protection Plan (EPP) 100
4.7.3 Contingency Plans 100
4.7.4 Compliance Monitoring 100
4.7.5 Environmental Coordination and Inspection 101
4.7.6 Post-Construction Environmental Effects Monitoring 102

List of Figures:

Figure i Preferred and Alternate Routes iv
Figure ii Construction and Permitting Schedule vi
Figure 1-1 Proposed Alignment 2
Figure 2-1 Natural Gas Distribution Schematic 14
Figure 2-2 Construction and Permitting Schedule 20
Figure 2-3 Typical Design Process Flowchart 22
Figure 2-4 Environmental and Socio-Economic Constraints 25
Figure 2-5 Typical Easement Cross-section 34
Figure 2-6 Watercourse Construction Isolated Crossings (Dam & Pump) 37
Figure 2-7 Watercourse Construction Isolated Crossing (Flume) 39
Figure 2-8 Watercourse Construction Horizontal Directional Drill Crossing 40
Figure 2-9 Sensitive Periods for Key Fish Species 46
Figure 3-1 Land Use Zoning – Route 6 to Willow Street 67
Figure 4-1 Generalized Soils 74
Figure 4-2 Wetlands 76
Figure 4-3 Hydrology 78
Figure 4-4 Designated Areas 83
Figure 4-5 Land Use 87
Figure 4-6 Land Use Integration with Pipeline Easement 89

List of Tables:

Table 1-1 Permitting Plan 6
Table 2-1 Factors Influencing Preferred and Alternate Alignment Evaluation 23
Table 3-1 Summary of Regulatory Agency Comments, June 29, 2004 63
Table 3-2 Summary of Stakeholder Comments 63
Table 4-1 Assessment of Criteria for Determination of Significance of Effects 70
Table 4-2 Issues and Location in the EA 72
Table 4-3 Summary of Watercourse Crossings 81
Table 4-4 Impact Assessment Summary 99

Appendices:

Appendix A Public Consultation Materials
Appendix B Watercourse Crossing Assessments
Appendix C Avian Survey Data
Appendix D Plant & Fauna Survey Data
Appendix E Cultural Heritage Impact Assessment

1.0 Introduction

1.1 Project Overview

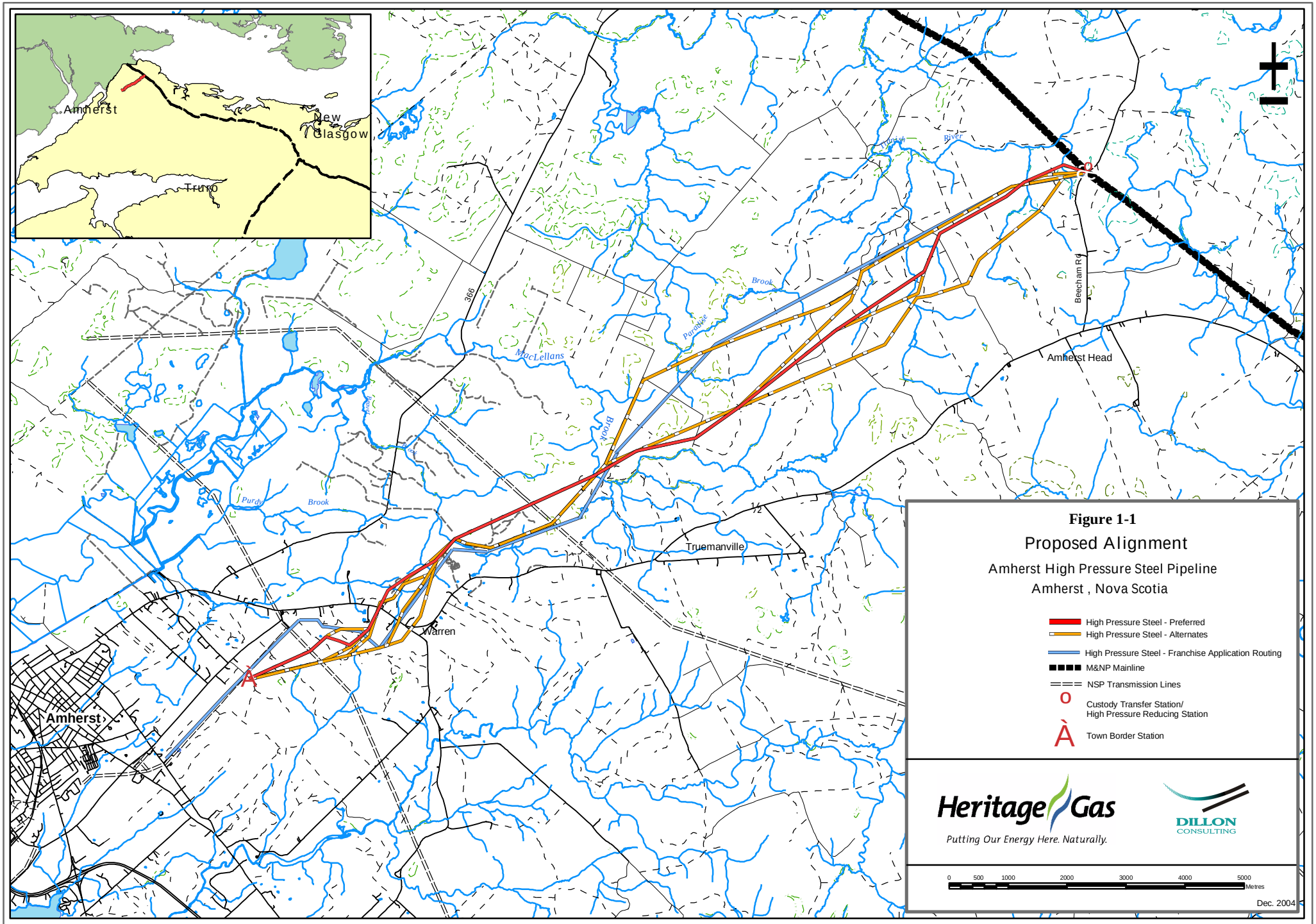
Heritage Gas proposes to construct and operate a high pressure distribution steel natural gas pipeline to serve residential, industrial, commercial and institutional customers in the Amherst area. Heritage Gas has committed to a schedule that anticipates commencement of construction in the spring of 2005 with first gas scheduled for the fall of 2005. The pipeline will be connected to and will receive natural gas from the Maritimes & Northeast Pipeline (M&NP) main line at Beecham Road north of Amherst Head.

1.1.1 Need for the Project

The need for this project, and the socio-economic impacts and benefits arising from it, were elaborated upon extensively, and were subject to thorough public review, during the public hearings before the Nova Scotia Utility and Review Board (UARB) in July 2002. At the conclusion of the hearing process, the UARB prepared a formal Decision that was documented in a public report issued on February 7, 2003. On February 21, 2003, the Government of Nova Scotia fully approved the terms and conditions of the UARB Decision to award Heritage Gas the franchise rights to distribute natural gas in five counties plus the Halifax Regional Municipality. Heritage Gas formally accepted the franchise in June 2003. Heritage Gas' franchise application to the UARB described the Amherst undertaking in some detail. This project is now underway as planned in the franchise application.

1.1.2 Elements of the Project

The undertaking comprises approximately 17.6 kilometres (km) of 114.3 millimetre (mm) high-pressure distribution steel pipeline. Two pressure-limiting stations within the system regulate the flow of natural gas and reduce pressures where gas is transferred from the M&NP mainline to the Heritage Gas system and at the Amherst Town Border Station (TBS). To deliver natural gas downstream of the high-pressure pipeline, Heritage Gas will also construct and operate distribution pipelines and service lines that are not within the scope of the registered undertaking. These distribution pipelines and service lines will carry gas to the customer service regulators and service meters attached to the outside of the buildings serviced by gas. Natural gas in the system will be odourized by Heritage Gas to facilitate detection. A more detailed description of the project is provided in Section 2. Figure 1-1 illustrates the proposed pipeline alignment and the alternates considered. The franchise application alignment, shown in blue line in Figure 1-1, is consistent with the alternatives explored and the final alignment selected.


Amherst
New Glasgow
Truro
Amherst Head
Truemanville
Warren
Amherst
MacLellans Brook
Purdy Brook
Paradise Brook
Beecham Rd
366
Figure 1-1
Proposed Alignment
Amherst High Pressure Steel Pipeline
Amherst , Nova Scotia
High Pressure Steel - Preferred
High Pressure Steel - Alternates
High Pressure Steel - Franchise Application Routing
M&NP Mainline
NSP Transmission Lines
Custody Transfer Station/
High Pressure Reducing Station
Town Border Station
Heritage Gas
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DILLON CONSULTING
0 500 1000 2000 3000 4000 5000
Metres
Dec. 2004
Source: SNSMR, NSDNR

1.1.3 Role of Environmental Planning

Environmental planning is fundamental to the successful execution of all stages of this project. The Environmental Assessment (EA), addresses the requirements for review of the project under the *Environmental Assessment Regulations.* The purpose of an EA is to identify the anticipated impacts of a proposed project, allowing for the identification of residual (remaining) impacts once reasonable and practical mitigation measures have been incorporated.

The Environmental Protection Plan (EPP) is referred to, and attached with this registration. This document has been previously developed by Heritage Gas for use in other service regions. It will be reviewed and further expanded as the detailed design of the project is conducted in advance of construction. The protection of biophysical and cultural resources is the fundamental goal of the EPP. Ongoing environmental monitoring and reporting of project activities is another fundamental component of the project.

1.2 Alternatives

The following sections address two specific classes of alternatives to the project. The first considers the potential for alternative means of conveying natural gas for distribution to residential, commercial, industrial and institutional customers. The second considers alternative means or methods to carry out the project.

1.2.1 Alternatives to the Project

A pipeline is the most economical and an environmentally sound means to convey natural gas from the M&NP mainline to residential, commercial, industrial and institutional customers throughout service areas. Alternatives to a gas distribution system, such as conversion of natural gas to a liquefied form, transporting gas by rail, and transporting gas by road, are not economically feasible. Other alternatives, such as energy conservation and efficiency measures, may influence gas demand, but will not eliminate the underlying demand for natural gas with these customers. Therefore, there are no economically viable alternatives to the project at this time.

1.2.2 Alternative Means of Carrying Out the Project

The alternative means of carrying out the project relates to evaluating alternative alignments for the pipeline and the selection of the preferred alignment. Routing and siting involve the collection and analysis of a wide variety of data, addressing social, technical, economic and environmental factors. The process of identifying the preferred alignment is described in Section 2.3.3.3. The general corridor of the

alignment was presented to the UARB as part of Heritage Gas' franchise application and was accepted by Cabinet (Figure 1-1).

1.3 Approvals and Permits Required

1.3.1 Permitting Plan Summary

Permits and approvals are summarized in Table 1-1, Permitting Plan. Listed are the regulatory permits, licenses, and approvals that are expected to be required to construct and operate the Heritage Gas system.

1.3.2 Permitting Process

1.3.2.1 UARB Permit to Construct

The *Gas Distribution Act* prohibits a gas distribution franchise holder from constructing a gas distribution system without a *Permit to Construct* from the UARB. The requirements outlined in the *Pipeline Act* and *Pipeline Regulations (Nova Scotia)* have been considered by Heritage Gas. The general documents that will be reviewed by the UARB prior to issuance of the *Permit to Construct* include, but are not limited to:

- detailed designs of pipeline;
- detailed specifications of pipeline components;
- quality assurance program;
- system to monitor changes in design, specifications standards and procedures, and;
- construction specifications including joining procedures and pressure testing.

The UARB reviews the above-listed documentation for evidence of compliance with the requirements of the *Pipeline Regulations (Nova Scotia)* and the Canadian Standard for *Oil and Gas Pipeline Systems* (CSA Z662).

1.3.2.2 Provincial Environmental Approvals

The provincial approvals which are anticipated for the construction of the project listed in Table 1-1.

1.3.2.3 Federal Environmental Approvals

The federal approvals identified as applicable to the project are listed in Table 1-1. These approvals focus on elements where a CEAA trigger is activated.

Federal approvals that trigger the CEAA process are listed in the *Law List Regulations*. Fisheries and Oceans Canada (DFO) will be responsible for approvals that may be required under Habitat Management.

1.3.2.4 Public Highway and Road Permits

Crossing of, or installing pipeline on a provincial highway requires a "Soil Breaking Permit" from the NS Department of Transportation and Public Works (NSTPW). For municipal road use, the approval of the municipality is required.

The process for obtaining these approvals involves:

- *Approval for the use of public highways:* The *Public Highways Act* requires that a "Soil Breaking Permit" be obtained from the relevant district or area office of the NSTPW.

- *Approval for the use of roads situated within municipalities:* Physical construction within towns and cities requires the consent of the "local authority". This requires interaction, at varying levels of formality, with the administration of each municipality. The process usually requires a description of the timing, routing and components of the pipeline that will be installed in the municipality. For this project, the roads that will be crossed are under the control of the NSTPW and not the Municipality.

1.3.2.5 UARB Licence to Operate

The *Licence to Operate* will be granted by the UARB when the following conditions have been met:

- the pipeline has been constructed to the satisfaction of Heritage Gas and any condition that the UARB may have attached to the *Permit to Construct* has been fulfilled;

- evidence has been furnished that the pressure tests have been conducted satisfactorily;

- if requested by the UARB, construction of the pipeline has been witnessed by the Certifying Authority; and,

- Operations and Maintenance Manuals have been submitted, and reviewed by the UARB.

The *Licence to Operate* will be periodically amended by the UARB as further sections of the system are commissioned and approved for activation.

Table 1-1 Permitting Plan

Action	Authority	Notes/Comments	Timing/Responsibility
ENVIRONMENTAL ASSESSMENT			
1. Provincial Environmental Assessment Process	Department of the Environment and Labour (NSDEL)	Onshore pipeline five km or more in length and greater than 500 psig in pressure are defined as Class I undertakings in *Environmental Assessment Regulations*. Heritage Gas is seeking Ministerial approval to be granted following Registration without requirement of formal Environmental Assessment (EA) Report and based on submitting a Registration that: • Meets all requirements for approval by the Minister under the EA Regulations. • Evidences that the assessment is guided by good planning and environmental management. • Builds upon the work done to examine the project publicly through the UARB Gas Distribution Hearings.	**Timing:** Submission of EA registration documents; submission of additional information prior to construction; continued compliance with Conditions of Approval issued as a component of regulatory review of the Registration Document.
2. Federal Environmental Assessment Process	Most closely connected Federal authority usually takes on role of lead "responsible authority" (RA). In this case, could be Canadian Coast Guard/Navigable Waters Protection Branch of Transport Canada, or Habitat Management Branch, Fisheries and Oceans Canada.	*Canadian Environmental Assessment Act (CEAA)* is triggered by application for approval of works or undertakings affecting fish habitat and application to construct new work on, over, under, through or across any navigable water. No navigable waters are crossed by the pipeline.	**Timing:** Pre-construction environmental screenings.

