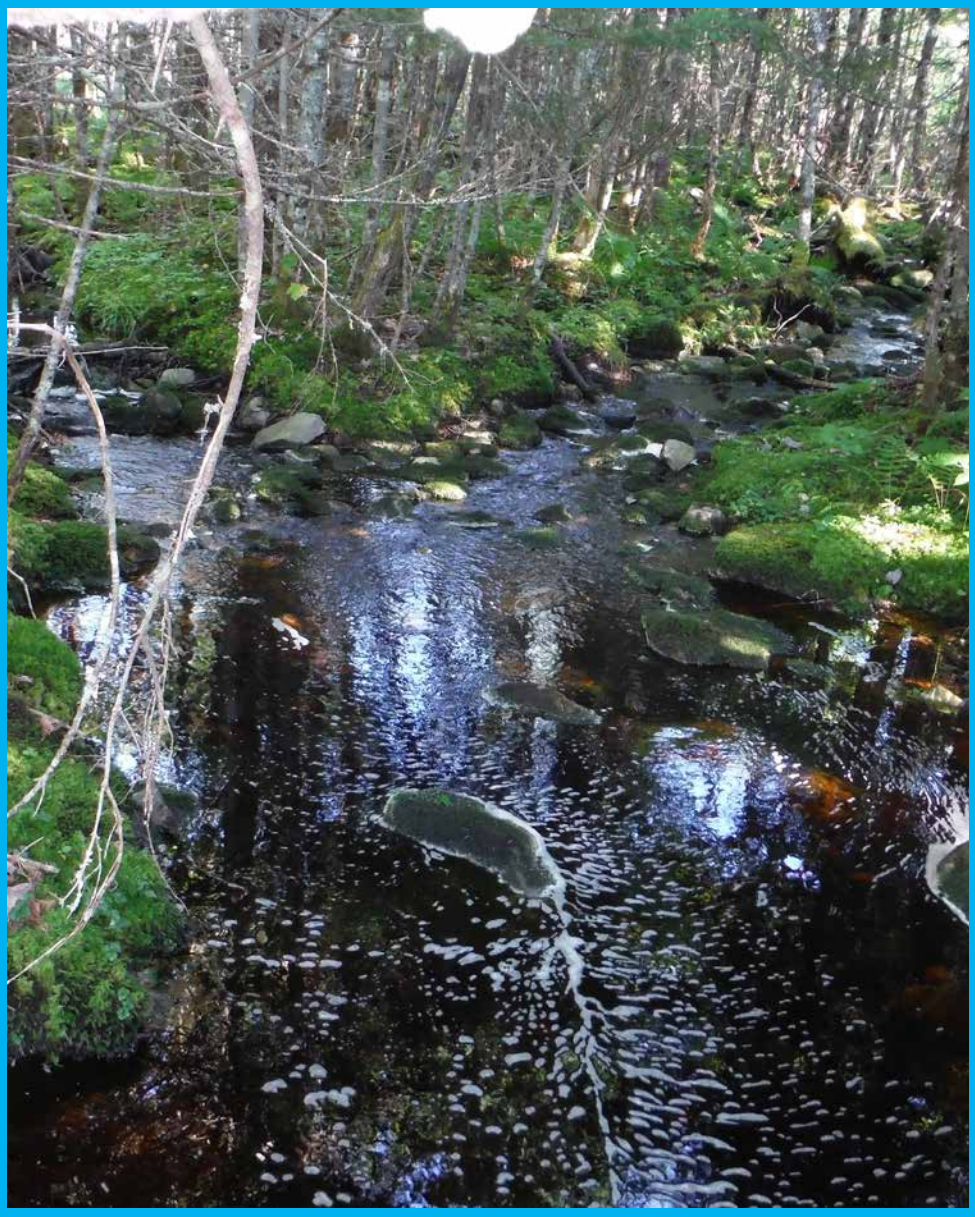

Bear Paw Pipeline

Environmental Assessment

March 2016

Prepared for:
Bear Paw Pipeline Corporation Inc.
1969 Upper Water Street, Suite 1903
Halifax, NS B3J 1M5

Document No. BP-NSE-AP-1001

Prepared by:
Stantec Consulting Ltd.
102 - 40 Highfield Park Drive
Dartmouth, NS B3A 0A3

Document No. 121413598EN_RPT0002

March 2016

Executive Summary

Bear Paw Pipeline Corporation Inc. (Bear Paw Pipeline) proposes to construct a natural gas pipeline (Bear Paw). Bear Paw Pipeline is a wholly owned subsidiary of Liquified Natural Gas Limited (LNGL) an Australian public company with liquefaction projects in Canada, Australia and the United States. Bear Paw will be built as a lateral pipeline to supply its sole costumer, Bear Head LNG, which is wholly owned subsidiary of LNGL. Bear Paw would interconnect the Maritimes and Northeast Pipeline (M&NP) mainline, offshore gas and other supplies near Goldboro, Nova Scotia, to the Bear Head LNG Corporation Inc. (Bear Head LNG) liquefied natural gas (LNG) export facility (Bear Head) which lies within the Point Tupper Industrial Park, near the town of Port Hawkesbury, Nova Scotia. Bear Paw consists of a 42" pipeline with a maximum operating pressure of 9930 kPa (1440 psig), extending approximately 62.5 km; compression, metering and associated facilities; and temporary ancillary facilities and access roads. This document is an environmental assessment (EA) intended to support the registration process under the Nova Scotia *Environmental Assessment Regulations*.

For planning and EA purposes, a 100 m wide assessment corridor (wider in some places) has been selected. The final right-of-way (RoW) will be approximately 35 m during construction and less during operation.

Bear Paw activities will be similar to those of other natural gas transmission pipeline projects in Nova Scotia. Construction will include site preparation (i.e., clearing, grubbing, topsoil stripping and grading, trenching), pipe installation, RoW restoration, and pipeline cleaning and testing. Operation and maintenance will be limited to maintenance of the RoW (e.g., occasional vegetation cutting), and regular inspections and testing.

The public and Mi'kmaq communities have been engaged in the EA process to identify potential issues or concerns, and to provide information on Bear Paw. Engagement and provision of information will continue as Bear Paw proceeds through the planning and approval process, as well as through construction, and operation.

Bear Paw will be subject to the requirements associated with a Class I registration under the Nova Scotia *Environmental Assessment Regulations* for "*an onshore pipeline that is 5 km or longer, other than a pipeline that carries natural gas, if the [natural gas] pipeline has a maximum operating pressure below 3,450 kPa (500 psig)*".

An important part of the EA process is the early identification of Valued Components (VCs) upon which the assessment can be focused for a meaningful and effective evaluation. The scoping of VCs, and the EA in general, included input from regulator and stakeholder consultation, regulatory issues and guidelines, research, and professional judgment of the Study Team. The following VCs have been selected for this EA:

- atmospheric environment;
- freshwater resources;

- groundwater resources;
- marine environment;
- vegetation and wetlands;
- wildlife and wildlife habitat;
- traditional land and resource use;
- land and resource use; and
- heritage resources.

The EA for Bear Paw includes an evaluation of the potential Project-related environmental effects for each phase (construction, and operation and maintenance) as well as accidents and malfunctions, with regard to the VCs identified above. Project-related effects are assessed within the context of temporal and spatial boundaries established for the assessment. Mitigation is proposed to reduce or eliminate adverse environmental effects. Monitoring programs have been proposed in some cases to verify the accuracy of effects predictions for effectiveness of mitigation.

With the implementation of the recommended mitigation measures, it is the conclusion of this report that adverse residual environmental effects of routine activities are not predicted to be not significant (based on regulatory standards, where applicable and/or using professional judgement) for all VCs. The environmental effects of any potential accidents or malfunctions that may occur can be addressed with appropriate environmental management and contingency response planning. Bear Paw is confident that with the proposal mitigation presented in this EA.and provision to appropriate response plans, no significant adverse environmental effects are likely to occur as a result of Project-related accidents and malfunctions.

Positive effects from Bear Paw are likely, particularly those related to increased economic activity through opportunities in labour and skills development. Bear Paw Pipeline will provide direct and indirect economic benefits to local communities and the region including jobs and training; use of local goods and services, where applicable, and local employment during construction and operation and maintenance. Bear Paw Pipeline will add to the property tax base of Guysborough and Richmond Counties. Bear Paw is fully aligned with provincial objectives for development and upgrading of efficient energy infrastructure.

Overall, Bear Paw will be developed to reduce adverse effects on the environment and provide economic benefits to Guysborough and Richmond County, the Strait of Canso Region, and the Province of Nova Scotia.

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Abbreviations

%HA	percent highly annoyed
°C	degrees Celsius
µS	microsecond
AC CDC	Atlantic Canada Conservation Data Centre
ADCP	Acoustic Doppler Current Profiler
ARD	acid rock drainage
ARIA	Archaeological Resource Impact Assessment
ATV	all-terrain vehicle
BBS	Breeding Bird Survey
CAC	criteria air contaminant
CAPP	Canadian Association of Petroleum Producers
CCME	Canadian Council of Ministers of the Environment
CEAA	*Canadian Environmental Assessment Act*
CEPA	*Canadian Environmental Protection Act*
CH_4	methane
CHP	Canada's Historic Places
cm	centimetre
CO	carbon monoxide
CO_2	carbon dioxide
COGOA	*Canada Oil and Gas Operations Act*
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRA	commercial, recreational, or Aboriginal
CSA	Canadian Standard Association

CWS	Canadian Wildlife Service
DAS	disposal at sea
dBA	decibel
DFO	Fisheries and Oceans Canada
DU	designatable unit
DWA	Deer Wintering Area
EA	environmental assessment
EC	Environment Canada
EEMP	Environmental Effects Monitoring Program
EGSPA	*Environmental Goals and Sustainable Prosperity Act*
EPP	Environmental Protection Plan
ERCP	Emergency Response and Contingency Plan
FSC	Food, Social, Ceremonial
g	gram
GHG	greenhouse gases
ha	hectare
HDD	horizontal directional drilling
Hp	horse power
HVAC	heating, ventilation and air conditioning
IBA	Important Bird Area
JWEL	Jacques Whitford Environmental Limited
km	kilometer
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
KP	kilometer point
kPa	kilopascals

L	litre
LAA	local assessment area
LNG	liquefied natural gas
LNGL	Liquefied Natural Gas Limited
m	metre
M&NP	Maritimes and Northeast Pipeline
m/s	metres per second
MBBA	Maritime Breeding Bird Atlas
MBCA	*Migratory Birds Convention Act*
MEKS	Mi'kmaq Ecological Knowledge Study
MEKS	Mi'kmaq Ecological Knowledge Study
MGS	Membertou Geomatics Solutions
mm	millimetres
MODG	Municipality of the District of Guysborough
MW	megawatt
N_2O	nitrous oxide
NAPS	National Air Pollution Surveillance Network
NEB	National Energy Board
NO	nitrogen oxide
NO_2	nitrogen dioxide
NO_x	nitrogen
NPA	*Navigation Protection Act*
NS	Nova Scotia
NS *ESA*	Nova Scotia *Endangered Species Act*
NSDNR	Nova Scotia Department of Natural Resources

NSE	Nova Scotia Environment
NSELC	Nova Scotia Ecological Land Classification
NSTIR	Nova Scotia Transportation and Infrastructure Renewal
NSUARB	Nova Scotia Utilities and Review Board
NTU	nephelometric turbidity units
NVC	no visible channel
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	polychlorinated biphenyls
PDA	project development area
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
psig	pounds per square inch (gauge)
PSU	practical salinity unit
RAA	regional assessment area
ROV	remotely operated vehicle
RoW	right-of-way
SAR	species at risk
SARA	*Species at Risk Act*
SO_2	sulphur dioxide
SOCI	species of conservation interest
SOEI	Sable Offshore Energy Inc.
SOEP	Sable Offshore Energy Project
SPL	sound pressure levels
TC	Transport Canada
TPM	total particulate matter

TSP	total suspended particulate
TSS	total suspended sediments
UPS	uninterruptible power supply
VC	valued component
WMP	Waste Management Plan

March 2016

1.0 INTRODUCTION

In 2001, plans were developed for a liquefied natural gas (LNG) import and re-gasification facility within the Point Tupper Industrial Park, near the Town of Port Hawkesbury, Nova Scotia. It was intended that this LNG import facility would supply natural gas to the Maritimes and Northeast Pipeline (M&NP) for distribution to markets in the northeastern United States. By 2005, this facility had received the necessary regulatory approvals, and construction began later that year. As a result of changes in the North American natural gas market, the LNG import facility project was put on hold in 2006.

Between 2006 and 2014, the project site and the associated permits were fully maintained. In 2014, Liquefied Natural Gas Limited (LNGL) purchased Bear Head LNG Corp. (Bear Head LNG) with the intention of modifying the project to an LNG export facility (Bear Head). Bear Head completed a registration under the *Environment Act* (Nova Scotia) as a Class 1 Undertaking and received environmental assessment (EA) approval from the Nova Scotia Minister of the Environment in May 2015.

To enable the export of LNG at Bear Head, Bear Paw Pipeline Corporation Inc. (Bear Paw Pipeline) is proposing to construct a lateral pipeline (Bear Paw) that would interconnect the M&NP mainline, offshore gas and other supplies near Goldboro, Nova Scotia, to Bear Head. Bear Paw Pipeline is a wholly owned subsidiary of LNGL.

1.1 PROJECT OVERVIEW

Bear Paw Pipeline proposes to construct a natural gas pipeline (Bear Paw). Bear Paw would interconnect the M&NP mainline, offshore gas and other supplies near Goldboro, Nova Scotia, to Bear Head which lies within the Point Tupper Industrial Park, near the town of Port Hawkesbury, Nova Scotia (Figure 1.1.1). One hundred percent of the shares of both Bear Paw Pipeline and Bear Head LNG are ultimately owned by LNGL. None of LNGL, Bear Paw Pipeline or Bear Head LNG has any common ownership or corporate affiliation with M&NP or any other pipeline company. A Project overview figure is provided as Figure 1.1.2.

Bear Paw consists of the following components:

- a 42" pipeline with a maximum operating pressure of 9930 kPa (1440 psig) extending approximately 62.5 km from a point along the existing M&NP main transmission line near Goldboro, Nova Scotia to Bear Head, near Port Hawkesbury, Nova Scotia;
- compression, metering and associated facilities; and
- temporary ancillary facilities and access roads.

Bear Paw will be operated as a standalone pipeline serving the needs of Bear Head and will not be subject to the control or direction of M&NP or any other pipeline company. Bear Paw Pipeline employees will be responsible for the operation, maintenance and monitoring of Bear Paw under the direction of Bear Paw Pipeline Management. In short, Bear Paw will be built as a lateral pipeline to serve its sole customer Bear Head LNG, which is a corporate affiliate.

For planning and environmental assessment purposes, an assessment corridor has been selected, within which the pipeline will be located (Figure 1.1.1). The assessment corridor is approximately 100 m for most of the length of the pipeline; however in some areas the corridor is wider to accommodate areas where additional design options may be required (e.g., areas of challenging topography, watercourse crossings). The right-of-way (RoW) width required for construction will be approximately 35 m, not including additional workspace areas at crossings or for timber storage and processing.

There are two existing pipelines that run from Goldboro to Port Hawkesbury, namely the Sable Offshore Energy Project (SOEP) NPS 8 (or 8") Natural Gas Liquids (NGL) Pipeline that connects the gas plant at Goldboro to the fractionation plant at Point Tupper, and the M&NP NPS 8 Natural Gas (NG) Pipeline. These buried pipelines were designed and constructed at the same time, positioned within approximately 30 cm of each other, and share a common trench, crossing, and cathodic protection designs. Approximately 60 km of the assessment corridor for Bear Paw follows the existing RoW for these pipelines.

The EA is regulated under the province's *Environment Act* and *Environmental Assessment Regulations*. Bear Paw will be subject to the requirements associated with a Class I registration under the Nova Scotia *Environmental Assessment Regulations* for "*an onshore pipeline that is 5 km or longer, other than a pipeline that carries natural gas, if the [natural gas] pipeline has a maximum operating pressure below 3,450 kPa (500 psig)*".

This report is submitted to satisfy the requirements for an EA Registration document under the *Environmental Assessment Regulations*.

Bear Paw is not regulated by the National Energy Board (NEB) and is therefore not subject to environmental assessment requirements under the *Canadian Environmental Assessment Act* (*CEAA*) and *CEAA* Regulations Designating Physical Activities.

This report describes and evaluates the potential environmental and socio-economic effects of Bear Paw during all Project phases. The evaluation includes mitigation measures, where required, to reduce or eliminate potential significant effects arising from Project-related activities. The report is based on information collected during field surveys, consultation with government and non-government agencies and individuals, background research and the professional judgment of the Study Team.

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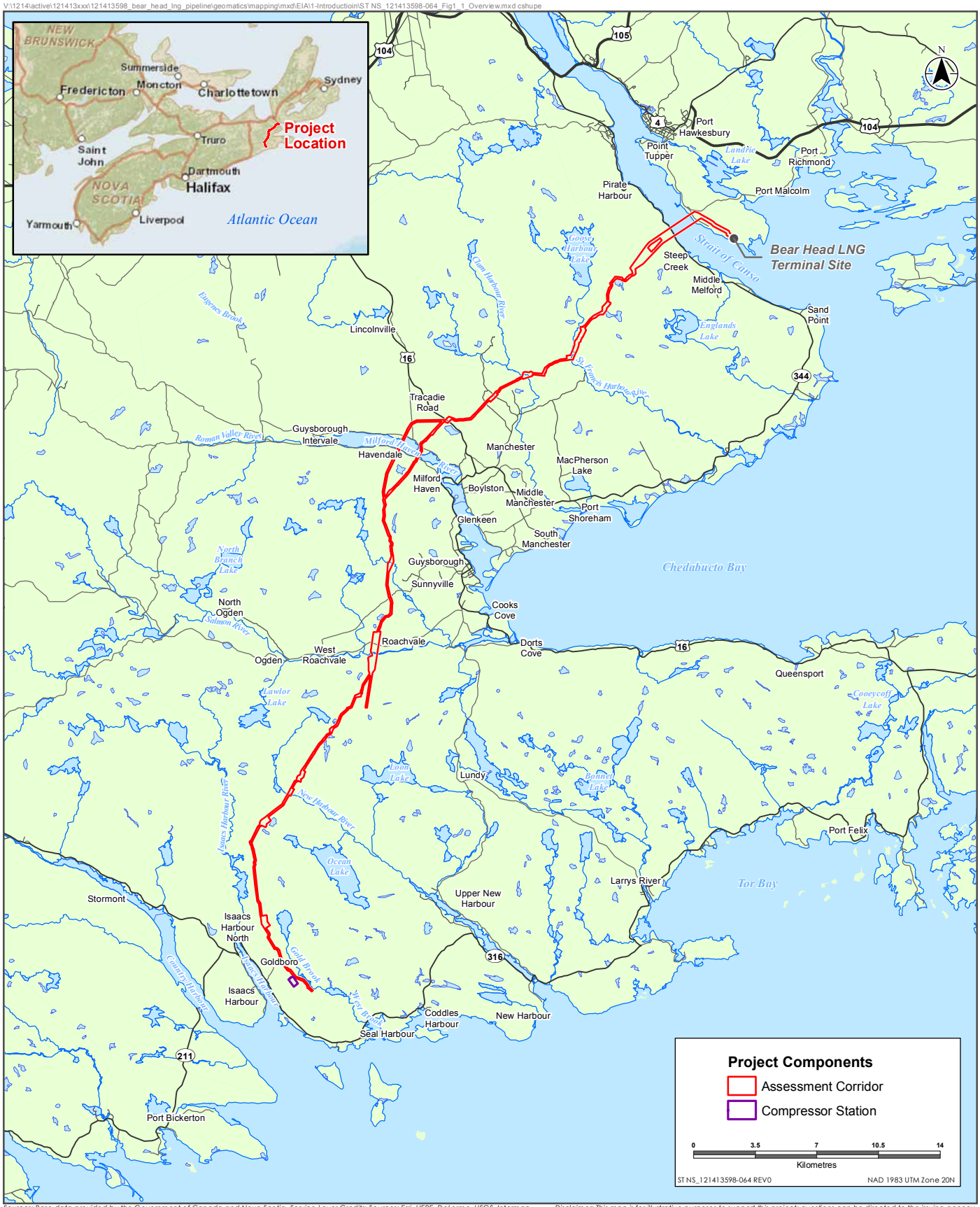