UTILITY AND REVIEW BOARD			
3. Permit to Construct	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 (Nova Scotia)*. There is opportunity to combine information required for all permits and approvals for project. General requirements include: • detailed designs of pipeline; • detailed specifications of pipeline components; • quality assurance program; • system to monitor changes in design, specifications standards and procedures; and, • construction specifications including joining procedures and pressure testing. The Board retains an independent consultant as the "Certifying Authority" to review Permit to Construct applications and to determine if applicable standards and regulations are being met by the design.	**Timing:** Pre-construction

4. Licence to Operate	Utility and Review Board	Compliance with conditions attached to Permit to Construct is a pre-requisite. General requirements, based on interpretation of the *Pipeline Regulations,* are expected to include: • Compliance testing program to establish that system has been constructed in accordance with drawings and specifications • Operating and Maintenance Procedure Manual • Standard Practice Instruction Manual including system integrity and protection program • Call Before You Dig program • Emergency plan and emergency procedures manual, with an emergency awareness program The Board retains an independent consultant as the "Certifying Authority" to witness construction activities and to determine if the system has been constructed in accordance with applicable standards and regulations.	**Timing:** Post-construction
PROVINCIAL APPROVALS			
5. Approvals for work in a watercourse (Water Approvals)	NSDEL	Required under *Activities Designation Regulations* and the *Approvals Procedure Regulations of the Environment Act.* Applies to installation or maintenance of a pipeline across a watercourse, dredging of a watercourse, or any type of removal of material from a watercourse.	**Timing:** Pre-construction; monitored during construction, as required.
6. Soil Breaking Permit	NSTPW	Required before breaking the soil of any public highway. Includes most highways within counties, but not those in towns and cities.	**Timing:** Pre-construction
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 sulfide-bearing material, primarily pyritic slate bedrock of the Halifax Formation. Not anticipated to be required for this project.	**Timing:** Construction; addressed as part of EPP submitted at pre-construction stage
8. License of Driver to transport dangerous goods	NSTPW	Required for certain materials likely to be used in construction which fall within the definition of "dangerous goods" under the *Nova Scotia Dangerous Goods Transportation Act.*	**Timing:** Construction
9. Permit to Generate, Carry or Receive Waste Dangerous Goods	NSDEL	"Waste dangerous goods" will be generated during some construction. Depending on volumes and characteristics, registration may be required.	**Timing:** Construction

10. Temporary Magazine License	NSDEL on behalf of the Explosives Regulatory Division (Federal)	Relates to the temporary storage of explosives during construction. The "Magazine Standards for Blasting Explosives and Detonators License" is required where explosives are used.	**Timing:** Construction
11. Registration of and Installation of Petroleum Storage Tanks	NSDEL	Petroleum storage tanks will be installed and used in marshalling yards requiring permitting. Petroleum storage tanks of greater capacity than 4000 L must be registered.	**Timing:** Construction
12. Approval to Burn Cleared Vegetation	NSDEL NSDNR	Approvals under the *Air Quality Regulations* will be required when it is necessary for burning of materials cut to clear rights-of-way, if any burning is undertaken.	**Timing:** Construction; addressed as part of EPP submitted at pre-construction stage
13. Approval for the Use and Disposal of Water	NSDEL	When the pipeline is ready for hydrostatic pressure testing, the permits are required under the *Activities Designation Regulations* and *Approvals 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
15. Granting of easements with respect to Provincial Crown Lands and approvals for work on Crown land	NSDNR	The Nova Scotia *Crown Lands Act* provides that the Minister of Natural Resources may, with Cabinet approval, grant an 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 uses.	**Timing:** Pre-construction
16. Heritage Research Permit	Nova Scotia Museum	The *Special Places Protection Act* requires a heritage research permit to carry out exploration or excavations seeking heritage artifacts (archaeological or cultural heritage resources). The permit holder must submit a report on the work above.	**Timing:** Pre-construction

FEDERAL APPROVALS			
17. Approval of works or undertakings affecting fish habitat	Department of Fisheries and Oceans (DFO)	Application Form set out in Schedule VI to *Fisheries (General) Regulations* May arise at watercourse crossings that may affect fish or habitat. Listed in *Law List Regulations*, and therefore triggers *CEAA*.	**Timing:** Pre-construction; monitored during construction as required
18. Approval to construct or alter work on, over, under, through or across any navigable water	Navigable Waters Protection Division of Coast Guard (Transport Canada)	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 existing lawful work does not (where profile of structure does not change). Not applicable – no navigable water.	**Timing:** Pre-construction
19. License or grant of interest in respect of Federal real property	Parks Canada, Department of National Defence, Public Works and Government Services	Not applicable	**Timing:** Pre-construction
20. 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	Not applicable	**Timing:** Pre-construction
21. Permit to transport explosives	Energy Mines and Resources administered through Nova Scotia Department of Environment and Labour	Required during construction for blasting operations.	**Timing:** Construction

2.0 Project Description

2.1 Introduction

This provides a detailed description of the Amherst High Pressure Distribution Steel Pipeline project (the Project). The project was conceptually defined in the 2002 application by Heritage Gas to the Nova Scotia UARB. This description presents a refinement and elaboration of the project as presented to the UARB, with reference to the components that make up the registered undertaking.

The Project description is presented in sufficient detail that reviewers can understand the potential environmental impacts of the project and the methods that will be applied to avoid or mitigate environmental effects. An overview of standard environmental management and protection measures are integrated with the project description. Detailed environmental and protection measures are described in the Environmental Protection Plan (EPP).

2.1.1 System Overview

The natural gas supply for the Project will be the transmission system constructed by Maritimes and Northeast Pipelines (M&NP). The pipeline will connect to the M&NP mainline near its crossing of Beecham Road north of Amherst Head. The Heritage Gas pipeline will consist of approximately 17.6 km of steel pipeline with a diameter of 114.3 mm (Figure 1-1).

The high-pressure distribution steel pipeline is used to convey natural gas from the M&NP pipeline to the Amherst area. The distribution plastic pipe network will be used to distribute natural gas to residential, commercial, industrial and institutional customers throughout the service region. Customers will be connected to the piping network through service connections and will have meters and regulators located on their property. The distribution system downstream of the TBS is outside the scope of this undertaking.

The physical project consists of:

- underground high-pressure distribution pipeline, and above ground facilities related to managing the transfer of gas through the system;
- the above ground facilities are: one high pressure reducing station (HPRS) and one TBS where the pressure is regulated down to the operating pressure of the distribution piping; and,

- for environmental assessment purposes the project also includes areas and facilities used during construction of the high-pressure distribution pipeline which include cathodic protection rectifier beds, temporary access and workspaces, and marshalling yards.

At the Custody Transfer Station (CTS) a short section of pipeline that is tapped into the M&NP mainline and runs to the inlet of the CTS, the flow of natural gas is metered, and telemetry is provided to communicate metering data to a remote facility. Custody is transferred from the M&NP system at the outlet of the CTS. The CTS will be owned, constructed and operated by M&NP and is not within the scope of this undertaking.

At the HPRS, odourant is added to the gas (for consumer safety, to make gas leak detection possible by smell), and the pressure is regulated to the operating pressure of the Heritage Gas high pressure distribution pipeline.

Other system control measures include: valves used to isolate portions of the system and provide over-pressure relief; cathodic protection of the steel pipelines; and, a supervisory control and data acquisition (SCADA) system.

Isolation valves will be provided at the HPRS and the TBS. These will allow isolation of the pipeline for emergency shutoff, preventive repair or inspection.

Other protective and management measures and components are described in Section 2.6. These include pipe coatings, cathodic protection, and system control features.

2.1.2 Environmental Protection

Section 2.5 presents general environmental protection measures related to: soils, bedrock and management of acid generating bedrock; sediment and erosion control; cultural heritage resource protection; and general approaches to environmental protection measures for the pipeline construction.

2.1.3 Presentation of this Section

The project is described in each of its phases. Section 2.2 overviews the project components. Section 2.3 then describes:

- project and construction management;
- the construction schedule;

The construction phase is described in Section 2.4. General construction methods are provided first, followed by methods of water crossing and commissioning of the system is also included. Section 2.5 describes typical environmental protection measures.

Operations and maintenance (O&M) are considered as one phase, and are described in Section 2.6. O&M includes system management and operation through remote measurement and control. Maintenance is a continuous part of system operation. Prevention of damage to the system by third parties and response to emergency conditions are also described as part of operations.

Decommissioning, the final phase, is described in Section 2.7. This is a brief section defining how the pipeline will be decommissioned if it ceases operation.

2.2 System Components

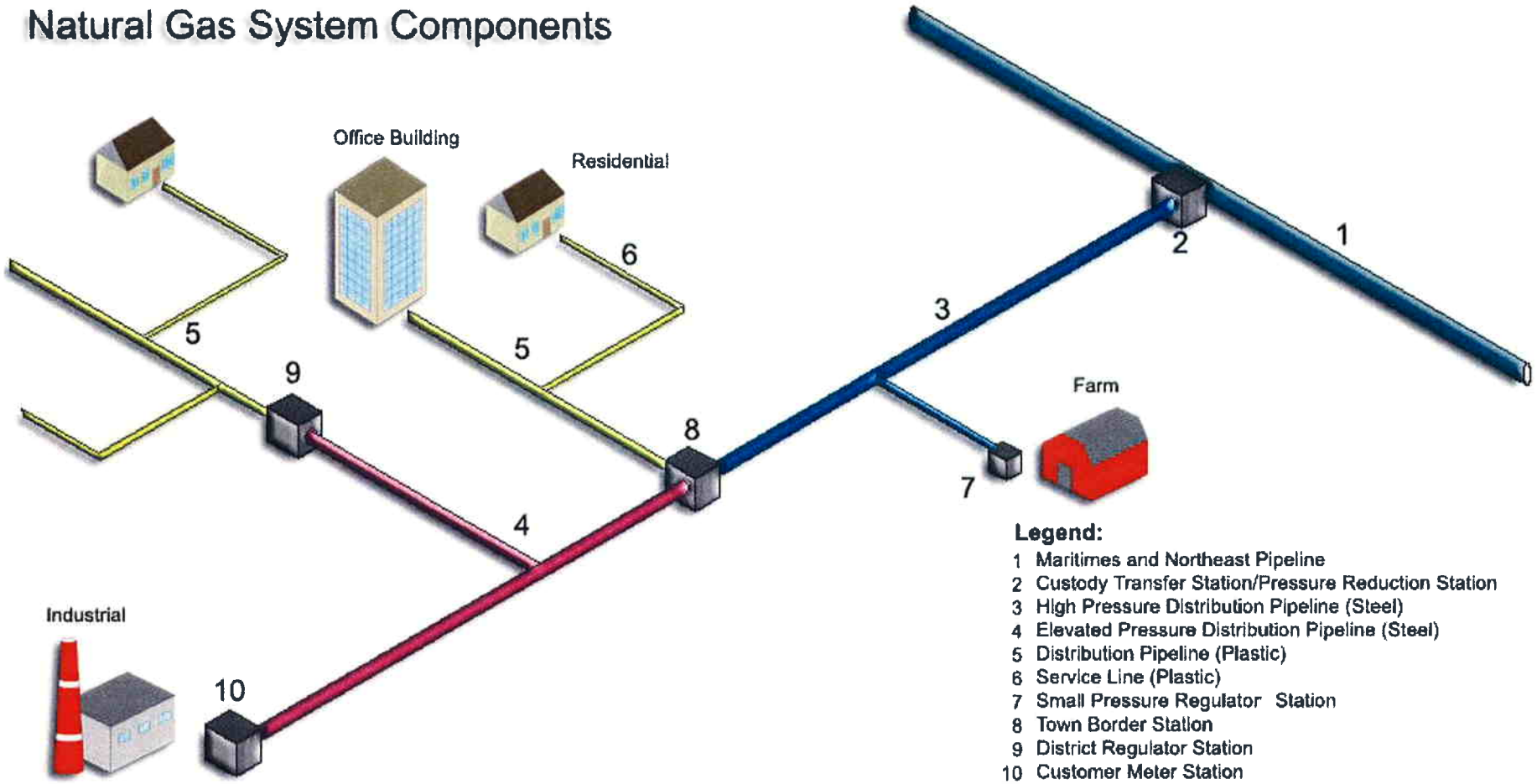
The system of steel pipeline and distribution pipelines will be used to convey natural gas from the M&NP mainline to residential, commercial, industrial and institutional customers. Downstream of the point of custody transfer from M&NP CTS, Heritage Gas will own and operate all pipelines and related facilities, up to and including the meters and regulators at the point of delivery to customers. Within service areas, gas is distributed by elevated and medium-pressure pipes to customers. The project will be constructed to meet or exceed the standards required in *CSA Z662 Oil and Gas Pipeline Systems*. A graphical representation of the system is provided in Figure 2-1.

Above ground facilities associated with the project are principally for the control of pressure and measurement of flow. The major facilities are:

- M&NP CTS where the natural gas flow is metered and custody is transferred from M&NP to Heritage Gas;
- HPRS where natural gas is odourized and the pressure is reduced to the operating pressure of the pipeline;

In addition, small pressure regulating stations (Figure 2-1) may be constructed to deliver natural gas to customers at intermediate points along the alignment. Currently, one such station is contemplated at the intersection of the pipeline with Highway 6.

Natural Gas System Components



Legend:

1 Maritimes and Northeast Pipeline
2 Custody Transfer Station/Pressure Reduction Station
3 High Pressure Distribution Pipeline (Steel)
4 Elevated Pressure Distribution Pipeline (Steel)
5 Distribution Pipeline (Plastic)
6 Service Line (Plastic)
7 Small Pressure Regulator Station
8 Town Border Station
9 District Regulator Station
10 Customer Meter Station

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DILLON CONSULTING	TITLE **Natural Gas Distribution Schematic**	PROJECT No. **04-3265**
DATE **Dec. 2004**	PROJECT **Amherst High Pressure Steel Pipeline**	FIGURE No. **2-1**

- TBS where gas is transferred to elevated or medium-pressure pipes; and
- isolation valves which are included in the HPRS and TBS layouts.

Photographs of existing Heritage Gas facilities are provided to illustrate the facilities (Plate 1).

2.3 Management, Schedule, Design and Pre-construction Activities

2.3.1 Management

2.3.1.1 Project Management

Heritage Gas will assign a broad, diverse team of project managers, engineers, environmental scientists, and construction managers to complete the management required for construction of this project. The team will include engineering design, environment, procurement, lands and construction staff. The team will assemble experienced personnel including Heritage Gas employees, parent company staff, consultants and contractors.

Heritage Gas staff will undertake management of the project's planning and design phases. Consultants will provide assistance to Heritage Gas as required.

2.3.1.2 Pre-Construction Management

A number of management activities are conducted prior to construction of the pipeline to faciliate timely project completion. These activities include:

- system planning and design, focussing on the environmental and engineering aspects of route selection and facility site selection;
- pre-construction activities, including surveying and soils and environmental investigations;
- regulatory permits and land access, to be secured in a timely manner;
- materials procurement, including documentation pertaining to quality control of pipe material and components;
- contracted resources, to be tendered for prior to construction; and,
- contracts and materials to be procured in accordance with Heritage Gas policies.

2.3.1.3 Construction Management

The construction stage of the project will include contract administration, construction, clean up, and pre-commissioning.

PLATE 1

Town Border Station

Small Regulator Station

Key construction management activities include:

- control of construction schedule and budget;
- coordination of construction logistics;
- coordination of contractors and contract administration;
- communications with the public and stakeholders during construction;
- application of company programs and procedures relating to construction activities;
- execution of the work in accordance with project standards and specifications;
- implementation of the safety, quality control, quality assurance and environmental management programs, including supervision of all independent testing and inspection requirements;
- certification, pre-commissioning and hand-off to operation; and,
- retention of construction records.

These activities are summarized in point form below.

Project Controls

- the construction of pipelines and components is managed to meet the budget, schedule and environmental management objectives set by Heritage Gas.

Management and Coordination

- construction logistics are managed with particular regard to construction staging, materials delivery, materials control, temporary facilities, emergency response during construction, and related factors;
- contractors are coordinated and administered to meet their individual targets and objectives; and,
- programs and procedures including environmental protection, construction safety and emergency response are applied to meet overall company goals, objectives and regulatory requirements.

Communications

- the public and affected property owners are kept informed of construction activities in a timely manner; and,
- regulators and other stakeholders are kept informed of issues arising during construction.

Materials Quality Control

- materials are received, and accepted from suppliers;
- measures for material inventory control and storage are implemented;

- delivery of material to contractors is coordinated and controlled; and,
- records are maintained to track the location of material installation.

Installation Quality Control

- standards and specifications are applied during construction;
- design changes are reviewed and receive appropriate approval and sign-off; and,
- quality control procedures are implemented to verify that construction proceeds in accordance with Heritage Gas' specified requirements.