Sources: Base data provided by the Government of Canada and Nova Scotia. Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency. Note: Crown lands shown is limited to parcels within a relevant distance of the project.

BEAR PAW PIPELINE

Stantec

BEAR PAW PIPELINE PROJECT

Project Location

Figure 1.1.1

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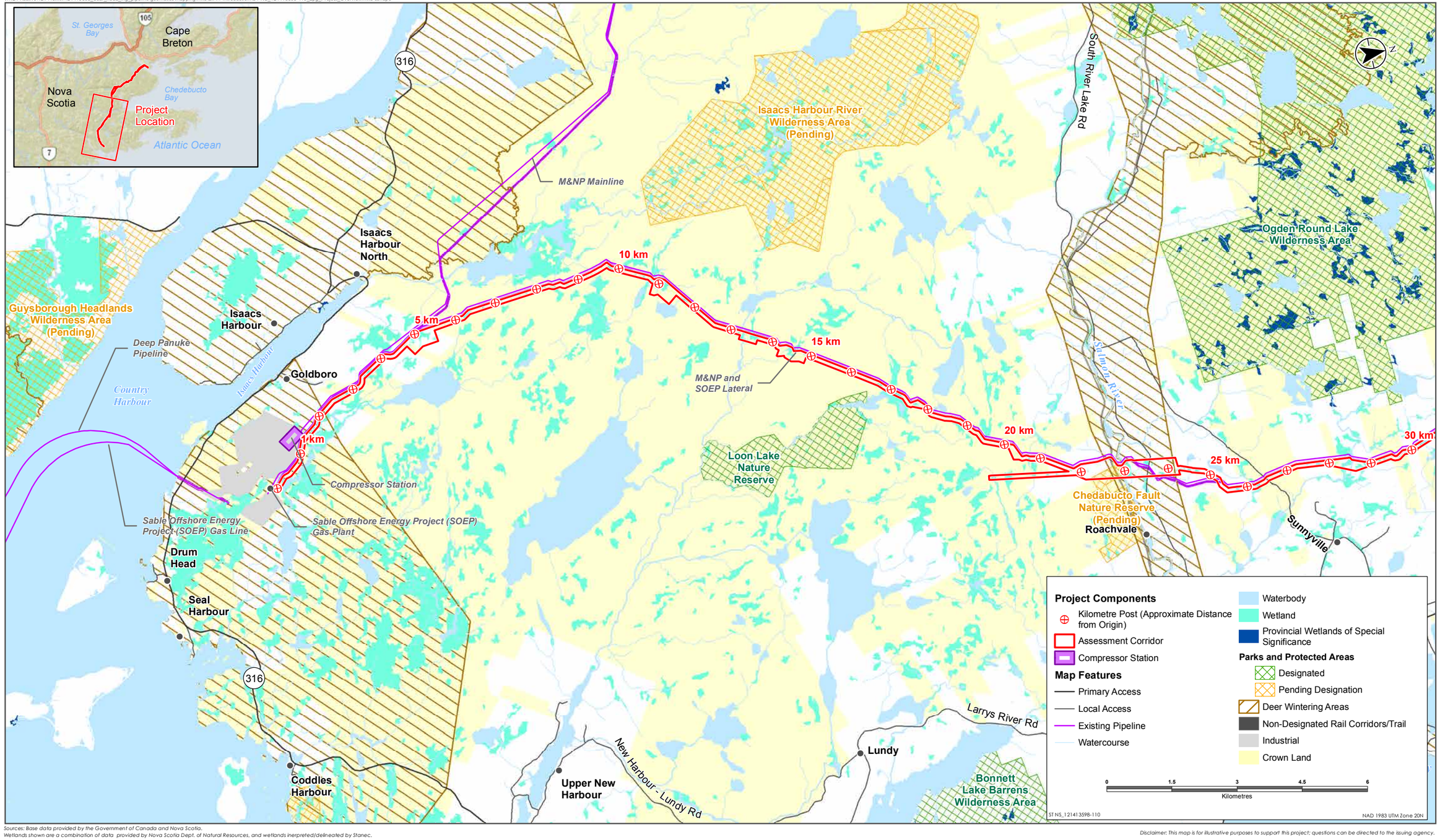


Sources: Base data provided by the Government of Canada and Nova Scotia.
Wetlands shown are a combination of data provided by Nova Scotia Dept. of Natural Resources, and wetlands inerpreted/delineated by Stanec.

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.

BEAR PAW PIPELINE

Stantec

BEAR PAW PIPELINE PROJECT

Project Overview

Figure 1.1.2
Map 1 of 2

1.2 PURPOSE AND NEED FOR THE UNDERTAKING

The purpose of Bear Paw is to connect to and supply natural gas from sources near Goldboro, Nova Scotia to Bear Head. Bear Head will supply natural gas, which has been transformed into the form of LNG to markets overseas, providing economic benefits to national, provincial and local governments and to company shareholders. The delivery of LNG to world markets will help to supply the increasing demand for relatively cleaner burning energy sources.

1.3 IDENTIFICATION OF THE PROPONENT

Name of Project: Bear Paw Pipeline Project (Bear Paw)

Proponent Contacts:

Darshi Jain, Vice President of Engineering, Construction, and Permitting
1001 McKinney, Suite 600
Houston, TX USA, 77002
Phone: (713) 986-0600
Fax: (713) 986-0800
Email: djain@bearheadlng.com

Paul MacLean, Strategic and Regulatory Affairs Advisor
1969 Upper Water Street, Suite 1903
Halifax, NS B3J 1M5
Phone: (902) 717-7077
Fax: (713) 986-0800
Email: pmaclean@bearheadlng.com

Consultant Contact:

Sara Wallace, Project Manager
Stantec Consulting Ltd.
120-40 Highfield Park Drive
Dartmouth, NS B3A 0A3
Phone: (902) 468-7777
Fax: 902-468-9009
Email: sara.wallace@stantec.com

Proponent

Darshi Jain, Vice President of Engineering,
Construction, and Permitting

Signature

Date: 23rd march 2016

1.4 REGULATORY CONTEXT

1.4.1 Provincial Legislation

Bear Paw will be subject to the requirements associated with a Class I registration under the Nova Scotia *Environmental Assessment Regulations* for "*an onshore pipeline that is 5 km or longer, other than a pipeline that carries natural gas, if the [natural gas] pipeline has a maximum operating pressure below 3,450 kPa (500 psig)*". Given the pipeline will be approximately 62.5 km in length with an operating pressure of 9930 kPa (1440 psig), a Class I registration is required.

Other provincial legislations applicable to Bear Paw is identified in Table 1.4.1. This list is intended to highlight key provincial legislations relevant to the environmental assessment and is not intended to represent an exhaustive list of all regulatory requirements.

Table 1.4.1 Key Provincial Legislation Relevant to the Environmental Assessment

Legislation	Regulating Authority	Relevance
Environment Act and Associated Regulations	Nova Scotia Environment (NSE)	In addition to environmental assessment approval under the *Environment Act,* Bear Paw would require other approvals under the *Activities Designation Regulations* of the Act, including Water Approvals to authorize alterations to wetlands and watercourses along the RoW. Approvals under the *Activities Designation Regulations* are granted by NSE. *Air Quality Regulations* under the Act specify ambient air quality maximum permissible ground level concentrations.
Nova Scotia *Endangered Species Act* (NS *ESA*)	Nova Scotia Department of Natural Resources (NSDNR)	NS *ESA* provides for the protection, designation, recovery and other relevant aspects of conservation of species at risk in the Province, including habitat protection. The Act prohibits killing or disturbing endangered or threatened species, destroying or disturbing its residence (habitat) and destroying or disturbing core habitat. Species assessed by the NS Species at Risk Working Group as endangered threatened, or vulnerable are listed under the NS *ESA* are legally protected.
Environmental Goals and Sustainable Prosperity Act (*EGSPA*)	NSE	In 2007, *EGSPA* established specific goals associated with air quality, water quality, renewable energy, ecosystem protection, contaminated sites, solid waste reduction, sustainable purchasing, and energy efficiency building. In particular, goals associated with climate change and air quality improvements (e.g., reduction of greenhouse gas emissions to at least 10% below 1990 levels) and ecosystem protection (e.g., prevention of net loss of wetlands) have implications for Bear Paw design and mitigation.