Quality Assurance/Inspection

- inspection, including verification of jointing and pressure testing, is conducted as part of the overall quality assurance program for the project;
- the constructed project meets specified Heritage Gas and CSA Z662 requirements;
- the constructed project meets the terms and conditions of the UARB Permit to Construct; and,
- appropriate quality record documentation is maintained to demonstrate the above.

Environmental Compliance

- environmental compliance is confirmed and measured against regulatory requirements, Terms and Conditions of Approvals, and the EPP during the construction phase;
- procedures are put in place for conducting corrective actions in the event that non-compliance is discovered during construction;
- the environmental protection program, which includes monitoring plans, environmental protection plans, environmental construction plans, emergency response plans, contingency plans, and auditing and reporting mechanisms, are applied in accordance with Heritage Gas' procedures and specified requirements.

Documentation and Records

- relevant data from the quality assurance program is maintained to demonstrate compliance with standard specifications; examples of information contained under the program are: pipe material testing; material certificates; shop and field testing results; and verification of operating pressures;
- documentation and records necessary to demonstrate conformance with the field joining program are maintained and include: welders certificates; inspectors certificates; signed-off welding procedures; non-destructive testing results (X-rays, Magnetic Particle Imaging (MPI) or other methods); destructive testing results (if any); and, description of remedial measures and repairs;
- documentation and records demonstrating conformance with the field testing program are maintained, including descriptions of the following: proof of permits and approvals; calibration

of testing equipment; and pressure testing results (description of test medium, pressure and duration); and,

- the construction team maintains a library of project records that may include such items as project photographs and video-recordings, copies of permits, inventory control records, safety records, design changes, contemplated change orders, and other records pertaining to construction activities.

Pre-commissioning and Hand-off

- the system is pre-commissioned and handed-off to the operation team of Heritage Gas; and,
- as-built information is collected to meet the requirements of the record retention program and included in the project geographical information system (GIS).

2.3.2 Construction Schedule

The proposed construction schedule is summarized in Figure 2-2. Construction will be initiated by centreline survey and clearing in the spring of 2005, however, if sufficient easement is available sooner, Heritage Gas will implement winter clearing. The pipeline installation is anticipated to begin in June, 2005. Clean-up, testing and commissioning will be completed by September, 2005.

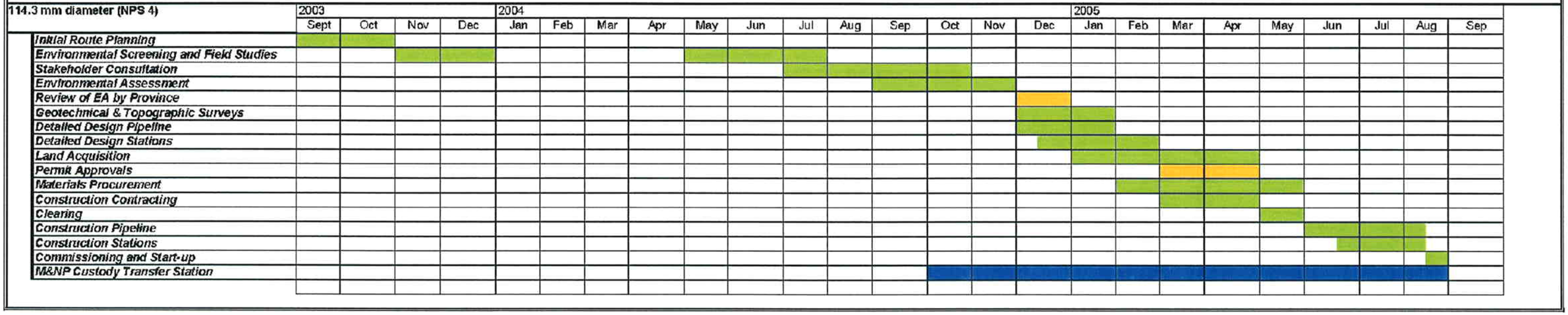
Sequencing of Construction Within a Service Area

Steel pipeline construction will normally require a single crew starting at the inlet of the TBS and proceeding linearly towards the HPRS area. Where required, the work program can be further divided and additional crews provided to increase productivity. For example, common practice is for specialized crews to proceed first with the installations of crossings and special facilities, such as valve sites. Horizontal directional drilling (HDD) and boring are completed before construction of the remaining pipeline. This proposed sequence may be affected by, and modified in accordance with, the easement acquisition process.

Testing and Commissioning

The pipeline will be tested for compliance upon completion of construction. Testing will include weld testing and hydrostatic pressure testing as specified. Once compliance testing is successful, the completed portions of piping are filled with compressed air until such time that the system is ready for connection. Above ground facilities also undergo a series of compliance tests prior to hand-off.

Year 2004 to 2005
Amherst High Pressure Distribution Pipeline
Implementation Schedule



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DILLON CONSULTING	TITLE Amherst High Pressure Steel Pipeline Design and Permitting Schedule	PROJECT No. 04-3265
DATE Dec. 2004	PROJECT Amherst High Pressure Steel Pipeline	FIGURE No. 2-2

At the end of the construction program, the entire system is pre-commissioned and handed-off from the construction manager to the operation team. The operation team oversees the gasification of the system and prepares to start operation after the License to Operate is received from the UARB.

2.3.3 System Planning and Design

The design process is a critical factor in assuring environmental resource protection. The planning and design of the project is described below under the following subsections:

- Regulatory Environment (2.3.3.1);
- Planning Process (2.3.3.2);
- Route Selection Process (2.3.3.3);
- Siting of Facilities (2.3.3.4); and
- Design (2.3.3.5)

2.3.3.1 Regulatory Environment

The regulatory environment for this project arises from the following provincial acts and regulations:

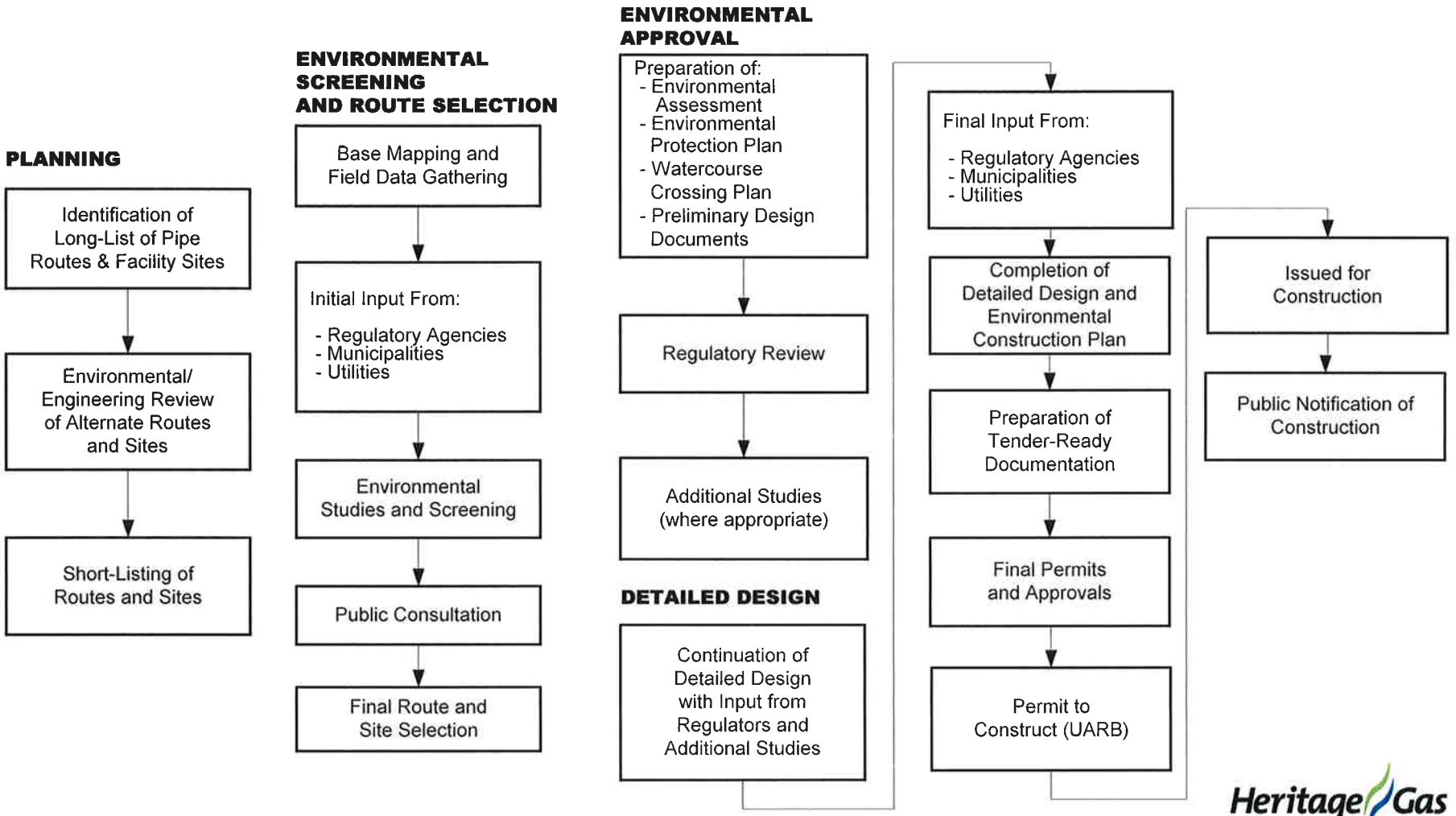
- *Pipeline Act - An Act Respecting the Transmission of Oil and Gas*, R.S. c.345, 1989
- *Pipeline Regulations* made under the *Pipeline Act*, 1998, N.S. Reg 199/2004
- *Gas Distribution Act - An Act Respecting the Delivery and Sale of Natural Gas in the Province*, 1997
- *Gas Distribution Regulations* made under the *Gas Distribution Act*, N.S. Reg. 72/2002

As stipulated in the above acts and regulations, the project will be designed and constructed in accordance with the requirements of the CSA *Standard Z662, Oil and Gas Pipeline Systems* and all associated standards and practices.

In addition to the above codes and regulations, the system will be designed to meet applicable environmental regulations and guidelines. The permitting framework for the project is presented in Section 1.4.

2.3.3.2 Planning Process

The sequence of activities required for planning of alternate routes and facilities siting and selection, interfacing with stakeholders, and the design and approvals process is described in the flow diagram presented in Figure 2-3. This diagram provides an overall view of the typical steps to complete design documents and receive the required Permit to Construct from the UARB.



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DILLON CONSULTING	TITLE **TYPICAL DESIGN PROCESS FLOW CHART**	PROJECT No. **04-3265**
DATE **Dec. 2004**	PROJECT **Amherst High Pressure Steel Pipeline**	FIGURE No. **2-3**

2.3.3.3 Route Selection Process

The initial routes were selected to connect between the M&NP pipeline and the Town of Amherst.

The initial routing alternatives were evaluated based on desktop geographic assessments at 1:50,000 scale and limited field reconnaissance.

Following the initial route selection, the alternative pipeline alignments were identified and evaluated based on engineering and environmental factors as indicated in Table 2-1. The following steps were also completed:

- Completion of an environmental screening report (with a view to identifying major environmental issues for input into the initial alignments considered) in September 2003.
- Collection of project-specific aerial photography survey in November 2003.
- Field data were collected through the spring, summer and fall of 2004 (rare plants, fish habitat, and cultural resources).
- Detailed site reconnaissance were undertaken through the summer of 2004.
- Stakeholder and landowner consultation were carried out in summer-fall 2004.
- A helicopter overflight reconnaissance was completed in fall 2004.

Routing evaluations were completed on an iterative basis, taking into account the information obtained during the execution of the above-described steps, and were based on the factors listed in Table 2-1.

Table 2-1
Factors Influencing Preferred and Alternate Alignment Evaluation

Factors	Rationale
Ease of access and proximity to M&NP lateral/mainline.	The location of the connecting point to the M&NP pipeline must have suitable for road access and power supply. Potential locations were discussed with M&NP and with the Town of Amherst. The location selected at Beecham Road was the only one meeting the requirements of all parties. The presence of the protected Amherst watershed was a key factor in the decision.
Distance from populated areas	The pipeline routes were selected to maximize distance from residences.
Impact on properties and land use	As much as possible, impact on properties was minimized. Measures considered include: placement of pipeline route along edge of properties; avoidance of camps and other such land use; avoidance of agricultural lands (where possible) and blueberry-growing lands.
Ease of natural gas access to consumers.	Ease of access to densely populated areas of residential customers and/or high industrial/institutional loads were considered favourably.
Pipeline length	The total length of pipe was considered from both cost and environmental perspectives. Shorter routes were considered more favourable because they may reduce the cost, and will reduce the amount of land disturbed during construction.

Factors	Rationale
Preference for locating pipeline in already disturbed areas	Examples of previously disturbed areas include cleared lands, and paralleling other utilities (such as power lines).
Avoidance of known environmentally sensitive areas and factors such as wetlands and sensitive water habitats.	Significant environmental factors that were deemed to be unmitigable, such as wetlands, were avoided to the maximum extent possible. The number of watercourse crossings were minimized.
Avoidance of protected water supply areas (municipal watersheds and areas of known domestic surface water supplies).	Routes that traversed protected municipal and domestic water supplies were avoided. By maximizing the distance from populated areas, sensitive domestic water supplies were avoided.
Avoidance of existing major municipal infrastructure, both above and underground.	Routes with complex existing infrastructure complicate the construction process and were considered less favourably. This factor had an impact on the location of the TBS.
Timing, Availability and Cost of Land Access	This factor included estimates of time needed to contact private land owners and negotiate easements.
Constructability and Capital Costs	All of the routes were evaluated based on their constructability. All other factors being equal, routes with the lowest overall capital costs were preferred.

None of the factors was considered more important than the others as they all influenced the alignment selection process; therefore, these factors were not ranked or scored. However, the underlying approach taken by Heritage Gas in selecting an alignment for the pipeline was to minimize the impact on the environment and on landowners through avoidance (Figure 2-4).

The preferred and alternate alignments were refined based on consultation with the public, regulatory authorities and stakeholders and study team review. Comments from all levels of government, community groups, the general public and other stakeholders were considered during alignment selection.