Table 1.4.1 Key Provincial Legislation Relevant to the Environmental Assessment

Legislation	Regulating Authority	Relevance
Special Places Protection Act	Department of Communities, Culture and Heritage	This Act provides for the preservation, protection, regulation, exploration, excavation, acquisition and study of archaeological and historical remains and paleontological sites, which are considered important parts of the natural or human heritage of the Province.
Pipeline Act Permit to Construct a Pipeline	Nova Scotia Utilities and Review Board (NSUARB)	Requires an application and approval to meet requirements for the Permit to Construct a Pipeline. A license to operate a pipeline will also be required pursuant to this Act.
Road Crossings	Nova Scotia Transportation and Infrastructure Renewal (NSTIR)	NSTIR regulates provincial road crossings (e.g., highways 16 and 334).
Crown Lands Act and *Beaches Act*	NSDNR	A permit under the Nova Scotia *Beaches Act* and Provincial Crown Land lease under the *Crown Lands Act* (Section 16(1)(a)) may be required from NSDNR for the construction along the water crossings depending on construction method. An easement will be required from NSDNR for the construction and operation of the pipeline RoW within provincial crown lands.

1.4.1.1 Concordance with the Environmental Assessment Regulations

Table 1.4.2 provides information on how the requirements for a Class I EA, per the *Environmental Assessment Regulations* are satisfied by this EA Report.

Under Section 9(1A) of the *Environmental Assessment Regulations*, a registration document must include the following information:

Table 1.4.2 EA Report Concordance with the Environmental Assessment Regulations

Requirement	EA Report Section Reference
• the name of the undertaking	Executive Summary
• the location of the undertaking	1.1 Project Overview
• the name, address, signature, and identification of the proponent including the name of the Chief Executive Officer and contact persons	1.3 Identification of the Proponent
• the nature of the undertaking	1.1 Project Overview 1.2 Purpose and Need for the Undertaking 2.0 Project Description
• the purpose and need of the undertaking	1.2 Purpose and Need for the Undertaking

Table 1.4.2 EA Report Concordance with the Environmental Assessment Regulations

Requirement	EA Report Section Reference
• the proposed construction and operation schedules	2.7 Project Schedule
• a description of the undertaking	2.0 Project Description
• environmental baseline information	1.6 Environmental Setting 5.1.4 – Atmospheric Environment 5.2.4 – Freshwater Environment 5.3.4 – Groundwater Environment 5.4.4 – Marine Environment 5.5.4 – Vegetation and Wetlands 5.6.4 – Wildlife and Wildlife Habitat 5.7.4 – Traditional Land and Resource Use 5.8.4 – Land and Resource Use 5.9.4 – Heritage Resources
• all steps taken or proposed by the proponent to identify and address the concerns of the public and aboriginal people	3.0 Stakeholder Consultation and Aboriginal Engagement
• a list of all concerns regarding the undertaking expressed by the public and aboriginal people	3.0 Stakeholder Consultation and Aboriginal Engagement
• a list of approvals which will be required and other forms of authorization and the sources of any public funding.	1.1 Project Overview
• the location of the proposed undertaking and the nature and sensitivity of the surrounding area	1.1 Project Overview 1.6 Environmental Setting
• the size, scope and complexity of the proposed undertaking	4.1 Scope of the Assessment
• concerns expressed by the public and aboriginal people about the adverse effects or the environmental effects of the proposed undertaking	3.0 Stakeholder Consultation and Aboriginal Engagement
• steps taken by the proponent to address environmental concerns expressed by the public and aboriginal people	3.0 Stakeholder Consultation and Aboriginal Engagement
• potential and known adverse effects or environmental effects of the proposed undertaking, including identifying any effects on species at risk, species of conservation concern and their habitats	5.1.5 – Atmospheric Environment 5.2.5– Freshwater Environment 5.3.5 – Groundwater Environment 5.4.5 – Marine Environment 5.5.5 – Vegetation and Wetlands 5.6.5 – Wildlife and Wildlife Habitat

Table 1.4.2 EA Report Concordance with the Environmental Assessment Regulations

Requirement	EA Report Section Reference
	5.7.5 – Traditional Land and Resource Use 5.8.5 – Land and Resource Use 5.9.5 – Heritage Resources
• project schedules where applicable	2.7 Project Schedule
• planned or existing land use in the area of the undertaking	5.8 Land and Resource Use
• other undertakings in the area	6.0 Other Undertakings in the Area
• whether compliance with licenses, certificates, permits, approvals or other documents of authorization required by law will mitigate the environmental effects	5.1.7 – Atmospheric Environment 5.2.7– Freshwater Environment 5.3.7 – Groundwater Environment 5.4.7 – Marine Environment 5.5.7 – Vegetation and Wetlands 5.6.7 – Wildlife and Wildlife Habitat 5.7.7 – Traditional Land and Resource Use 5.8.7 – Land and Resource Use 5.9.7 – Heritage Resources

1.4.2 Federal Legislation

Federal legislation that is applicable to Bear Paw is identified in Table 1.4.3.

Table 1.4.3 Key Federal Legislation Relevant to the Environmental Assessment

Legislation	Regulating Authority	Relevance
Canadian Environmental Protection Act, 1999 (CEPA, 1999)	Environment Canada (EC)	*CEPA, 1999* pertains to pollution prevention and the protection of the environment and human health in order to contribute to sustainable development. Among other items, *CEPA, 1999* provides a wide range of tools to manage toxic substances, and other pollution and wastes, including disposal at sea.
Fisheries Act	Department of Fisheries and Oceans (DFO) EC (administers Section 36, specifically)	The *Fisheries Act* contains provisions for the protection of fish, shellfish, crustaceans, marine mammals and their habitats. Under the *Fisheries Act*, no person shall carry on any work, undertaking, or activity that results in serious harm to fish that are part of a commercial, recreational, or Aboriginal (CRA) fishery, or to fish that support such a fishery, unless this activity has been authorized by the Minister of Fisheries and Oceans. Section 36 of the *Fisheries Act* pertains to the prohibition of the deposition of a deleterious substance into waters frequented by fish.

Table 1.4.3 Key Federal Legislation Relevant to the Environmental Assessment

Legislation	Regulating Authority	Relevance
Migratory Birds Convention Act, 1994 (*MBCA*)	EC	Under the *MBCA*, it is illegal to kill migratory bird species not listed as game birds or destroy their eggs or young. The Act also prohibits the deposit of oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds.
Navigation Protection Act (*NPA*)	TC	The *NPA* is intended to protect specific inland and nearshore navigable waters (as identified on the list of "Scheduled Waters" under the *NPA*) by regulating the construction of works on those waters and by providing the Minister of Transport with the power to remove obstructions to navigation.
Canadian Environmental Assessment Act, 2012 (*CEAA, 2012*) Section 67	TC DFO	The pipeline will cross the seabed of the Strait of Canso, which is federal land, and therefore should TC or DFO need to exercise a power or perform a duty to allow that crossing on federal land, they will need to comply with s.67.
Species at Risk Act (*SARA*)	DFO/EC/Parks Canada	*SARA* is intended to protect species at risk in Canada and their "critical habitat" (as defined by *SARA*). The main provisions of the Act are scientific assessment and listing of species, species recovery, protection of critical habitat, compensation, permits and enforcement. The Act also provides for development of official recovery plans for species found to be most at risk, and management plans for species of special concern. Under the Act, proponents are required to complete an assessment of the environment and demonstrate that no harm will occur to listed species, their residences or critical habitat or identify adverse effects on specific listed wildlife species and their critical habitat, followed by the identification of mitigation measures to avoid or minimize effects. All activities must be in compliance with *SARA*. Section 32 of the Act provides a complete list of prohibitions.

Bear Paw will not be subject to regulation under the *National Energy Board Act* or the *Canadian Oil and Gas Operations Act* (*COGOA*) because it does not fall within the definition of pipeline under either act. In particular, Bear Paw will not connect Nova Scotia with any other province and will not extend beyond the limits of the province and thus falls outside the definition of "pipeline" in the *NEB Act*. In addition, Bear Paw will not carry natural gas from the well head or place of production or storage to another place but instead will distribute gas to an ultimate consumer and this falls outside the definition of "pipeline" under *COGOA*.

Bear Paw is also not subject to an environmental assessment as a designated project under *CEAA, 2012*. Pursuant to Section 4(3) of the *CEAA* Schedule of Activities List, *CEAA 2012* only applies to pipelines that are linked to the NEB or *COGOA*. Because Bear Paw is not subject to

regulation by the NEB or under *COGOA*, the *CEAA, 2012* environmental assessment does not apply to it.

1.4.3 Municipal Legislation

Bear Paw falls within the Municipality of the District of Guysborough (MODG) and in the County of Richmond. In Nova Scotia, all municipalities are enabled to create legally binding municipal planning strategies in compliance with Nova Scotia's *Municipal Government Act*. Municipal planning strategies as well as land use bylaws are used by municipalities to guide the development and management of the municipality, giving policy direction to regulate the use of land within the borders of a municipality to reduce conflicts in land use. Activities are also regulated through legislation such as noise bylaws and property-standards bylaws to reduce conflicts between land uses. Bear Paw will adhere to applicable municipal bylaws.

Bear Paw is located in the following MODG zones: Industrial Resources (I-3), Natural Resources (NR-1) and Mixed Use Rural Residential (MRR-1). The construction and operation of an underground pipeline is permitted in all zones (Torrey, D. pers. comm., 2015). Development Permits will be required for the construction of buildings and compression facilities associated with the proposed pipeline. In the County of Richmond, Bear Paw is located in an Industrial Zone.

1.5 FUNDING

Bear Paw Pipeline is a publicly owned and traded company.

1.6 ENVIRONMENTAL SETTING

This section provides a brief overview of the environmental and socio-economic setting near Bear Paw. This information in based on information gathered for the environmental assessment including research and field surveys completed in 2015. Additional environmental setting information is provided in existing conditions sections for each Valued component (VC) in Chapter 5.

1.6.1 Physical Environment

Bear Paw is located in a predominately rural area of eastern Nova Scotia, between the Goldboro Industrial Park in Guysborough County and the Point Tupper Industrial Park in Richmond County (Figure 1.1.2).

The climate in Guysborough and Richmond County is humid and temperate, moderated by its proximity to the Atlantic Ocean. January is typically the coldest month of the year, with a daily average temperature of -6.2°C. The warmest month of the year is usually August, with an average daily temperature of 18.6°C. The average annual precipitation is 1,524.7 mm, with

November being the month with the greatest precipitation (155.8 mm on average). Typically, February is the month that receives the most snow, with an average snowfall of 45.6 cm.

Winds are predominantly from the southwest and south-southwest directions. Wind speeds average 5.35 m/s. Wind speeds are less than 5.7 m/s 60% of the time, and are greater than 11.1 m/s 3% of the time.

The existing ambient sound levels in the surrounding area are expected to be typical of rural ambient levels, as well as the existing industrial activities in the area, and any natural background sounds (e.g., wind).

Bear Paw is located in an area of hard metacrystalline bedrock of the Late Cambrian to Ordovician aged Meguma terrane that underlies the southern portion of Nova Scotia from Yarmouth to Canso, and passes through Late Devonian to Carboniferous aged lowlands from Roachvale to Bear Head. There are seven surficial geological units within the area, of which four are classified as glacial till. Glacial till thicknesses typically range from 3 m to 5 m, but can reach greater depths in bedrock depressions and in the vicinity of drumlin fields (25 m to 30 m depth). The remainder of the area is characterized by very thin and likely permeable glacial till and boulders associated with numerous bedrock outcrops as well as minor areas of sand and gravel and areas of peatland or organic deposits.

Many rural residents rely on shallow groundwater from glacial till. The glacial till units, where sufficient saturated thickness is present, can typically provide yields of 1.0 L/min to 4.5 L/min to dug wells ranging in depth from 3 to 10 m and averaging 4.5 m deep (NSE Pumping Test Inventory 2015). The water quality from glacial till can be expected to be good, naturally soft and dilute in thin sandy till areas, hard in thick silty till areas, and may have elevated concentrations of iron and manganese when in proximity to wetlands.

Residential water supplies near the Project are derived from individual drilled wells in bedrock, dug wells or drive points in overburden, or shallow springs in overburden. Potential well yields are determined from drill log reports and constant rate pumping tests conducted throughout Nova Scotia for each hydrostratigraphic unit, based on an inventory of pumping tests maintained by NSE (1965-2015). Drilled wells typically yield 0.8 L/s to 5.0 L/s from wells ranging in depth from 76 m to 156 m (SOEI 1996).

1.6.2 Terrestrial Environment

Bear Paw primarily falls within the Eastern Interior Ecodistrict of the Eastern Ecoregion and the Mulgrave Plateau Ecodistrict of the Nova Scotia Uplands Ecoregion. Both of these ecodistricts are characterized by warm summers and long cold winters. The southern and northern limits of Bear Paw extend into the Atlantic Coastal Ecoregion, where vegetation and climate is strongly influenced by proximity to the ocean (Neily et al. 2003).

Forests dominate the land cover classes in the area, and are comprised of stands of varying composition and seral stages. Stands of early-mid successional softwood are particularly abundant, but mid-successional stands of mixedwood and hardwood are also common. The composition and structure of forests reflect the influence of logging activities. Much of the forest cover is fragmented by existing roads and other linear developments (e.g., existing pipeline RoW). Interior forest conditions are present throughout much of the area with relatively high concentrations occurring between Godfry Brook and near Nickerson Lake and in the north from the Milford Haven River to near the Strait of Canso.

The majority of wetlands throughout the surrounding landscape are comprised of swamp. Coniferous treed swamps are particularly abundant but those having a mixedwood overstory are also common, as are those dominated by tall shrubs. Peatlands (i.e., bogs and fens) are prominent features within portions of the area, such as near Carters Lake and although of much lesser abundance, occurrences of marsh and shallow-water wetland classes are also present.

Desktop research and field surveys indicated 16 plant species of conservation interest have been recorded in the area. The plant species include 13 vascular plants and three lichen; two are considered Species at Risk, Atlantic population of boreal felt lichen and blue felt lichen (AC CDC 2015a).

As noted above, the majority of the area near Bear Paw provides forested habitat with several freshwater bodies and open wetlands. This habitat has potential to support a wide variety of bird species. Data obtained for Bear Paw indicate that approximately 142 bird species have been recorded in the area, including 10 Species at Risk and 35 other species of conservation interest.

Eight herpetile species were recorded during 2015 field surveys, including seven amphibians and one reptile, none of which are identified as species of conservation interest. Though not recorded during field surveys, two herpetile species of conservation interest have the potential to be found in the area, the wood turtle and four-toed salamander.

Atlantic Canada Conservation Data Centre (AC CDC) data and incidental field observations indicate that at least 17 mammal species have been recorded near the area, including one Species at Risk, the mainland moose. Moose are known to occur throughout the area. There are two Deer Wintering Areas in the area; one is located at its southern end, the other is near Salmon River.

1.6.3 Aquatic Environment

Bear Paw passes through four watersheds (Country Harbour River, New Harbour/Salmon River, Clam Harbour/St. Francis River and River Inhabitants), and approximately 69 watercourses. Several fish species of conservation interest have the potential to be located within the area, including the American eel, Atlantic salmon (Nova Scotia Upland and Eastern Cape Breton populations), brook floater, brook trout, and four-spined stickleback. Of those, only the brook

floater is afforded regulatory protection as it is listed as threatened under the Nova Scotia *Endangered Species Act*. In addition to these species of conservation interest, several secure species are known to be present, including white sucker, alewife, rainbow trout, nine-spine stickleback, and creek chub.

Watercourses within the eastern shore of Nova Scotia are known to have naturally occurring low pH values (acidic waters) in areas dominated by Halifax formation bedrock (Stantec 2012a), and low pH values (ranging from 4.6 to 6.8) were measured during 2015 field studies conducted for Bear Paw. Fish species in this region are believed to be locally adapted to naturally low pH conditions.

Bear Paw crosses the marine environment at two locations, at Milford Haven River, an estuarine environment, and at the Strait of Canso (Figure 1.1.2). The prevailing wind at both marine crossings is from the northwest. The Strait of Canso is well sheltered from long period swells and the wave climate is predominately driven by wind (CBCL 2015). Currents in the Strait of Canso southeast of the Canso Causeway are generally weak and are predominantly wind-driven (McCracken 1979).

The sediment in the a Strait of Canso near the assessment corridor is primarily silty sand in the deeper water and the majority of the cross section up the Strait, with coarser sand and gravel sediments closer inshore. Construction of the Canso Causeway has increased fine sediment deposition within the mid-channel, which may be a contributing factor to the reduced diversity of benthic taxa encountered there.

The Strait of Canso and Milford Haven River have the potential for fish species similar to those in the adjacent waters of Chedabucto Bay and the Nova Scotia coast. Marine waters of the inshore Scotian Shelf (shoreline to 90 m water depth) support populations of summer flounder, winter flounder, Atlantic wolffish, spiny dogfish, cod, haddock, pollock, halibut, American lobster, rock crab, and scallop (DFO 2007).

Marine mammals in the region are predominantly harbour seals and grey seals that are present year-round (JWEL 2004). Nearshore waters off the coast of Nova Scotia are also inhabited by white-sided dolphins and harbour porpoises. Migratory whales, including fin whales, humpback whales, and right whales, are also present off of Nova Scotia during the spring, summer and fall, but are not known to be found in the Strait of Canso (SNC 2015).

Marine Species at Risk are not known to be present within a 5 km radius of the area, but habitat suitable for Atlantic wolfish, a species listed under schedule 1 of *SARA* is present.

1.6.4 Socio-Economic Environment

Approximately 54% of the Assessment Corridor is privately owned and 46% is Provincial Crown land. The location of Bear Paw is predominately rural, containing few developed areas. Small clusters of residential dwellings are concentrated around the population centres of Goldboro, Sunnyville, Guysborough, Mulgrave, Point Tupper, and Port Hawkesbury.

Traditional land use in the area by the Mi'kmaq includes hunting, fishing, and harvesting resources for sustenance, medical, ceremonial and/or conservation purposes (MGS 2015). Although it is known that most First Nations have and do hunt and fish in the lands and waters through which Bear Paw is proposed, there are no Mi'kmaq communities in the immediate vicinity. The closest is Paqynkek in Antigonish county, which is approximately 30 km away. Other mainland communities who may have interests in the area include Pictou Landing, Millbrook and Sipekne'katik. Mi'kmaq from one or more of the five First Nations communities in Cape Breton may also have ties to the area. The closest Cape Breton communities would be Potlotek and We'koqma'q.

Agricultural areas are uncommon in the area with only a few hobby farms adjacent to old homesteads. Recent forest harvesting activities were noted throughout the assessment corridor during 2015 field surveys . There are also two mineral exploration licenses in the area.