When detailed design is conducted, a final review of the alignment, based on the factors in Table 2-2, either confirms the suitability of the selection, or leads to the modification of the selection as follows:

- a small section of the alignment is re-evaluated and adjusted to suit the physical characteristics of the terrain; or,
- an alignment preference is identified by landowners, regulators and/or stakeholders;

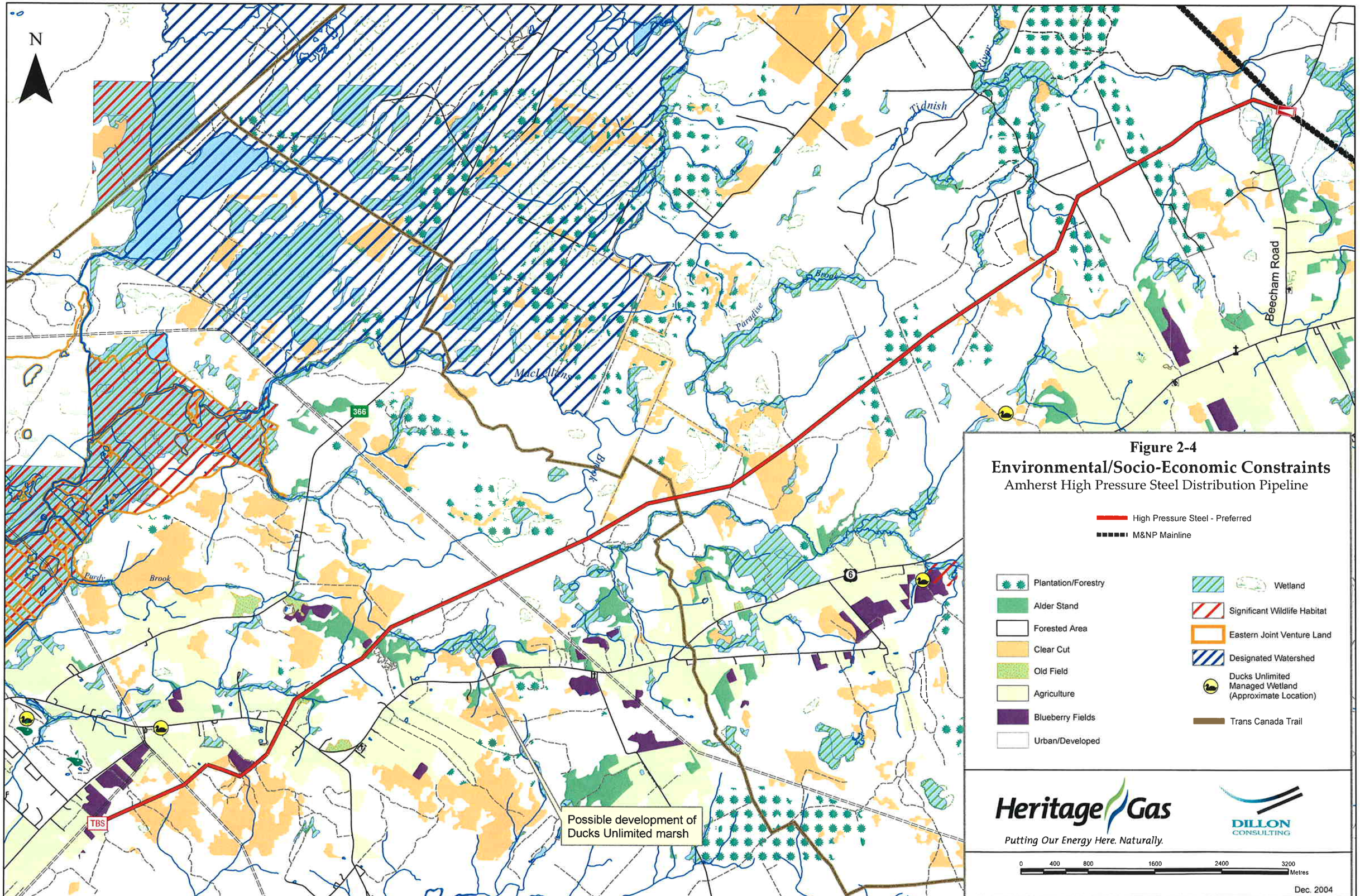

Figure 2-4

Environmental/Socio-Economic Constraints

Amherst High Pressure Steel Distribution Pipeline

High Pressure Steel - Preferred

M&NP Mainline

Plantation/Forestry

Alder Stand

Forested Area

Clear Cut

Old Field

Agriculture

Blueberry Fields

Urban/Developed

Wetland

Significant Wildlife Habitat

Eastern Joint Venture Land

Designated Watershed

Ducks Unlimited Managed Wetland (Approximate Location)

Trans Canada Trail

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Dec. 2004

The final stage in the process is the detailed design of the preferred alignment. At this stage, detailed survey information is collected, and the alignment is fully defined. The detailed design, as well as consultations that are a part of the approvals process, may result in minor refinements to the alignment of particular pipeline sections.

The environmental and engineering factors influencing detailed design are listed in Table 2-2.

Table 2-2
Factors Influencing Detailed Design Alignment Evaluation

Factors	Rationale
Soils – Erodible Soils	Areas of highly erodible soils require additional erosion control. Route minimizes watercrossings.
Constructability	Options for alignment and construction methods that limit disturbance are preferred.
Easement Access	Ability to readily access work site. Requires evenly spaced access roads, maximizing use of existing roads.
Rare Plants	Route adjusted to avoid.
Critical Habitats	Route adjusted to avoid
Acid Bedrock	Not applicable.
On-site Water Supplies	Avoid to minimize disruption to water supplies.
Archaeology	An archaeology model has been developed to identify areas of high, medium and low probability of occurrence of cultural heritage resources.
Fish and Aquatic Habitat	Avoidance of sensitive fish and aquatic habitat where possible.
Wetlands	Location of wetlands will influence the location of the pipeline in the easement. Wetlands were avoided.

2.3.3.4 Siting of Facilities

Three types of facilities will sited as components of the project:

1) Custody Transfer Station (CTS) by M&NP,
2) High pressure reducing station (HPRS), and
3) Town border station (TBS).

Following the identification of the preferred high pressure distribution pipeline alignment, potential locations for the three facility types were initially determined. Information on potential locations of the CTS site, which have been determined for the pipeline, has been provided to M&NP as part of the ongoing discussions between Heritage Gas and M&NP on CTS approvals, design, construction, and ownership.

A summary of the approach utilized for the selection of preferred sites for the CTS, HPRS and TBS is presented below.

2.3.3.4.1 Siting of the Custody Transfer Station

The following sources were used in the identification of potential Custody Transfer Station locations:

- Maritimes & Northeast Pipeline *Public Notice and Route Maps,* March 1998 (1:50,000);
- Maritimes & Northeast Pipeline *Constraint Mapping, Environmental and Socio-Economic Assessment,* September 1996;
- NTS Topographic (Base) Mapping, latest available version (1:50,000);
- aerial photographs from NSDNR, 1992 and 1997 (1:10,000) and project specific aerial photography, 2003;
- field truthing observations by Heritage Gas project team personnel; and,
- internet on-line provincial *Property Records Database*.

The following preferred characteristics were applied in selecting the preferred CTS/HPRS location:

- located close to the Maritimes & Northeast Pipeline;
- accessible from a public road;
- suitable site for construction purposes (*e.g.*, topography, maximize separation distance from wetlands and watercourses);
- availability/proximity to electrical power supply;
- minimum property size of 50 m x 100 m (1.2 ha) in rural areas;
- minimal number of nearby dwellings;
- located within the boundaries of a single existing property;
- compatibility with adjacent land uses (*e.g.*, forestry, agriculture);
- compatible with zoning regulations; and,
- avoidance of ESAs.

2.3.3.4.2 Siting of Town Border Station (TBS)

The following sources were used in the identification of potential TBS:

- Proximity to customers;
- NTS Topographic (Base) Mapping, latest available version (1:10,000);
- Aerial Photographs from NSDNR, 1992 and 1997 (1:10,000) and project specific aerial photography, 2003;
- Field-truthing observations by Heritage Gas project team personnel; and,

- Internet on-line Provincial *Property Records Database*.

The following preferred characteristics were applied in selecting the preferred TBS and DRS stations:

- accessibility from a public road;
- suitability for construction purposes (*e.g.*, topography, maximize separation distance from watercourses);
- availability/proximity to power supply;
- nominal property size of 30 m x 30 m (0.09 ha) for TBS and 10 m by 10 m (0.01 ha) for DRS;
- located on vacant land;
- located within an industrial park/area (first preference) or commercial area (second preference);
- distant from adjacent residential dwellings;
- a minimum facility setback from the nearest telecommunication tower, power pole or tree of 1.5 times its height;
- located within the boundaries of a single existing property;
- compatibility with zoning regulations; and,
- avoidance of ESAs.

Using preliminary high-pressure pipeline design, potential locations for the TBS and DRS were identified. These locations were then field-truthed, with relation to the selection criteria, and a refined candidate location was identified.

2.3.3.5 Design

Design of the gas distribution system is addressed in this section under the following sections:

- Design Philosophy (2.3.3.5.1);
- Pipeline Materials (2.3.3.5.2);
- System Design Tools (2.3.3.5.3); and,
- GIS (2.3.3.5.4).

2.3.3.5.1 Design Philosophy

The project will consist of high-pressure steel transmission pipeline: of welded steel pipe with maximum operating pressures (MOP) of 4,965 kPa (720 psig), will be used to convey natural gas from the M&NP main line to the Amherst service region.

All of the piping will be buried. The depth of pipe burial will meet or exceed the minimum standards under CSA Z662. Locations where the standard will be exceeded will generally be a response to the

requirements of the owner of the property in which the pipe is installed. Table 2-3 provides a summary of the minimum cover requirements in various locations. The table is nominally based on CSA Z662, however, it also presents Heritage Gas cover requirements particular to Cumberland County.

Table 2-3
Minimum Cover Requirements for Buried Pipelines (cm)[2]

Location	Normal Excavation	Rock Excavation[3]
General	60	60
Within pipeline easement	100	75
Crossing travelled surface (road)[4]	200	200
Below roadway ditch[4]	120	To be determined
Railway[5]		
Cased	168	168
Uncased	305	305
Water Crossing	120[6]	60
Drainage and Irrigation Ditch Invert	75	60

1. Table based on CSA Z662
2. Measured to top of carrier or casing pipe
3. Rock excavation requiring blasting or removal by comparable means
4. NSTPW requirement
5. Within 7 m of centreline of the outside track, measured at right angles to the centreline of the track (CN Rail)
6. Cover not less than 60 cm may be used where analysis indicates the potential for erosion is minimal.

2.3.3.5.2 Pipeline Materials

Materials for the high pressure distribution pipeline will be steel, meeting specifications of CSA Z245.1, with additional specifications to be determined by Heritage Gas. The steel grade will be 290 or greater. The pipe wall thickness for each pipe size will be selected in combination with the material yield strength of the steel, based on reducing the magnitude of hoop stress experienced at MOP to below 30% of Specified Minimum Yield Stress (SMYS). Pipe diameter will be 114.3 mm (NPS4). A cathodic protection system, coupled with the "yellow jacket" polyethylene coating on the pipeline, will ensure system integrity.

2.3.3.5.3 System Design Tools

The software used for system analysis and hydraulic modelling is Stoner Associate's SynerGEE Gas. This software determines the size and magnitude of the distribution system, and is integrated into Heritage Gas' Geographic Information System (GIS). The modelling is conducted by Heritage Gas staff to predict the pressures and flows throughout the system.

All piping systems will be designed for winter peak design, using peak winter hourly data when all potential customers are on the system.

2.3.3.5.4 GIS

Heritage Gas will operate a GIS to serve multiple purposes and functions through all stages of the project. The GIS will be used as a planning and design tool as well as for project data recording and will assist work management functions during operations. The GIS will be compatible with existing provincial and municipal GIS databases.

The GIS functions are:

- socio-economic data analysis and preparation of thematic maps for marketing support;
- environmental planning and screening support;
- mapping and base drawings preparation;
- alignment drawings preparation;
- quality assurance records and as-built drawings repository;
- reporting functions; and,
- "Call Before You Dig" support.

In addition to planning and design support, the role of the GIS will be to provide an accurate and detailed geo-referenced database of the complete system. It will be a record of construction, and provide the basic support to enable implementation and operation of the "call before you dig" program and emergency response plans.

2.3.4 Pre-construction Activities

Supporting activities such as surveying and geotechnical investigations. These activities are required before detailed design is completed and construction begins. These activities have relatively low and localized impact on the environment, however, Heritage Gas will implement the protection measures for these activities as described in the EPP.

2.3.4.1 Surveying

Surveying includes gathering of location and elevation data required for the design of the system. Surveying requires cutting of vegetation along survey lines and cross-section offsets to provide clear line of sight for survey equipment. Access to the easement will be by existing access roads and trails.

2.3.4.2 Geotechnical Investigations

Surficial soil conditions, depth to bedrock and the nature of the overburden and bedrock are investigated once the pipeline route is selected. Both excavation by mechanical equipment and drilling with a drill rig are used for these investigations. Watercourse crossing design requires site specific geotechnical

information which can be collected from the bank areas. Limited tree and shrub cutting may be required for these activities to provide access or to clear a work area.

As with surveying, access to the easement will be by existing roads and trails. Where new access is required, it will be negotiated with the landowner and its construction will follow the requirements of the EPP. If the drill rig or other equipment cannot use an existing structure to cross watercourses, temporary crossings will be constructed in accordance with an Approval from NSDEL and will meet the requirements of the EPP.

2.4 Construction Methods

This section summarizes typical pipeline construction activities and general environmental protection measures. Detailed environmental protection measures for each activity are detailed in the Heritage Gas EPP. Site specific measures will be detailed on environmental control plans (ECPs) to be prepared for the project as part of the detailed design.

2.4.1 Construction Equipment

Although decisions on specific types of equipment have not been made, some equipment used for construction of natural gas pipelines are described below.

Chain Trenchers

Specialized excavation machinery used to dig a narrow trench for the installation of underground utilities. Trenchers range in size from walk-behind (100 lbs.) units used for the installation of small diameter shallow pipes (such as individual service lines to houses) to large (500,000 lbs.) high output units used for deeper, wider trenches in tough soil and rock conditions. Trench widths can be as little as 150 mm for the smallest unit or up to 800 mm and beyond.

Trenchers use a toothed chain mounted on a chain-saw like boom. Removal of the soil is effected by the rotation of the chain. Spoil is deposited beside the excavation for reuse as backfill or can be conveyed to a truck for disposal offsite. Spoils are typically a mixture of fines and granular materials as a result of the grinding action of the chain.

Trenchers anticipated for use on the project will be diesel driven, with noise generation and maintenance requirements similar to conventional construction equipment. The units anticipated for use on high-pressure distribution steel pipelines are expected to be in the 18 tonne range and will cut trench widths between 300 and 600 mm.

Excavator

Excavators range from those that can be towed behind a pick-up truck to large, high production units that can be used in rough digging conditions.

Excavated soil is typically stored next to the trench and reinstated as backfill in the trench line. Unsuitable or excess soil can be loaded into an awaiting truck for disposal off-site. The consistency of the excavated soils is not altered by this type of equipment.

Excavators used on the project will be diesel driven, with noise generation and maintenance requirements similar to equipment used in excavation of water and sewer lines, or house foundation excavation. Trench widths will typically be over 400 mm for an excavator. Other bucket widths can be used if required.

Side Booms

Also referred to as pipelayers, these units are constructed on a special purpose crawler frame and have a boom and cable sling projecting off the side. The equipment is used for moving and/or placement of the pipe into the trench. Side booms are used primarily on steel high-pressure distribution pipelines.

The side booms are diesel driven and can be expected to generate noise and have maintenance requirements similar to conventional construction equipment.

Rubber Tired Backhoes

Backhoes function as a small capacity excavator, or a small capacity front end loader. The backhoe will be used primarily for site clean-up and trench backfilling.

Backhoes are diesel powered but generate less noise than the other equipment described.

2.4.2 Construction Sequence

Typically, a number of crews will be assigned to the project:

- Clearing crew, normally under a separate contract ahead of the pipeline construction activities;
- Main pipeline spread with primary responsibility for installation of the pipeline, including:
    - right-of-way crew (responsible for environmental protection measures, grading, clean-up and stabilization)
    - ditching crew (responsible for trenching)
    - welding and X-ray inspection crews
    - lowering-in and backfilling crews;
- One or more 'trenchless' crews for completing crossings using horizontal directional drilling (HDD) and boring methods; and,
- Tie-in crew, for connections at crossings and above-ground facilities.

The production rate will depend on a number of factors such as topography, presence of bedrock, or weather, but is generally expected to be in the order of 500 m per day. In total, it is estimated that approximately 1.0 to 1.5 km of the pipeline alignment will undergo construction at any one time.

At the completion of all construction and tie-ins, final inspection and hydrostatic testing will be completed prior to obtaining License to Operate and activation of the system.

2.4.2.1 Clearing

The easement will be cleared and grubbed of all brush and timber to a cleared width of 20 m. Stumps and root systems will be retained to the extent practical except over the ditch line and where removal is necessary for safe equipment access. The need for, and extent of, stump and root system removal will be determined on a site-by-site basis. Merchantable timber will be salvaged and the remaining debris disposed of in accordance with landowner agreements and the EPP. It is anticipated that stumps will be buried at pre-selected locations spaced evenly along the alignment. Selection of these locations will be done during detailed design.