The hunting and trapping of rabbit, mink, muskrat, red squirrel, skunk, weasel, otter, bobcat, beaver, fox and coyote is known to occur in the area. Bear Paw falls within NSDNR Deer Management Zone 110, where 400 deer stamps were available. Recreational fishing also occurs in the area. Given its size and accessibility, the Salmon River supports both recreational fishing and boating activities. Recreational fishing for mackerel, occurs from the Canso Causeway, at local wharves and piers around Port Hawkesbury, as well as the southeast tip of Bear Head. Two mackerel traps are registered in the wider area of the Strait (i.e., outside of the assessment corridor) where it opens to Chedabucto Bay (SNC 2015).

Chedabucto Bay supports fisheries species that include American lobster, shrimp and eastern oyster (AMEC 2008; Kenchington 2014), in addition to finfish fisheries species that include halibut, cod, haddock, pollock, white hake, Atlantic herring and mackerel (AMEC 2008). There is no evidence of large-scale fishery in the Strait of Canso (SNC 2015), including prior to the installation of the causeway (McCracken 1979). No commercial fisheries occur in the Strait of Canso because this area is used for shipping and has been extensively industrialized (SNC 2015). A valued lobster fishery is active outside the Strait and nearshore areas.

The Bear Paw assessment corridor is adjacent to or crosses two nature reserves (Figure 1.1.2) with 'pending' status. These are the Chedabucto Fault Nature Reserve and the Mulgrave Nature Reserve. The Bear Paw assessment corridor crosses the northwestern edge of the pending Chedabucto Fault Nature Reserve, running adjacent to the existing M&NP Right of Way that also passes through the pending nature reserve (both of which are displayed on Figure 1.1.2. As the assessment corridor in this area is adjacent to the existing RoW, it is the preferred routing option. Bear Paw Pipeline is consulting with Nova Scotia Environment on this issue, and will continue to do so through the detailed routing process to develop appropriate mitigation.

The Guysborough County Nature Trail is a 45 km trail that is part of the Trans Canada Trail system (Canada Trails n.d.) and runs between Country Harbour Cross Roads to the town of Guysborough. Activities along this trail include walking, hiking, cycling, horseback riding, cross-country skiing, snowmobiling and ATV use. Other recreational uses within the area near Bear Paw include snowmobiling and ATV use, although neither have designated trails.

1.7 ORGANIZATION OF THIS REPORT

This EA Report is organized as follows:

- Section 1: provides general project information, describes the regulatory environment and describes the environmental setting.
- Section 2: provides the project description, including standard mitigation.
- Section 3: provides an overview of public and aboriginal engagement
- Section 4: outlines the scope of the assessment;
- Section 5: presents the assessment of valued components;
- Section 6: presents and assesses other undertakings in the area;
- Section 7: presents and assesses the potential environmental effects of accidents and unplanned events;
- Section 8: provides the summary and conclusions of the EA Report; and
- Section 9: provides a list of literature cited and personal communications.

2.0 PROJECT DESCRIPTION

2.1 PROJECT DEFINITION AND LOCATION

Bear Paw consists of the construction, operation and maintenance of a lateral pipeline to supply natural gas to Bear Head. This pipeline will be used exclusively to supply natural gas to Bear Head; there will be no other industrial or residential customers. The Project Development Area (PDA) is defined as the maximum extent of the physical area of possible disturbance. The PDA will include all temporary and permanent areas of ground disturbance, including:

- the pipeline RoW (both during construction and operation and maintenance);
- mainline block valve stations (valve stations);
- the compressor station;
- temporary and permanent access roads; and
- any storage, staging or other working areas required to support construction.

The pipeline will extend approximately 62.5 km from a point along the existing M&NP main transmission line near Goldboro, to Bear Head in the Point Tupper Industrial Park. For planning and environmental assessment purposes, a 100 m wide assessment corridor (100 m minimum, but wider when necessary) has been selected as shown on Figure 1.1.1. The pipeline will be located within this corridor. Although the assessment corridor covers a large area, the RoW will be much smaller (approximately 35 m during construction and less during operation).

Approximately 60 km of the assessment corridor follows the existing RoW for the two existing 8" pipelines (the M&NP NPS 8 NG pipeline and SOEP NPS 8 NGL pipeline) that run from Goldboro to Point Tupper. Bear Paw pipe size is substantially larger in diameter (42" NPS) than those within the existing RoW, therefore it is anticipated that the final Bear Paw route will deviate from the existing RoW where necessary for constructability reasons. Areas where it may be difficult to follow the existing RoW include:

- sharp bends;
- steep or rocky terrain;
- water crossings;
- wetlands;
- other sensitive habitat; and
- nearby structures and buildings.

2.2 PROJECT COMPONENTS

Bear Paw consists of three major components (pipeline, compressor station, and temporary ancilliary facilities) are described in the following sections.

2.2.1 Pipeline

Bear Paw consists of the construction of approximately 62.5 km of new pipeline with an outside diameter of 1067 mm (NPS 42) at a designed maximum operating pressure of 9930 kPa(g) (1440 psig). The pipeline will be designed and constructed in accordance with the *Pipeline Regulations* (*Nova Scotia Reg. 66/98*) promulgated under the *Pipeline Act, R.S.N.S 1989, c. 345*; the latest edition of CAN/CSA Z662 - Oil and Gas Pipeline Systems; and all other applicable regulatory requirements.

There will be three valve stations installed on the pipeline in the following general locations:

- south of the Salmon River;
- north of the Milford Haven River; and
- south of the Strait of Canso.

It will be possible to close the valve stations remotely to isolate sections of the pipeline for maintenance, or in the event of a leak or rupture. The valve station sites will be fenced and will include, at a minimum, an above ground valve actuator, a building housing the valve controls (approximately 2 m by 3 m) and a small power source. Power will be provided either through the local electrical grid, or generated through solar panels and stored in batteries.

The pipeline will be designed to accommodate inline inspection and cleaning tools, often referred to as pigs. Pig launching and receiving assemblies through which these inspection tools can be inserted and removed from the pipeline will be included in the design. To maximize the amount of line that can be inspected, the insertion point will be at the compressor station, and the removal point will be at, near to, or within the Bear Head facility.

The cleared area required for construction will be approximately 35 m wide, with additional temporary work areas required at watercourse crossings and construction staging areas. Marshalling yards, storage areas, and temporary or permanent access roads to the RoW will also be required. Wherever practical, the pipeline will parallel the existing RoW for the M&NP NPS 8 NG pipeline and SOEP NPS 8 NGL pipeline. The pipeline will be installed to provide at least 0.9 m of cover.

2.2.2 Compressor station

A compressor station is required at the head of the pipeline, near Goldboro, to pressurize the natural gas to allow it to flow at the designed rate and deliver to Bear Head at the desired pressure of 1000 psi. The preferred location of the compressor station is shown in Figure 2.2.1, and the facility layout is shown in Figure 2.2.2. The compressor station will be approximately 300 m by 500 m, with a total required cleared area of approximately 15 ha.

The compressor station will be designed to provide pressures up to 9930 kPag (1440 Psig). The compression units will be industrial gas turbine driven and designed to provide up to 80 MW (107,100 hp) of compression power. Facilities will be designed in accordance with:

- CSA Z662 - Oil and Gas Pipeline Systems;
- API 616 – Gas Turbines for the Petroleum, Chemical & Gas Industry;
- API 617 - Axial and Centrifugal Compressors and Expander-compressors;
- CSA B51 - Boiler, Pressure Vessel, and Pressure Piping; and
- ASME Section Viii Division 1- Boiler and Pressure Vessel Code.

Six compression units will be installed, ranging in size from 3 MW to 30 MW. Each compressor package will be housed in an individual building that sits on a concrete slab. The compressors will be powered with natural gas turbines. After compression, the natural gas will be directed through cooling units. Because the temperature of natural gas increases during compression, it is necessary to cool the gas before it enters the pipeline to increase flow efficiency. Two meter stations will be installed to measure the flow of gas into the compressor station. One meter station will be installed at the inflow point from the offshore gas source; the second will be installed for the inflow from the onshore gas source.

In addition to the main compression and cooling units, ancillary equipment and buildings will be installed to support the operation of the compressor station. These include power generation equipment, compressed air equipment, electrical equipment, facility controls, offices, and workshops. The facility will be enclosed to limit unauthorized access. Most piping will be located above ground, except when crossing under travel ways.