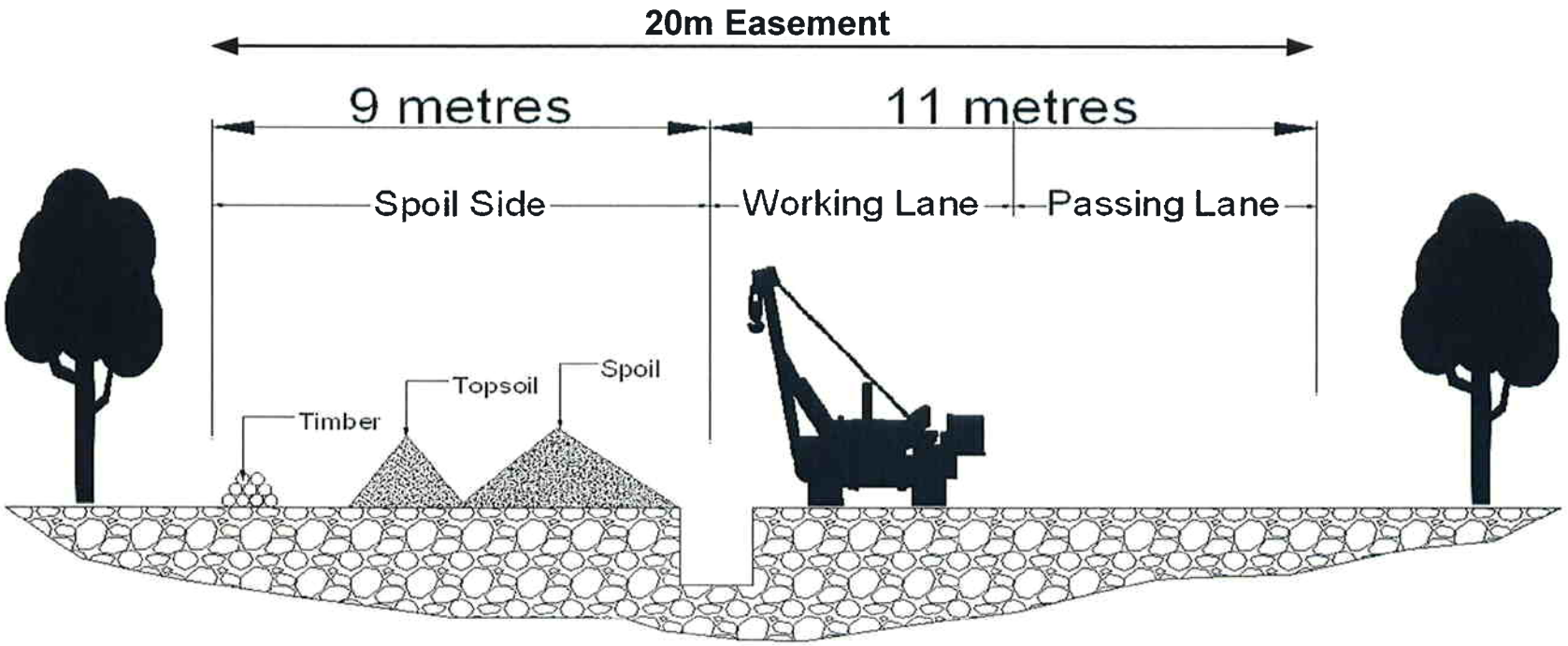
In addition, Heritage Gas will retain timber suitable for construction of corduroy where additional stability is required (e.g., wet areas). The entire easement is cleared mechanically with the exception of a minimum 10 m buffer zone on either side of watercourse crossings in which only merchantable timber cleared by hand or by equipment that can reach into the buffer zone until immediately prior to a watercourse crossing.

2.4.2.2 Grading

Environmental control measures such as sediment fencing, diversion, ditching or sedimentation ponds will be installed by the crews prior to commencement of grading activities. Grading may be required to level the work area. Where required, graded areas will be grubbed and topsoil stripped and stockpiled for reuse. Roots and slash generated from the grubbing operation may be stockpiled for use as rollback, used for corduroy or buried in the easement. The locations for corduroy or burial will be determined as part of detailed design. A typical cross-section of the easement is provided in Figure 2-5.

Given the nature of the bedrock geology (predominantly of Pictou Group mudstones and sandstones) in the project area and the depth of overburden, blasting is not anticipated. In addition, acid generating rock is not anticipated as the Pictou Group bedrock does not contain sulphides.

In the unlikely event instream blasting is required, the 1998 *Guidelines for Use of Explosives In or Near Canadian Fisheries Waters* will be complied with, requiring written commitments to follow DFO's *Blasting Fact Sheet - Fish and Fish Habitat Protection.*



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DILLON CONSULTING	TITLE **Typical Easement Cross Section**	PROJECT No. **04-3265**
DATE **Dec. 2004**	PROJECT **Amherst High Pressure Steel Pipeline**	FIGURE No. **2-5**

Temporary access road structures may be required at watercourse crossings and for access to the construction area. All watercourse crossings will require some degree of equipment access. Selection of vehicle access techniques will take into consideration a wide range of factors including: pipeline construction technique, watercourse physical character, environmental sensitivity, geotechnical issues and technical aspects associated with vehicle use.

Vehicle crossings, if required, are expected to be temporary bridges, mats or culverts. Temporary bridges are generally used for highly sensitive watercourses, particularly those of a larger size. Mats and culverts could be used for smaller less sensitive watercourses. Environmental protection measures for vehicle crossings are described in the EPP.

2.4.2.3 Stringing

The pipe will be laid out along the pipeline route. The pipe will be set on skids, bent to conform to the surface topography and welded. Each welded joint will be non-destructively inspected and coated.

2.4.2.4 Trench Excavation

Using a trenching machine or an excavator, a trench will be excavated to provide adequate ground cover depth as specified by Heritage Gas, but not less than the cover specified under CSA Z662. The width of the trench will vary but generally be 400 mm. If bedrock is encountered, use of rock breaker may be required. Rock blasting is not anticipated, but if any is required, it will be conducted in accordance with applicable blasting regulations.

When water accumulates in the open trench, the trenches will be dewatered to filter bag located, where possible, in a vegetated area removed from watercourses to prevent sediment laden runoff from entering watercourses.

2.4.2.5 Watercourse Crossings

Construction of the project will require nine watercourse crossings. Heritage Gas has committed to cross watercourses using dry methods (e.g. dam and pump, flume), or by horizontal directional drilling (HDD). The selection of water crossing method depends on the size of the watercourse, potential sensitivities and resource/land uses, as well as on the physical characteristics of the area including: environmental sensitivity, bedrock, soil, local topography, geotechnical characteristics, working space, and crossing approaches. In all cases, the crossing location and type will be selected to consider environmental concerns. If a particular crossing cannot be constructed without significant effects, an alternate location will be selected. The specific method of watercourse crossing will be confirmed during the detailed design of the pipeline and will be specified in its applications for approval for the watercourse crossings.

Any instream construction activity will be undertaken within the June 15 to September 15 construction window, when aquatic life is least sensitive to potential construction effects.

In the unlikely event, that Heritage Gas requires instream construction outside this period, Heritage Gas will develop a specific crossing work plan for approval from NSDEL and DFO.

The following sections summarize the watercourse crossing techniques. Site specific measures will be outlined for each crossing type during detailed design and submitted with the Application for Approval. At crossings where there is potential for sensitive habitat to be affected, plans will include site specific Sediment and Erosion Control Plans which will outline the crossing layout, techniques to be used, environmental protection measures and on-land sediment control strategies to be employed during construction. In addition, a site specific reclamation plan may be developed to ensure that impacts to aquatic resources are minimal in magnitude, short term in duration, and non-residual in nature.

2.4.2.5.1 Crossing Methods

Dry Crossings

Dry (isolated) crossing techniques involve the use of measures to isolate the trench excavation and pipe placement from direct contact with the watercourse. The two isolation crossing techniques commonly implemented in pipeline construction are: dam and pump, and flume methods. Other methods which may be used for specific situations, although unlikely for this project due to the small size and low flows of the watercourses, include high volume by-pass, partial pump bypass and aquadam/cofferdam techniques.

Dry crossings are typically used for watercourses less than 10 m wide with anticipated flows during construction from less than 1 cms to a maximum of 3 cms. Dry crossings are suitable for those crossing locations with mitigable aquatic resources.

Dam and Pump

The dam and pump method involves the construction of temporary dams (e.g. sand bags, wood or steel panels) upstream and downstream of the crossing and the pumping of the watercourse flow around the work area. The pumped flow is typically discharged to a rock scour pad placed in the watercourse to prevent erosion of the streambed. Fish are removed from the dam areas and a fish screen is installed upstream and downstream of the crossing to keep fish out of the work area. The isolated area is de-watered to a vegetated location or to a filter bag. This method is commonly used for the crossing of small watercourses where fish passage is not a concern at the time of construction. This crossing is typically completed in one day. A typical example of this method is presented on Figure 2-6.

FIG2-6.dwg
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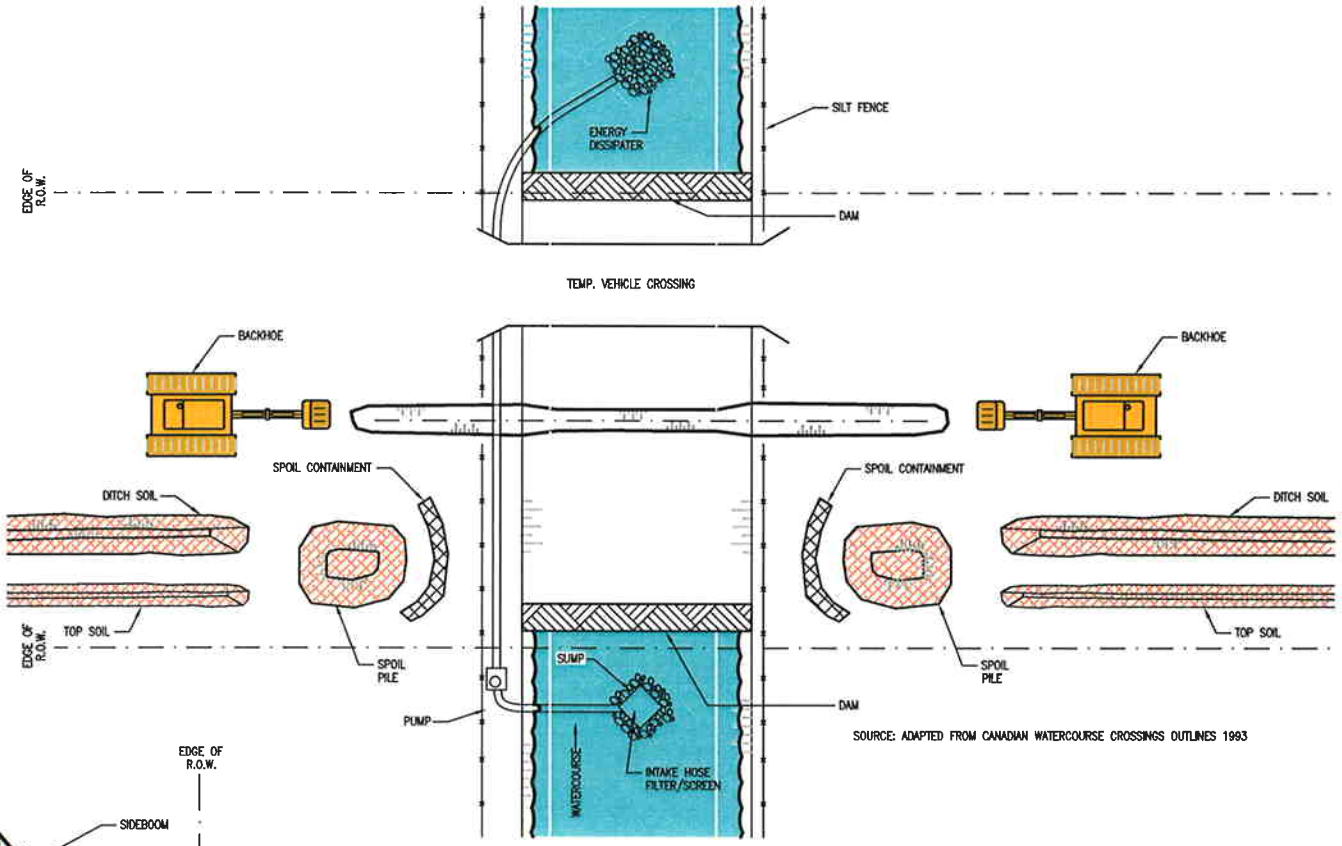
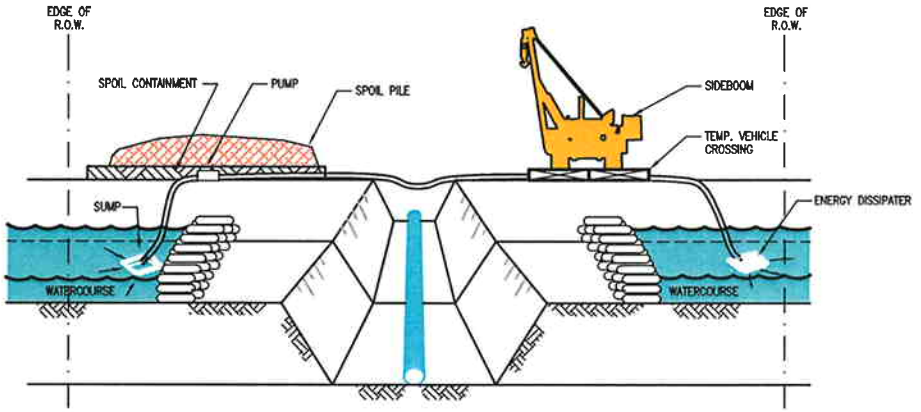


SOURCE: ADAPTED FROM CANADIAN WATERCOURSE CROSSINGS OUTLINES 1993



SECTION - INSTALLATION OF PIPELINE

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DATE DEC. 2004

TITLE **WATERCOURSE CONSTRUCTION ISOLATED CROSSING (DAM & PUMP)**

PROJECT **AMHERST HIGH PRESSURE STEEL PIPELINE**

PROJECT No. **04-3265**

FIGURE No. **2-6**

Flume

Fluming involves the diversion of the entire flow of the watercourse through a number (usually two) of appropriately sized flumes (temporary culverts). The size and number of flumes are chosen to carry the anticipated flows during the construction period. This method is most commonly used for crossing of small watercourses having defined banks and channel, and where sediment generation and fish passage during construction are of concern. A typical crossing plan and sequence of events involved with the flume method is shown on Figure 2-7.

A flume(s) is placed in the watercourse. Temporary dams (sand bags, wood or steel panels) are constructed at each end of the flume to isolate an area where excavation, pipe placement and restoration occurs. Fish are rescued from the isolated portion of the watercourse and then the isolated area is de-watered to allow for trench excavation, pipeline installation and backfilling in dry conditions. Typically, water is discharged to a vegetated area or filter bag to minimize sedimentation. Flume crossings can be completed within 1 to 2 days.

Horizontal Directional Drilling (HDD)

With HDD, a drilling rig is used to directionally drill a path beneath a watercourse from a location on one bank to a location on the opposite bank. It can be used for any size watercourse but for this project it is proposed for the most sensitive crossings such as MacLellans Brook.

The two-stage process involves the drilling of a small diameter pilot hole along a designated directional path, followed by the enlarging of the pilot hole by reaming to a diameter suitable to accommodate the proposed pipeline. A pre-welded section pipe string is then pulled through the drilled hole.

The technical feasibility of a HDD installation is determined by the distance to be drilled, the diameter of the pipeline, and the subsurface conditions. Geotechnical information is required to determine whether HDD is feasible. Inconsistent bedrock and overburden conditions present impediments to the use of HDD technology.

A typical illustation of this crossing method is illustrated on Figure 2-8. The work space requirements are generally larger than those associated with dry crossings due to the requirement to site additional temporary workspace for spoil stockpiling, de-watering activities, and erosion and sediment control measures. The work space can be as large as 10 m wide and 15 m long on each side of, and set back from the watercourse. However, these dimensions are dependent upon the site topography. Typically, a HDD crossing of the size contemplated on this project can be completed with 2 or 3 days including equipment set up and take down.

FIG2-7.dwg
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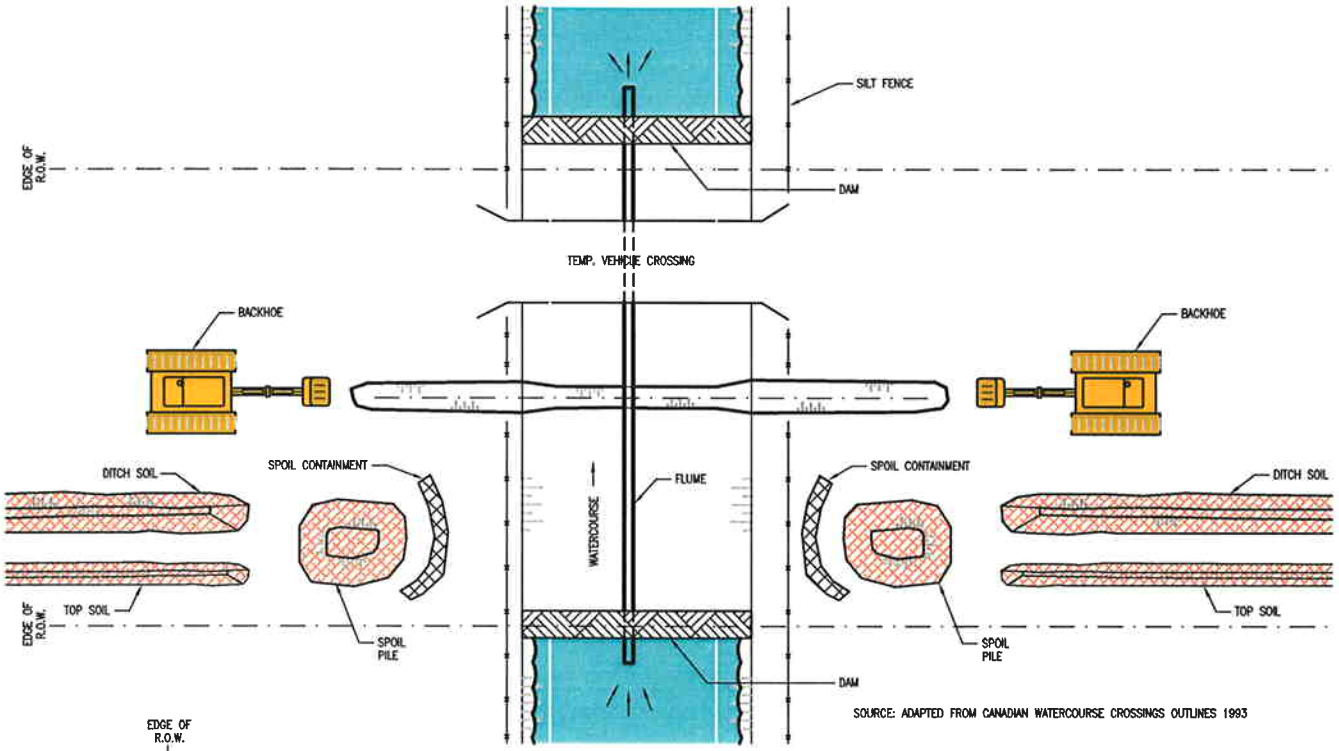
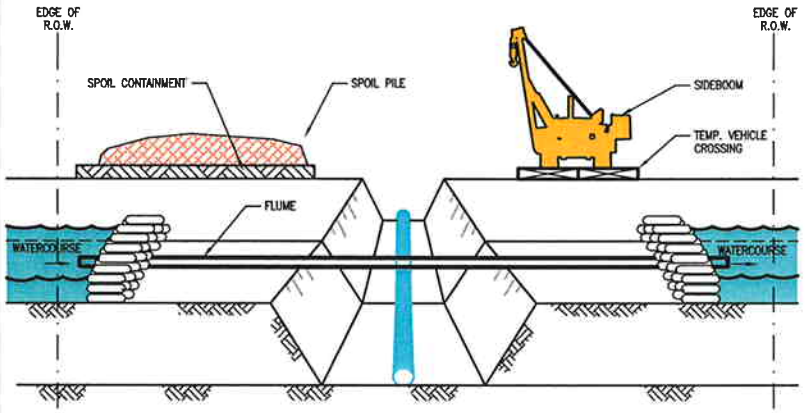


PLAN - EXCAVATION OF TRENCH



SECTION - INSTALLATION OF PIPELINE

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DILLON CONSULTING

DATE DEC. 2004

TITLE **WATERCOURSE CONSTRUCTION ISOLATED CROSSING (FLUME)**

PROJECT **AMHERST HIGH PRESSURE STEEL PIPELINE**

PROJECT No. **04-3265**

FIGURE No. **2-7**

FIG2-8.dwg
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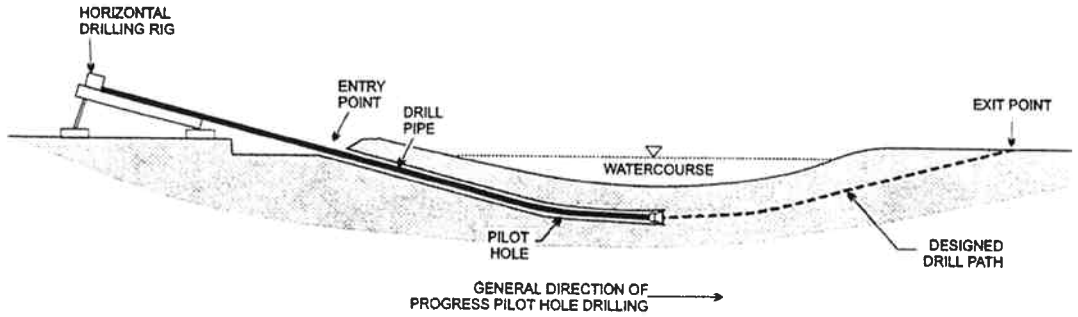
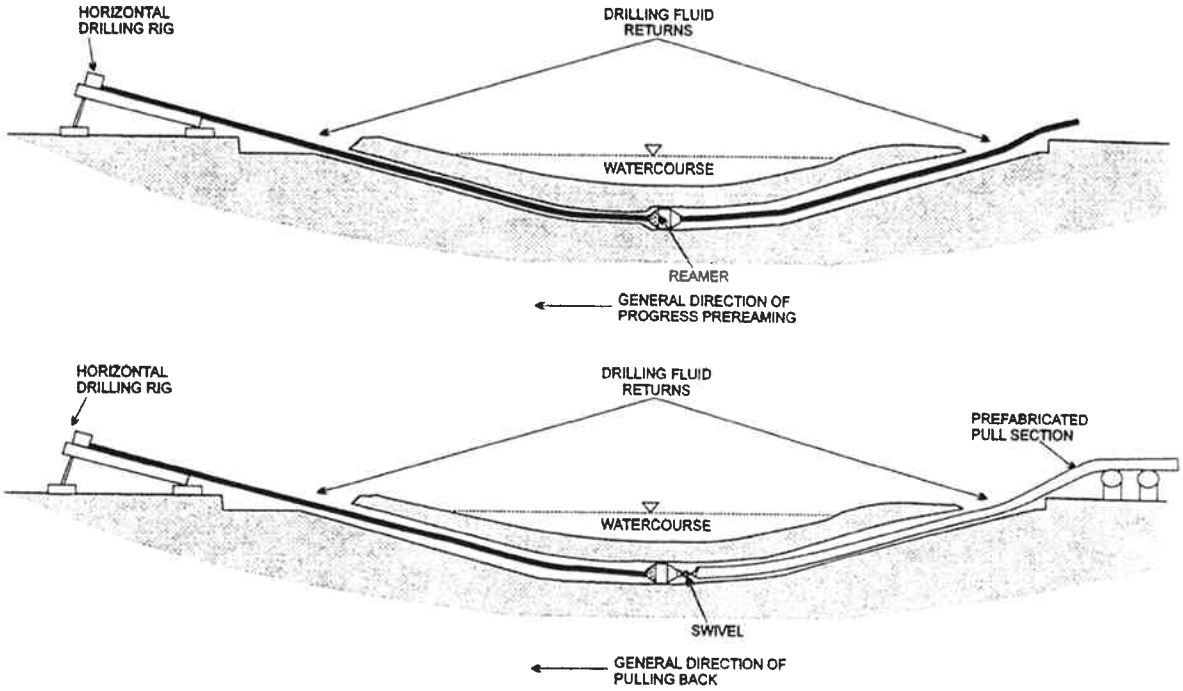
STAGE 1: PILOT HOLE DIRECTIONAL DRILLING



STAGE 2: REAMING AND PULLING BACK



PROFILE
(Not to Scale)

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SOURCE:
ADAPTED FROM TERA 1998; CANADIAN PIPELINE WATER CROSSING COMMITTEE, 1999.

DILLON CONSULTING

DATE DEC. 2004

TITLE **WATERCOURSE CONSTRUCTION HORIZONTAL DIRECTIONAL DRILL CROSSING**

PROJECT **AMHERST HIGH PRESSURE STEEL PIPELINE**

PROJECT No. **04-3265**

FIGURE No. **2-8**

HDD has many environmental advantages. Since the entry and exit points are set back from the watercourse to be crossed, the stream bed and generally the stream banks and approach slopes remain undisturbed. This reduces the potential for instream sediment generation and, at the same time, maintains streamflow and fish passage. An additional advantage of the maintenance of a buffer on each side of the watercourse, is that it will provide a natural barrier to unauthorized vehicles and minimize the release of erodible sediments into watercourses from both construction and off highway vehicles.

This method requires suitable substrate to be successful. Large boulders, unconsolidated material and inconsistent grain size/texture decrease the success of this method. However consistent particle size is less critical for boring than for HDD. Impermeable stream bottom and underlying material is preferred. Our knowledge of the geotechnical conditions along the pipeline route indicates that HDD will be technically feasible.

2.4.2.6 Installation and Backfill

The pipe will be lowered into the trench and to the fullest extent possible backfilled with excavated soil. Where the backfill material is unsuitable, sand padding will be used around the pipeline. The trench will be compacted to restore the easement to previous the previous grade and to minimize ponding over the trench.

In agricultural lands topsoil and subsoil will be placed separately to avoid mixing and potential loss of productivity.

2.4.2.7 Cleanup and Stabilization

Following construction, disturbed areas will be restored and stabilized in accordance with Heritage Gas practice and landowner agreements. Previously graded areas will be recontoured to match pre-construction conditions, where practicable. Permanent diversion berms and drainage channels will be left in place where required to control run-off and minimize erosion. The location of these controls will be shown on the ECPs. At watercrossings, rock used to stabilize temporary bridge approaches will be placed on disturbed areas adjacent to the watercourse or placed on the banks to provide scour protection. Topsoil, where previously segregated, will be graded out onto the easement and the easement will be seeded. In addition, construction related materials such as survey staking, temporary crossings, and pallets will be removed from the easement. Sediment fencing will remain in areas adjacent to watercourses and wetlands until the easement vegetation has been re-established.

2.4.2.8 Internal Inspection and Hydrostatic Testing

Internal inspection consists of the use of sponge or brush pigs to clean and dry the pipeline, followed by, where specified, smart pigs to confirm pipeline and weld integrity. Pigs are pushed through the pipeline

using inert gas. Gauge pigs may also be used to confirm pipe diameter and detect diameter variations. For this project, the use of smart pigs may not be required. Hydrostatic testing of the pipeline will be required following completion of the construction and internal inspection to confirm the integrity of the pipeline under pressure prior to commissioning. Water withdrawal sites will be selected in accordance with: volume requirements; water quality; and in consultation with NSDEL and DFO. If feasible, the pipeline may be filled using the town's municipal supply, however, this may require dechlorination prior to release. Alternatively, the pipeline will be filled from watercourses provided the withdrawal does not diminish flow greater that 25%. The pipeline will be filled to capacity with water and pressurized to complete the test. The use of additives or biocides is not anticipated. Water will be discharged from the pipeline and flows will be directed to an energy dissipator to slow the flow to minimize the potential for erosion and then to a vegetated area removed from watercourses.

2.4.2.9 Waste Management

Construction operations will generate minor amounts of liquid and solid wastes. Liquid waste produced includes oils, solvents, grease, fuels and sewage. Liquid wastes such as fuel, oil and solvents will be recycled or reused wherever possible and the remaining materials disposed of at an approved facility. Waste storage will be minimized by prompt removal of waste following equipment servicing. However, if liquid waste storage is required, the storage areas will be located following the requirements for fuel and lubrication storage.

Solid waste produced will include materials such as strapping, temporary fencing, bridge material, signs, containers and welding rods. Construction specifications will include requirements for litter control and management of construction wastes. Non-hazardous solid waste will be collected and disposed of at an approved facility by a licensed contractor.

2.5 Environmental Protection Methods

2.5.1 Purpose of Providing Environmental Protection Methods

Environmental protection is an integral component of the project. Heritage Gas has developed an EPP to guide this aspect of the project. There are several important aspects of environmental protection that are common to several or all construction components. These include:

- management of wood;
- soils and bedrock;
- sediment, erosion and drainage control;

- general protection measures; and,
- cultural heritage resources.

Soils are addressed relating to highly erodible or compactable soils, contaminated soils and agricultural soils. Bedrock in general is addressed relative to blasting, and the expectation of the extent of shallow bedrock.

Cultural heritage resources refers to historic or pre-historic resources of cultural value. This section addresses the methods to be used to identify and evaluate these resources during construction, and to recover or protect the resources on their discovery.

The following subsections summarize the contents of the EPP. Site specific environmental mitigation methods will be developed during the detailed design stage. Environmental Construction Plans (ECPs) will be prepared to define the scope of site specific environmental protection requirements for contractors. Construction contractors will receive a copy of the EPP and ECPs as part of contracts.

2.5.2 Management of Wood

Merchantable timber will be retained on the easement and stockpiled in accordance with landowner agreements. Some of this timber and suitable slash will be set aside by Heritage Gas for use as corduroy in those areas of the easement requiring stabilization to permit movement of equipment. Stumps will generally be buried in the easement away from watercourses or retained for use as rollback, depending on landowner requirements. Slash that is not suitable for corduroy will be burned or chipped.

2.5.3 Management of Soils and Bedrock

2.5.3.1 Management of Soils

The potential effects of the proposed pipeline construction and operation on the physical properties of the soil resource can be grouped as soil mixing, soil compaction and cutting, and disturbance of contaminated soils. Environmental issues relating to soil disturbances will be mitigated by measures discussed in general in the following section.

2.5.3.1.1 Soil Mixing and Loss of Topsoil Fertility

Topsoil mixing may result during grading, trenching, backfilling and cleanup operations. The risk of mixing developed soil profiles is possible as areas of agricultural and forestry soils will be encountered.

The proposed pipeline construction and reclamation practices incorporate a range of standard mitigation measures to retain soil productivity and capability. The conservation of topsoil is important for the successful restoration of certain soils that may be disturbed by construction; for example, if agricultural

land is used for pipeline easement, topsoil can be salvaged and stored separately from subsoil. In forested areas, topsoil will not typically be salvaged unless well developed and easily separated; however, negotiations with landowners will be conducted to determine topsoil stripping requirements.