2.2.3 Onsite Power Generation

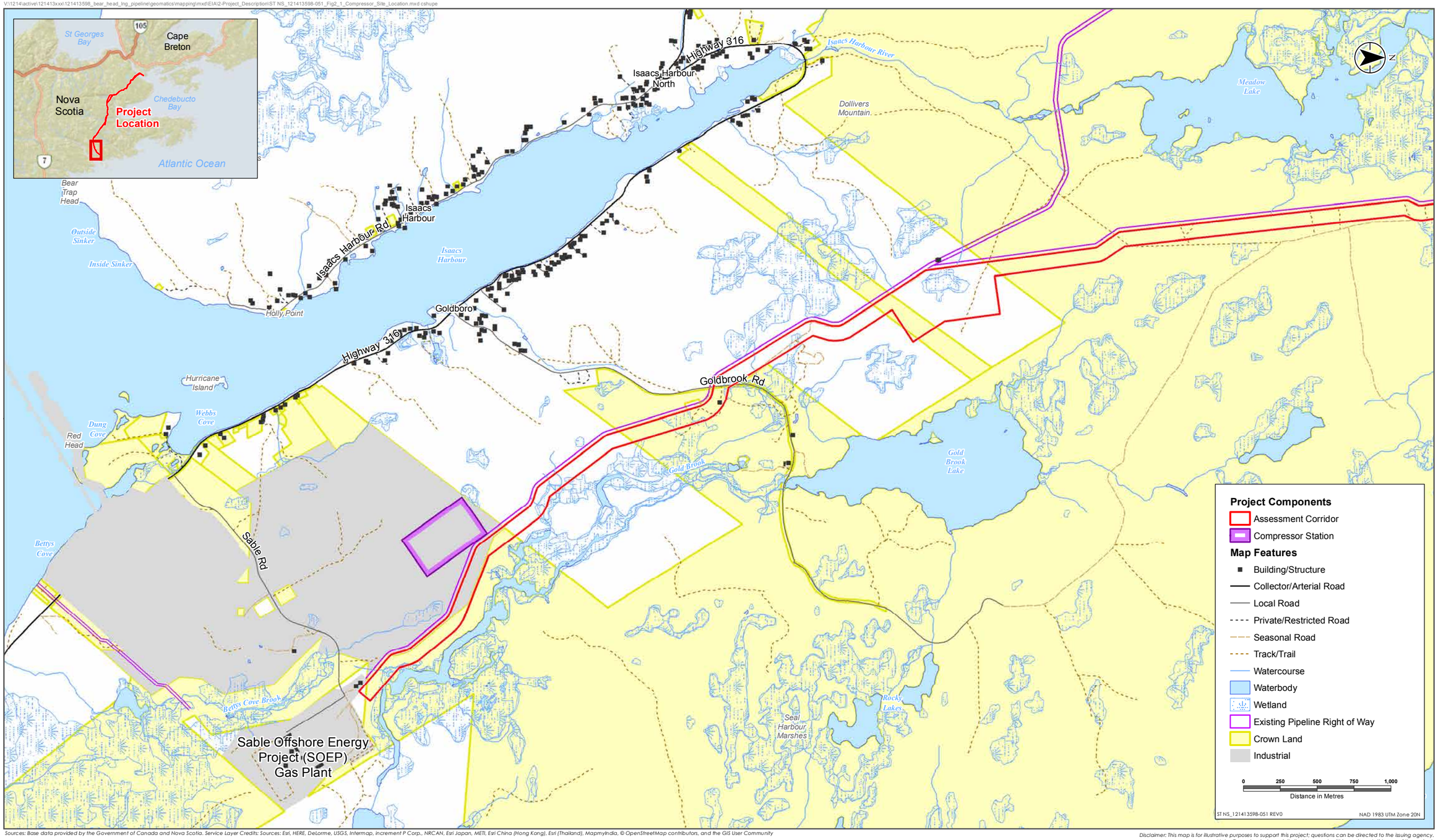
Electric power for the station operation will be generated onsite with N+1 skidded gen-sets, each sized at about 1 MW. The bulk loads for power are the aerial cooler fan motors, instrument air compressors, glycol pumps, ventilation fans and lighting. Power reserve is required for electric hydraulic starting of the compressor packages (up to 250 hp per start).

Redundant generators will be installed to ensure reliability and maintenance and maintain continuous station operation. Generator buildings will contain the generators, engines, electrical equipment and ancillary systems required for the operation and protection of the generator units. Each generator will be provided with a cooling radiator mounted outside the generator building.

2.2.4 Temporary Ancillary Facilities

Temporary ancillary facilities (e.g., temporary offices and workshops, materials storage areas, fuelling areas) will be required during construction. These will be sited within the assessment corridor.
Temporary access roads will be required during construction, and permanent access will be required for operation. The area has a high road density due to past and current forestry activities, as well as the existing pipelines. Therefore, the number of new access roads will be minimal. Existing roads will be assessed for suitability, and may be upgraded to handle the required loads and frequency of use.

V:\1214\active\121413xxx\121413598_bear_head_lng_pipeline\geomatics\mapping\mxd\EIA\2-Project_Description\ST NS_121413598-051_Fig2_1_Compressor_Site_Location.mxd cshupe



Sources: Base data provided by the Government of Canada and Nova Scotia. Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), Mapmyindia, © OpenStreetMap contributors, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency.
Note: Crown lands shown is limited to parcels within a relevant distance of the project.

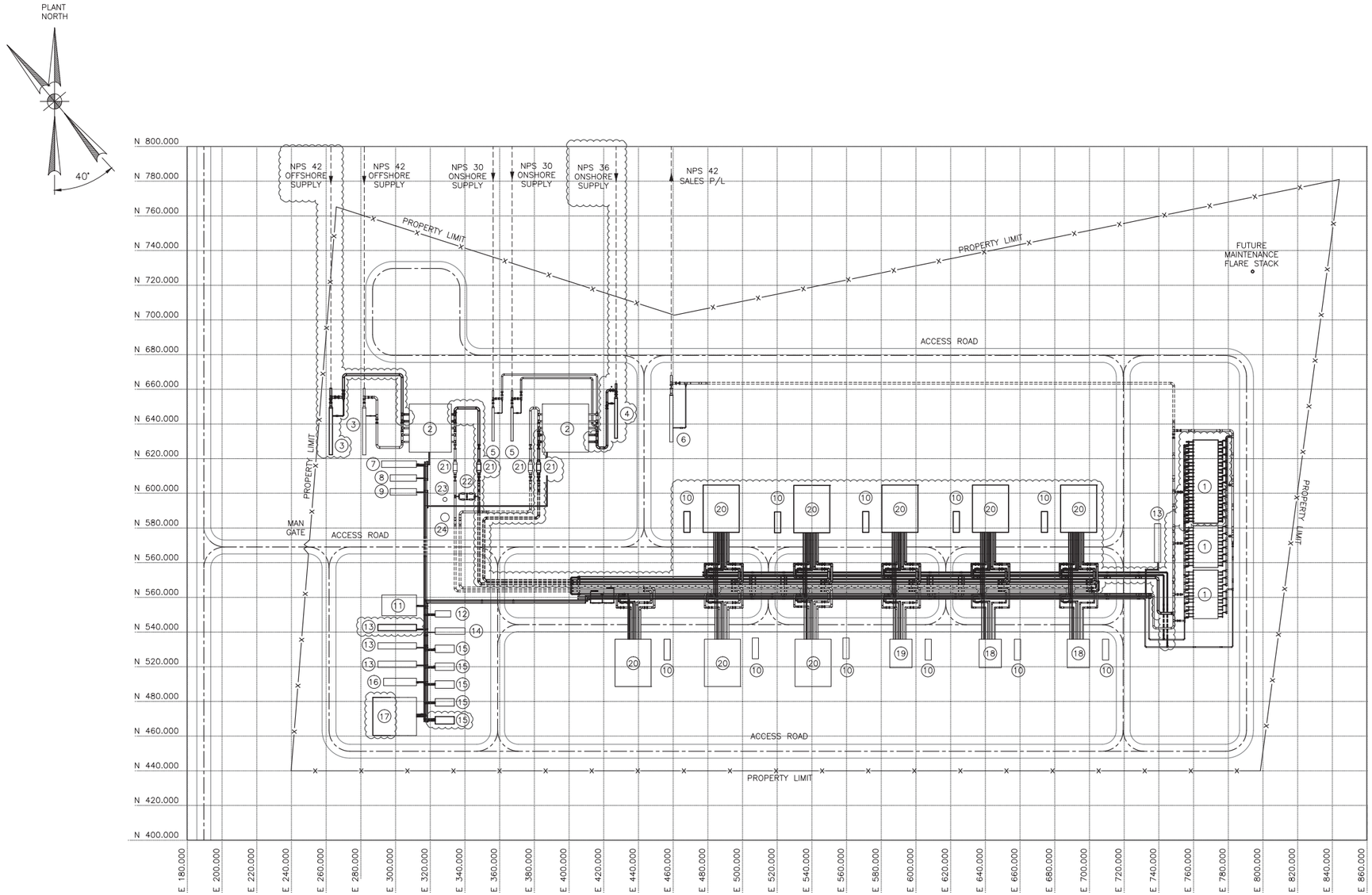
BEAR PAW PIPELINE

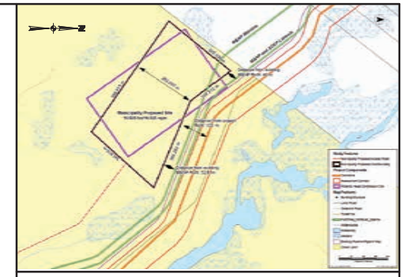
Stantec

BEAR PAW PIPELINE PROJECT

Compressor Station Location

Figure 2.2.1





LOCATION PLAN

NAD 1983, UTM ZONE 20N
MUNICIPALITY OF THE DISTRICT OF GUYSBOROUGH
COMPRESSOR STATION PROJECT No. XXXXXXX
SCALE: NTS

= PHASE III ADDITIONS

BUILDING LEGEND

ITEM	DESCRIPTION
1	AERIAL COOLER BANKS
2	NPS 30 METERING BUILDING
3	NPS 42 PIG RECEIVER
4	NPS 36 PIG RECEIVER
5	NPS 30 PIG RECEIVER
6	NPS 42 PIG LAUNCHER
7	UTILITY GAS BUILDING
8	ANALYZER BUILDING
9	INSTRUMENT BUILDING
10	LOCAL CONTROL MODULES
11	HEATED STORAGE BUILDINGS
12	WATER BUILDING
13	ELECTRICAL BUILDINGS
14	PERSONNEL BUILDING
15	APU BUILDINGS
16	COMPRESSED AIR BUILDING
17	GLYCOL BOILER BUILDING
18	4700 HP COMPRESSOR BUILDINGS
19	7700 HP COMPRESSOR BUILDING
20	30000 HP COMPRESSOR BUILDINGS
21	SUCTION SCRUBBER
22	EQUILIZATION SKID
23	DRAIN TANK
24	CYCLONE SEPARATOR

Figure 2.2.2

PRELIMINARY

DRAWING NUMBER	DRAWING NAME
	REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	DRN	CHK	DSGN	APVD
B	ISSUED FOR COST ESTIMATE	16/02/16	DJ	DGH		
A	ISSUED FOR REVIEW	16/01/27	CB	DB	DF	DM

		DATE
DRN BY		
CHKD BY		
DSGN BY		
APVD BY		

CLIENT: BEAR PAW PIPELINE CORPORATION INC.
SUITE 1903–1969 UPPER WATER STREET
HALIFAX, NS B3J 1M5

GENERAL INFORMATION – BEAR PAW PIPELINE PROJECT
GOLDBORO COMPRESSOR STATION
PHASE III PLOT PLAN
NOVA SCOTIA

SCALE	PROJECT No	DRAWING No	REV
1:750	121413598	121413598ED-PLA0003-01	B

CAD FILE: TB
PLOT–DATE

2.3 PROJECT ACTIVITIES

2.3.1 Construction

The following is a general description of typical pipeline construction activities.