2.5.3.1.2 Contaminated Soils

Soil contamination relating to pipeline construction and operation may result from spills or leaks of fuels and changing of fluids (*e.g.*, oil changes) for equipment. The risk of such events is considered to be low; however, isolated spills of fuel and oil can occur during construction as with any construction project using heavy machinery. Safe handling practices and waste management issues will be employed by Heritage Gas as detailed in the EPP.

Soil contamination resulting from former land uses may also exist at specific locations along the alignment, particularly adjacent to developed areas. Where contamination is susptected, test pits will be excavated during the design phase to establish the nature and extent of the impacted soils.

During construction, areas of suspected soils contamination within the pipeline trench will be initially identified by visual indicators (*i.e.*, staining) and odours. Field and/or laboratory analytical procedures will be completed to confirm the existence and nature of the contamination. Once it has been confirmed that contaminated soils have been encountered, a management plan for the material will be developed.

The physical extent of investigative and mitigative activities coordinated by Heritage Gas will be limited to the width of the pipeline trench. The EPP documents the contaminated soils mitigation protocol, including details on emergency response procedures, personal protective equipment (PPE) and reporting.

2.5.3.2 Management of Bedrock

Typically, pipeline construction depths are not likely to exceed 1.5 to 1.8 m; therefore, in areas with overburden thickness greater than 1.8 m bedrock conditions will likely not be encountered. Planned geotechnical investigations will confirm depth to bedrock, prior to construction.

In areas of shallow bedrock conditions, rock breaking using hydraulic breakers may be required to gain the desired trench depths. Trench depth requirements through bedrock may be reduced at watercourse crossings or ditches (CSA Z662). Where absolutely necessary, bedrock will be blasted; however, there is no anticipation of this being required on the project.

If blasting occurs, blast monitoring will be conducted during blasting activities. Requirements for safe handling and use of blasting materials are detailed in the EPP.

Pre-blast surveys will be conducted for wells and structures subject to potential adverse effects resulting from the effects of blasting bedrock. Surveys will be conducted on groundwater wells in the bedrock aquifer within 200 m of the centerline of the pipeline. The surveys will evaluate general water quality and quantity components. These may be re-assessed following construction. The issue of potential impacts on groundwater wells are further discussed in Section 4.6.10.

2.5.4 Management of Sediment, Erosion and Construction Drainage

2.5.4.1 Overview

The soils in Cumberland County are characterized by fine-grained texture, and complex topography with occasional steep undulating and rolling slopes. These features, combined with frequent rainfall and runoff, result in these soils being susceptible to erosion. The major element that protects these soils against soil erosion rates is vegetation cover. When the pipe alignment is cleared of vegetation and the soil is exposed, it becomes particularly susceptible to erosion. The areas of soil excavation are therefore most susceptible to erosion during construction.

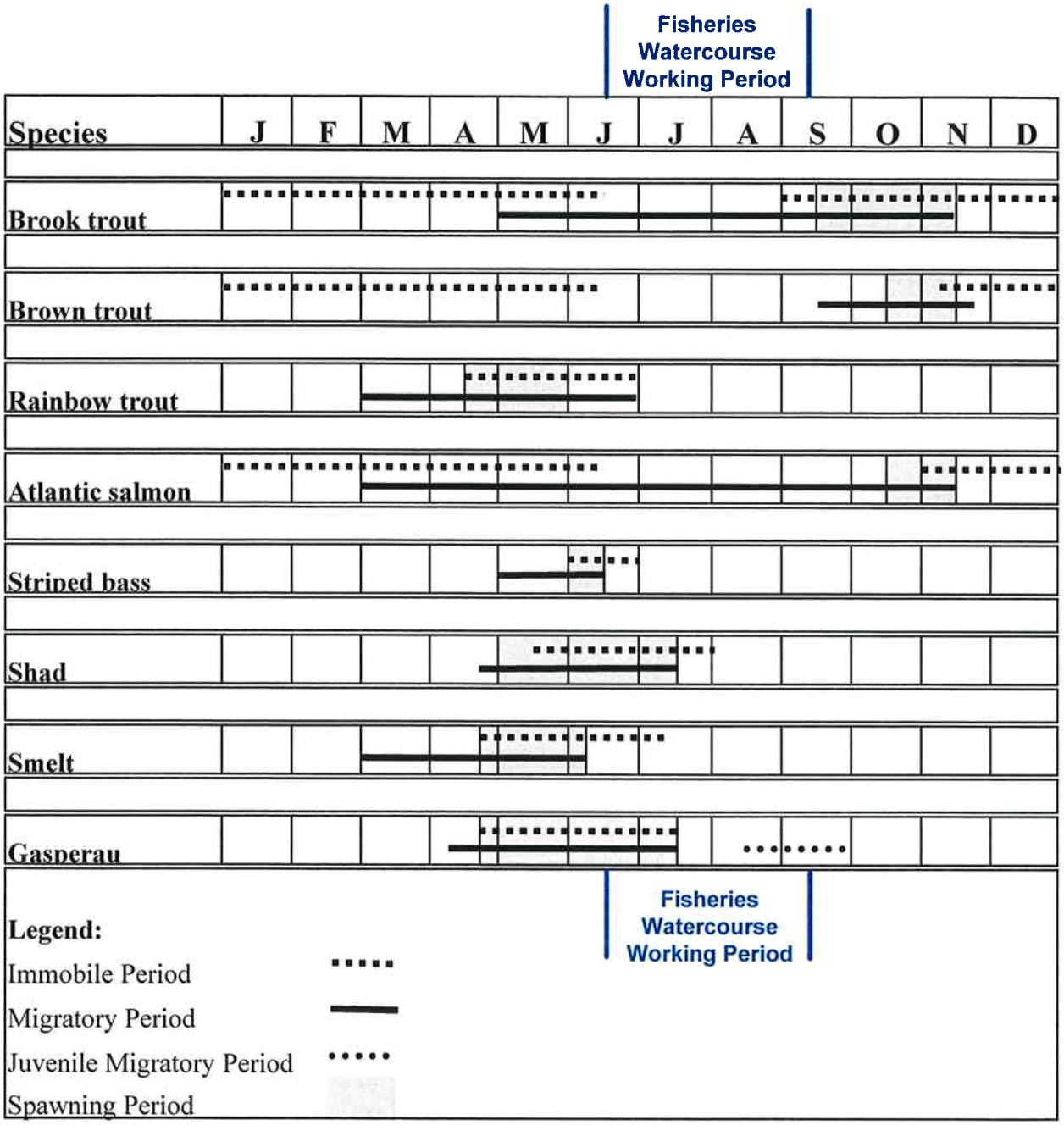
The highest potential for soil erosion occurs where there is a combination of steep slopes (degree and length), low soil permeability, fine soil texture, and high rainfall rates. These areas, which are associated with sandy loam to clay loam soils with undulating to rolling topography, occur at various locations of the proposed alignment. Areas of high risk will be confirmed for the project part of detailed design activities before the commencement of construction season. Base mapping will be prepared from the aerial photography collected in 2003, and will be used to support this assessment. Site-specific mitigation measures will be addressed in the ECPs.

Runoff from the pipeline easement may enter watercourses and wetlands at intervals along the length of the pipeline construction area. Heritage Gas is committed to minimizing the impact of this runoff from activities on sensitive resources through appropriate drainage control adjacent to watercourses throughout the construction.

During construction, Heritage Gas will provide sediment, erosion and construction drainage control to protect watercourses and wetlands. This protection will incorporate construction scheduling and installation of erosion and sediment control measures in accordance with Provincial guidelines, standard industry practice and the EPP.

2.5.4.2 Schedule

Construction activity in the vicinity of fisheries watercourses and wetlands will be undertaken within the June 15-September 15 construction window (Figure 2-9). Additional regulatory approvals will be



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DILLON CONSULTING	TITLE: SENSITIVE PERIODS FOR KEY FISH SPECIES	PROJECT No.: 04-3265
DATE: Dec. 2004	PROJECT: Amherst High Pressure Steel Pipeline	FIGURE No.: 2-9

obtained, as necessary, if constructing outside the regularly established construction windows, which is typically only expected for non-fisheries watercourses.

The best protection of watercourses, wetlands and other sensitive resources from sedimentation is to prevent erosion. Erosion will be minimized by exposing the smallest area for the shortest time. Heritage Gas will achieve this by minimizing the width of the trench and backfilling and restabilizing the construction area as quickly as possible after the piping has been placed. Use of trenchers will permit a narrower trench width and quicker stabilization time. Again, use of HDD at the most sensitive crossings will help avoid these impacts.

Due to project scheduling, it is likely the clearing will take place during the spring. As a result, Heritage Gas will undertake a nesting bird survey prior to clearing.

2.5.4.3 General Procedures for Erosion and Sediment Control

Construction in the easement will involve clearing and grubbing of new areas. Clearing and grubbing will be kept to the minimum width possible for construction. Clearing within 10 m of the crest of the slope of a watercourse or wetland will be performed by hand or by equipment that can reach into the buffer zone. Sediment control fencing will be installed along the edge of right-of-way until stabilization of the grubbed area. Erosion and sediment control techniques listed below will be incorporated to stabilize slopes and settle out sediment.

A buffer zone will extend 10 m each side of the crest of slope of a watercourse. A buffer zone is an area that will not be grubbed prior to 24 hours before construction of the crossing. Buffer zones will be delineated with environmental fencing. The use of construction equipment will be minimized within the buffer zone. Trenching will be discontinued at the buffer zone and a trench plug will be left to prevent sediment laden water from entering the watercourse. The plug will be removed when the crossing construction is initiated if a dry method is used. The plug will remain in place if HDD is used. Containment measures will be used for spoil piles associated with watercourse crossings including sediment fence or berms.

Trenches collect water from groundwater or surface runoff. Trenches will be dewatered during construction to minimize the potential for sediment laden water to reach a watercourse or wetland. Trench water will be pumped to a geotextile filter bag, or sediment trap prior to discharge. In some circumstances, vegetative buffer zones will be used to facilitate sediment control.

High water table or flooded conditions will require special measures for dewatering management. High water table or surface flooding can be seasonal, temporary or perennial. For seasonal conditions or temporary conditions following heavy precipitation, construction can be scheduled or delayed until water

levels drop to a workable level. Where work cannot be delayed or perennial high water levels exist, special trench dewatering, erosion and sediment management practices will be designed and applied. In some locations, pipes may be lowered into a flooded trench. Design for these installations may include saddle weights to prevent pipe flotation.

Spoil piles will generally be placed in the easement. Since the trenches will be constructed and backfilled quickly, the time available for erosion of spoil piles will be limited. If spoils are stockpiled for an extended period of time, sediment fence will be installed on the downslope side. Spaces between spoil piles will be provided at predetermined intervals for drainage purposes.

Where HDD is used, the entry and exit points will be set back from the watercourse. The watercourse buffers will therefore be wider and kept intact at these locations. However, temporary access/bridge will be required to take the equipment over to the other side of the watercourse.

2.5.4.4 Description of Erosion and Sediment Control Measures

The following is a brief summary of the erosion and sediment control measures to be used:

Buffer Zones

Buffer zones are areas that will not be grubbed before 24 hours prior to construction. Buffer zones will extend 10 m each side of the crest of the slope of a watercourse or wetland, wider where HDD is used.

Sediment Control Fence

Sediment control fencing is a sheet of geosythetic fabric imbedded into the ground parallel to the contours. Sediment control fencing is used to filter sheet runoff. It will be used to delineate buffer zones as well as at the edges of the rights-of-way and near water courses. It can also be used on toe of slopes and at intermediate locations to control siltation.

Diversion Ditches

A diversion ditch is normally constructed up slope of the work to divert clean water prior to it entering the work area. Stabilized diversion ditches will be used to minimize the amount of off-site water entering disturbed areas.

Geotextile Filter Bags

Sediment laden water is pumped into geotextile filter bags such that the water filters out and the sediment remains in the bag. These may be used where small volumes of sediment laden water require filtering.

Sediment Pond/Trap

A sediment pond or sediment trap is designed to contain flow for a period of time in order to facilitate the settling out of sediments.

Stabilization Methods

Stabilization methods will be used to minimize the potential for erosion. These include:

- hydroseed will be used for stabilization in all areas that have not been designated otherwise; tackified mulch will be applied when hydroseed is applied to slopes adjacent to watercourses outside the growing season;

- tackified straw mulch, polyethylene sheets or other geosynthetic materials may be used as a temporary stabilization method if there is an impending rainfall event or if a disturbed area cannot be permanently stabilized immediately;

- erosion control blankets are sheets of biodegradable material that are installed before or after hydroseeding; the blanket protects the seed from washing away with rain and provides soil splash protection while grasses become established; erosion control blankets may be necessary in areas with high slopes or where there are erodible soils; and,

- gravel including clear stone, surge rock or riprap may be used in ditches where the water velocities are high, in areas with high slopes and erodible soils, or to dissipate energy from stormwater discharges.

2.5.5 Cultural Heritage Resource Protection During Construction

Cultural heritage resources is the collective term given to artifacts, buildings, features and landscapes that reflect past human activities. Archaeologically identified resources can take the form of First Nations campsites, fishing stations, burial sites, as well as the remains of historic farmsteads, residential or commercial buildings, and urban infrastructure. Existing historic buildings and landscapes, including cemeteries, are also considered cultural heritage resources. In addition to these observable resources, locations of spiritual and/or cultural significance to First Nations identified through traditional cultural or ecological knowledge, are also recognized as part of our collective heritage.

Construction related activities are within the pipeline easement itself, but also include the development of ancillary facilities including town border stations, stockpiling areas, marshalling yards, temporary work areas, and access roads, temporary or permanent. In order to minimize these impacts and mitigate those that cannot be avoided, Heritage Gas has undertaken a cultural heritage impact assessment to identify

areas of resource potential, to design strategies for the pre-construction field verification of resource potential, to implement construction period monitoring and to propose appropriate and responsible mitigation strategies to address accidental cultural heritage resource impacts during construction. An overview of the cultural heritage impact assessment is provided in Section 4.6.12, and Appendix E.

During construction, Heritage Gas will conduct a program of archaeological monitoring in areas of moderate to high archaeological sensitivity as identified by the archaeological potential model. In addition, a sample of areas considered to exhibit low archaeological potential will also be monitored in order to test the validity of the model.

Archaeological monitoring will consist of visual inspection of trenching and excavation activities, as well as other construction related activities (grubbing, clearing, drilling, blasting, filling and grading) that will result in the disturbance of the ground surface, either within the pipeline easement or at ancillary facility sites. Monitoring methods will be modified to address variations in excavation techniques and levels of archaeological sensitivity.

Archaeological resources recognized during the course of monitoring will be documented with particular attention paid to the identification of spatial boundaries, complexity of the site, age and function. Where possible, stratigraphic profiles will be drawn and photographed. Artifacts will be collected from the spoil piles along side the trench and documented as to their location and association with features within the trench. Subsequent analysis and interpretation of the field data will result in the registration of significant sites and the development of appropriate protection and/or mitigation strategies.

In areas of high archaeological potential, no construction activities which would have an impact on the ground surface, including grubbing, clearing, drilling, blasting, filling or grading, will be undertaken until requirements for cultural heritage resource protection have been addressed and approved by the Nova Scotia Museum. These requirements would include pre-construction sub-surface archaeological testing. This provision applies to pipeline easements and ancillary facilities including HPRS and TBS, stockpiling areas, marshalling yards, temporary work areas, and access roads, temporary or permanent. Completion of the assessment may diminish the need for construction period monitoring but not necessarily eliminate it. If monitoring is still required, the above outlined procedures will be followed.

Archaeological monitoring will be coordinated with construction management to facilitate full integration of cultural heritage resource protection measures into the construction process and all other environmental resource protection procedures.

The archaeological monitor will complete the documentation of resources in a timely manner. In situations of particular sensitivity, site inspection by the Provincial Archaeologist may be deemed

necessary. The context for such inspections will be detailed in the archaeological monitoring protocol. Where feasible, advance notification will be given to the Provincial Archaeologist prior to beginning work in high potential areas. Trenches will not be backfilled until archaeological monitoring has been completed.

Not all sections of the pipeline trench will be archaeologically monitored. To facilitate the recognition of heritage/archaeological resources, field employees will be briefed regarding the recognition and sensitivity of cultural heritage resources and provincial heritage legislation. The Nova Scotia Museum will be contacted regarding sample archaeological specimens to be used during training. 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 Environmental Inspector will then contact the archaeological monitors.

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. Upon securing the site, the discovery will be reported to the closest detachment of the RCMP and the archaeological monitor. The subsequent contact with the Nova Scotia Museum will be detailed in the Archaeological Monitoring Protocol developed between Heritage Gas and the Nova Scotia Museum.

Monitoring will be conducted by qualified archaeologists working under the terms of a Heritage Research Permit issued by the Nova Scotia Museum. As issuing agency for Heritage Research Permits, the Nova Scotia Museum reviews and approves research and field strategies before they are implemented.

2.5.6 Construction of the High Pressure Regulating Station

The High Pressure Regulating Station (HPRS) will be constructed to regulate the pressure where natural gas is transferred from the M&NP's CTS outlet (9,950 kPa) to the high pressure (4,965 kPa) distribution pipeline. Land will be acquired prior to construction. Preferred siting will be within compatible land use. Siting will include identification and avoidance of sensitive environmental features.

The site will be cleared and levelled. Vegetation will be disposed in accordance with the EPP. Fabrication of the above ground facilities will partially occur off-site and some equipment will be delivered to the station site pre-assembled. The assembly of the above ground facilities will be completed and connected to the underground piping onsite.

Facilities within the regulator station may include:

- pressure regulating;
- heating;
- pressure relief;

- telemetry (pressure and temperature measurements);
- power and telecommunications supply (optional);
- odourant addition (permanent);
- filtering (permanent); and,
- isolation valving.

Standard mitigation for the construction of the HPRS is:

Solid Waste
Surplus construction materials may be produced during the construction of regulator stations. Materials may include timbers, concrete and electrical supplies. These materials will be recycled or reused whenever possible. The remaining waste material, including used welding rods and pipe coating, will be disposed of according to existing regulations and at approved disposal sites.

Air and Noise
Dust created during the construction will be minimized through the use of water trucks. Noise levels will adhere to regulatory requirements and applicable municipal by-laws.

Liquid Waste
Refuelling of all equipment will follow guidelines for environmental protection. Surplus paint will be stored for future use. Waste paint will be disposed of according to regulatory guidelines.

2.5.7 Construction of the Town Border Station

The Town Border Station (TBS) will be constructed to regulate the pressure where natural gas is transferred from high pressure (4,965 kPa) to elevated pressure (1,900 kPa) steel distribution pipelines. Land will be acquired prior to construction. Siting will include identification and avoidance of sensitive environmental features.

The site will be cleared and levelled. Vegetation will be disposed in accordance with the EPP. Fabrication of the above ground facilities will partially occur off-site and some equipment will be delivered to the station site pre-assembled. The assembly of the above ground facilities will be completed and connected to the underground piping onsite.

Facilities within the regulator station may include:

- pressure regulating;
- heating;
- pressure relief;

- telemetry (pressure and temperature measurements);
- power and telecommunications supply (optional);
- odourant addition (temporary);
- filtering (temporary); and,
- isolation valving.

Standard mitigation for the construction of the TBS will be the same as the HPRS.

2.5.8 System Commissioning and Activation

The commissioning and activation of the natural gas system will occur upon completion of construction activities and when compliance testing is satisfactory. It will be conducted by the Heritage Gas operation team.

The activation of the system will occur in isolated sections between valves. Natural gas will be introduced into the pipeline at a controlled rate and the system purged to remove air from the pipeline. Pressure gauges will be used on each section to monitor the pressure as the pipeline is filled. Natural gas monitors will be used at the purge points to identify when the required percentage of natural gas content has been reached. Natural gas will be flared to minimize methane release into the atmosphere.

Pipelines and above ground facilities will have specific purging and activation plans developed to test all equipment.

Liquid waste such as solvents and grease may be generated during commissioning. Salvageable material will be recycled or reused. Waste material will be disposed of in accordance with relevant regulatory requirements. All natural gas releases will be carried out in accordance with operating procedures. Methane release will be mitigated through the use of flares to facilitate the purge of the pipeline.

Heritage Gas informs landowners in the vicinity of flare points such that they understand the process and are not alarmed by the potential release of odour and the noise from flaring. These impacts are temporary, normally a few hours, and controlled by Heritage Gas operation staff.

2.6 Operations

2.6.1 Overview

The Heritage Gas operations staff will be responsible for:

- activation of the natural gas distribution system;
- operating and monitoring the gas distribution system;

- ensuring the natural gas pipeline system is operated in accordance with applicable regulations including Pipeline Regulations (Nova Scotia);
- maintenance of above and below ground facilities, including cathodic protection;
- monitoring and adjusting odourant levels in the system;
- locating underground pipelines as part of the "Call Before You Dig" program,
- emergency response; and,
- public awareness and education.

During the operation phase, the environmental management plan is implemented in accordance with its stated requirements throughout the operational life of the gas distribution system. A range of standard operation and maintenance measures will be developed and documented in operational environmental program manuals. The environmental management plan will provide a cross-reference to specific tools for environmental protection during the operation phase. These tools will include patrolling, monitoring, reporting, corrective action and documentation.

2.6.2 Operations Documentation

The operations documentation listed below addresses the requirements of the *Pipeline Regulations (Nova Scotia)*. This documentation has been previously prepared by Heritage Gas and approved by the UARB for use in other service regions. It will be reviewed and adjusted for suitability to the Amherst project, and will form part of submissions to the UARB to obtain the *Licence to Operate.*

Record Retention

Types of information retained include material specifications, inspection results, test results, odourant levels, cathodic protection checks, line repairs, pipeline emergencies, leaks and breaks, corrective actions and hot taps completed. These requirements are stipulated within each of the manuals described herein.

Occupational Health & Safety Manual

Addresses health and safety during both the construction and operation stages of the project. This is discussed in more detail in Section 2.8.

Environmental Protection Plan

Addresses environmental protection during the operation stage of pipelines and facilities. Aspects such as vegetation control, waste management, spill response, incident investigation, and post-construction monitoring are outlined in the manual.

Operating & Maintenance Procedure Manual

This manual addresses the following aspects of pipeline and facility operations:

- Measurement and metering;
- Pressure control and over pressure protection;
- stations and valves operation and maintenance;
- Leak detection
- Odourization;
- Ground disturbance and pipeline protection, including the "Call Before You Dig" program;
- Corrosion control;
- Lock-out and tag-out procedures;
- Pipeline repair;
- Working in gaseous environment; and,
- System commissioning and equipment calibration.

Standard Practice Instruction Manual

This manual outlines standard practice for facilities operations and system integrity. Aspects of facility operations that are include are measurement, pressure regulation, relief valves, and signage.

System integrity aspects covered by the manual include public awareness programs, pipeline hazard assessments, ground disturbance protocols, sectorization, odourization, cathodic protection, and leak detection.

Emergency Response Manual

Heritage Gas has prepared an Emergency Response Manual for use in other service regions. This manual will be updated for implementation in the Amherst service region. The manual provides information on Company organization structure and resources, and defines the roles of Heritage Gas personnel for response situations. It defines the types of emergencies that the Company is prepared for and the emergency response preparedness measures that are implemented in case of an emergency. The response protocols are described for major and minor incidents. Notification and communication procedures, both internal and with other emergency responders and EMO, are provided in the manual. Follow-up investigations and reporting requirements are described. Training requirements are also outlined.

2.6.3 Facilities Operations

Facilities within the Heritage Gas system will include:

- valve sites;
- regulating stations;
- odourization;
- cathodic protection; and,
- SCADA system.

These facilities will be operated by Heritage Gas personnel. The valve sites will be provided to isolate the natural gas flow within the pipeline and to limit the loss of natural gas to the atmosphere from a break or during repair or other work on the pipeline system while maintaining service to other areas of the system. Regulating stations will maintain the pressure of the natural gas to meet design requirements. Odourant injection is required to make gas leak detection possible by smell, a public and customer safety measure. Cathodic protection is required to protect steel pipeline from corrosion. The SCADA system provides remote monitoring capabilities.

Liquid waste such as oils and grease may be generated during operation. Waste material will be disposed of in accordance with relevant regulatory requirements.

All natural gas releases will be carried out in accordance with operating procedures. Methane release and noise levels may be mitigated through the use of flares to facilitate the purge of the pipeline.

Natural gas will be odourized for public and consumer safety at the HRPS. Odourant, which is blend of mercaptans and sulphides which produce a very strong odour. These will be either vapourized or injected into the flow of natural gas.

Initially, due to the small volumes of natural gas, Heritage Gas will utilize a vapourizer type odourizer; during year one it is estimated that 100 L of odourant will be introduced into the gas dream at this facility, which will require refilling not more than three times a year.

In the longer term, depending on the rate of growth of the system, Heritage Gas may change its odourant system from a vapourization type odourizer to an injection odourizer. The major difference will be that the odourant itself will be delivered to the site in a special purpose transport truck and will be transferred to a bulk storage tank permanently located on site. The transfer of the odourant from the storage tank to the odourizer will be completely sealed as an "odourant free" transfer system.

Finally, temporary odourization will also be provided at the TBS for the initial year or two of the proposed development, until pipeline walls are saturated with the odourant and the odourant level within the entire system has been stabilized at acceptable levels. This temporary installation at the TBS will be managed in the same manner as the permanent installation at the HRPS.

2.6.4 Telemetry

The system operations monitoring and communications will be implemented using a SCADA (supervisory control and data acquisition) system allowing the operations staff to remotely monitor pressure regulating stations, pressure relief devices and key valve stations. The SCADA system will incorporate communication, field instrumentation and alarm, and monitoring equipment to ensure for the safe operation of the gas distribution system. In addition to remote monitoring, the SCADA system, where necessary, will permit remote actuating and control of designated components from a central location. Some components may be designed to mechanically respond to changes in system conditions.

2.6.5 Inspections of Pipelines and Facilities

An inspection program will be developed and implemented by Heritage Gas, based on a periodic, regularly scheduled basis and specified standard procedures. Inspection needs are expected to be met using ATV or aircraft surveillance. The inspection program may include:

- over the line surveys;
- leakage surveys;
- in-line inspections;
- aerial patrols; and,
- site inspections.

The pipeline locations will be marked with signs and post markings at public roads, railroad and water crossings and at separation distances along the easement so that signage is visible from any location on the line. The signs will allow for rapid identification during inspection surveys.

Over the line surveys will monitor the performance of the cathodic protection system. Leakage surveys will identify locations of natural gas leakage from the pipeline to enable repair. In-line inspections will monitor the condition of the pipeline walls through the use of remote-controlled inspection devices. Aerial patrols may be used to identify unauthorized third party activities in the vicinity of the pipelines and detection of leakage by vegetation discolouration. Valve inspections will be completed on a routine basis to ensure valve operability.

A purge of natural gas may be required during in-line inspections. All purging will be carried out in accordance with operating procedures. Methane release and noise levels will be mitigated through the use of:

- flares;
- silencers; and,
- isolation valves to facilitate the lock in of natural gas within the lines to allow repair while maintaining customer service elsewhere in the system during the purge.

2.6.6 Maintenance of Pipelines and Facilities

2.6.6.1 Activity Description

Standard procedures will dictate a schedule of maintenance on all components of the natural gas system. Maintenance will be required to ensure all facilities within the natural gas system are in good working order.

Maintenance may include:

- regulation and over-pressure protection inspections and overhauls;
- valve inspections and repairs;
- coating repairs;
- cathodic protection repairs and anode installation;
- pipeline repairs; and,
- above-ground facility building, piping and appurtenances maintenance.

Operational Issues at Watercourses

Several specific operation and maintenance issues at watercourse crossings are described below:

Pipeline Repair within Watercourse Crossing or Approach

Instream work may be required during operation in the event that a pipeline repair is required within an area of a watercourse crossing caused by excessive river scour, pipeline facility malfunction, or rupture. Instream work during operation would be guided by the same requirements, procedures and guidelines as instream work during construction.

Watercourse Access

Use of access roads will be in consultation with the landowner. Barricades will be placed if required by the landowner.

Vegetation Management

Vegetation control will be required around signage to maintain visibility. Hand clearing will be used where appropriate. Approved herbicides will be used in isolated locations along the easement (such as at valve sites) and by licensed applicators. Only mechanical and hand clearing will be conducted within 30 m of a watercourse.

2.6.7 Call Before You Dig Program

Heritage Gas has developed and operates a "Call Before You Dig" service in other regions. This program will be extended to include the Amherst service region. The toll-free number will be widely publicized for the use of all contractors and residents. Public education programs will deliver the message that prior to digging, residents or contractors must call the toll free number to request a location of the pipeline.

As part of this program, Heritage Gas provides field locations of underground natural gas pipelines free of charge. Locates will be scheduled for completion by operations personnel. Procedures will also be implemented to provide locating service during emergency situations (*e.g.*, watermain breaks, power pole replacement).

2.6.8 Emergency Response

Heritage Gas operates a 24/7 emergency response system. A toll-free number is publicized for the use of all Nova Scotia residents in case of a natural gas emergency. This system will be expanded to include the Amherst service region. Operations personnel will respond to all emergencies involving the natural gas system. An Emergency Response Plan will be developed in consultation with local and provincial emergency response organizations to ensure rapid and effective response in the unlikely event of a serious accidental event.

Upon notification of the possibility of a leak on a natural gas pipeline, operations personnel will be dispatched to the site to identify the location of the leak. A leak investigation will be performed to pinpoint the location of the leak and identify required repair procedures.

Upon notification of a natural gas pipeline break, operations personnel will be dispatched to assess the damage and perform make-safe services and to facilitate repair of the pipeline. Once arriving on site, the operations personnel will isolate the natural gas source, if the line is damaged, to prevent further release of natural gas. This isolation may be accomplished using system valves or by pinching the pipeline. The pipeline will be repaired and purged to restore natural gas supply.

Pressure regulating stations may be equipped with over-pressure protection that will respond to a problem by releasing natural gas in a controlled manner. Such releases will be reported through the use of the SCADA system, and responded to as emergencies. Heritage Gas personnel will be dispatched to the

station site to identify and repair the problem at the station. Procedures will be followed to resolve the problem and discontinue the natural gas release.

2.7 Decommissioning, Closure and Abandonment

The evolution of a natural gas pipeline system may involve the decommissioning, closure or abandonment of facilities as redundancies develop or system requirements change.

Facilities that are no longer required as part of the Heritage Gas system will be decommissioned or abandoned according to the *Pipeline Regulations (Nova Scotia)* and the latest version of *CSA Z662-Oil and Gas Pipeline Systems.*

Removing below ground pipe may result in environmental effects similar to those experienced during construction. To minimize adverse effects, below ground pipeline facilities will be abandoned in place. The pipeline will be purged of natural gas and physically separated from active pipeline facilities. The ends of the pipeline will be sealed and the pipeline filled with an inert gas, such as nitrogen, or air.

Above ground facilities, including valves, meters and regulating devices, will be removed upon decommissioning. Remaining underground portions of the facility will be capped and left buried as described above.

Salvageable material will be recycled or reused. Waste material such as welding rods and concrete will be disposed of in accordance with relevant regulatory requirements.

All purging will be carried out in accordance with established operating procedures. Methane release and noise levels will be mitigated through the use of flares to facilitate the purge of the pipeline.

Decommissioned facility sites will meet regulatory guidelines for clean-up. In some cases, groundwater and/or soil testing may be undertaken to ensure that sites are free of contamination. If contamination is discovered, sites will be restored to approved standards.