2.3.1.1 Site Preparation and Construction of Temporary Work Areas

Prior to any construction, a survey crew will survey and stake the RoW along the pipeline route.

The RoW traverses and intersects several existing public and private roads, including forestry roads. It is anticipated that access to the RoW for construction will be from these points. Where required, access roads will be built as temporary or permanent access routes and will consider the applicable local or provincial standards or guidelines for these uses.

All utilities (e.g., existing pipelines, telephone lines, power lines) will be located prior to construction to avoid damage to the utility and hazards to construction workers.

Clearing consists of removing trees, stumps, brush, and crops from the RoW to allow access for construction. Temporary work spaces needed to support construction (e.g., staging areas, drill sites) are also cleared at this time. Clearing will be restricted to the RoW as staked during field surveys.

Grading consists of the stripping and conservation of topsoil from the RoW. Soil handling procedures will be specified in the Project-specific Environmental Protection Plan (EPP).

2.3.1.2 Pipeline Installation

Line pipe will be delivered to the RoW by trucks with trailers designed to haul large diameter, pre-coated pipe. The stringing crew is responsible for offloading of the individual pipe joints and positioning them along the RoW on skids in preparation for the next crew. The pipe is bent to allow the completed pipeline to match the contours of the RoW (lateral, vertical and compound deflections). Pipe joints are welded together and pipe coating is applied to the welds.

Trenches are excavated using backhoes or trenching machines; trenches will be approximately 4 m wide at the top, and about 2 m deep, to provide the required depth of cover over the pipe. In areas of bedrock, the requirements for depth of cover may be reduced in accordance with applicable code requirements. The contractor will provide access across the PDA as required for property owners. A typical profile of the RoW during construction is provided in Figure 2.3.1.

Road crossing locations will be bored. This method involves excavations on both sides of the crossing to accommodate the boring equipment to operate with adequate space and at the proper elevation. Augers placed in a bore pipe are used to bore beneath the infrastructure to be crossed to avoid disrupting surface features at the site. When the bore pipe exits on the far side of the crossing, the augers are removed, the carrier pipe or casing pipe is attached to the bore pipe, and the bore pipe is pulled back, drawing the carrier pipe or casing pipe into place. Typically, paved highways and main roads are bored; smaller road crossings may be crossed using an open cut method. If a road is open cut, the trench is backfilled quickly to maintain access.

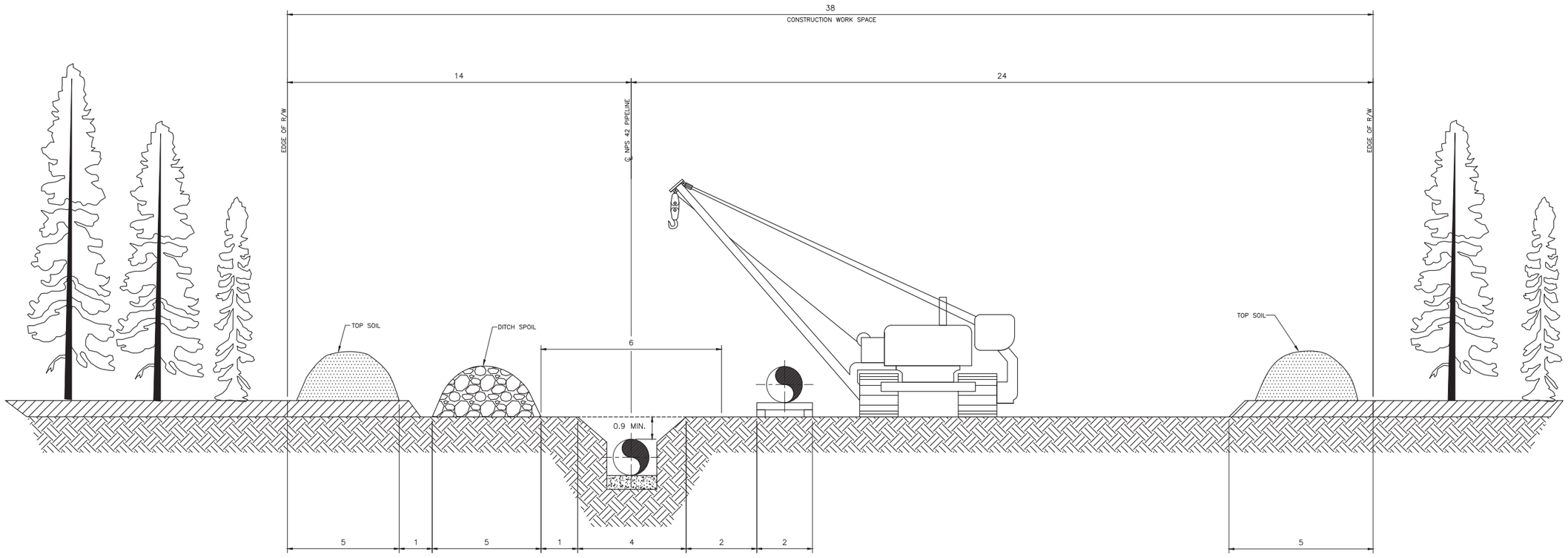
If substantial bedrock is encountered, blasting may be required for trench excavation for the pipeline. All blasting activity is carried out by licensed blasting personnel to protect the public, personnel and property and in accordance with all regulatory requirements.

Once trenching is complete, the completed pipe system is layed into the trench. Inspection personnel work with the lowering crew to inspect the integrity of the external coating of the pipe with a specialized inspection device.

Backfilling of the trench will commence immediately after the pipe has been installed by dozers or backhoes. In steep sloped areas, ditch plugs, RoW cross drains, and diversion berms will be installed at regular intervals to prevent trench and surface erosion and promote re-vegetation.

2.3.1.3 Construction Methods at Watercourse Crossings

The pipeline will cross two major marine watercourses and 69 freshwater watercourses.



NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DITCH WIDTH AT TOP OF DITCH MAY VARY DUE TO DIFFERING SOIL CONDITIONS.
3. ADDITIONAL TEMPORARY WORKSPACE REQUIRED AT BENDS, CROSSINGS, AND SIDEHILLS.
4. IF MORE SPACE IS REQUIRED FOR GRADE AND DITCH SPOIL, EXTRA TEMPORARY WORK SPACE WILL BE REQUIRED.

Figure 2.3.1

DRAWING NUMBER	DRAWING NAME
	REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	DRN	CHK	DSGN	APVD
A	ISSUED FOR INFORMATION	15/10/27	DJ			

DRN BY	D. JURZYNEK	DATE 15/10/27
CHKD BY		DATE
DSGN BY		DATE
APVD BY		DATE

Stantec

CLIENT: Bear Paw Pipeline

GENERAL INFORMATION – BEAR PAW PIPELINE PROJECT
NPS 42
MAINLINE 38m R/W CONFIGURATION
FLAT TERRAIN – SUMMER CONSTRUCTION
NOVA SCOTIA

SCALE	PROJECT No	DRAWING No	REV
N.T.S.	121413598	121413598ED-ROW0002-01	A

CAD FILE: TB

PLOT–DATE

2.3.1.3.1 Marine Crossings

The watercourse crossing methods being considered for the two marine watercourses (Strait of Canso and the Milford Haven River, Figure 1.1.2) are provided in Table 2.3.1. Multiple construction methods and alignments are being considered at both crossings.

Table 2.3.1 Summary of Marine Watercourse Crossing Methods Being Considered

Watercourse	Assessment Corridor	Possible Marine Crossing Method				
		Bottom Lay	Open Cut	Horizontal Directional Drill (HDD)	Micro Tunnel	Combination HDD & Bottom lay (shore approach)
Strait of Canso	500 m wide assessment corridor	✓	-	✓	-	✓
Milford Haven River	West	-	-	✓	-	-
	East	-	✓	✓	✓	-

Bottom Laying

Bottom laying is a crossing construction method in which a section of pipeline is towed into place after being assembled on land, and is left to rest on the water bed. The installation is not isolated from the surrounding environment (i.e., water flow is not diverted during installation). The pipe is anchored using concrete coating or bolt-on weights. To provide mechanical protection from falling or laterally moving objects, rip-rap or concrete mattresses may be applied. An example profile of a bottom-laid installation is provided in Figure 2.3.2. Total installation time using this method after the pipe is pre-assembled on land is anticipated to be approximately 60 days.

Open Cut

An open cut watercourse crossing is similar to the bottom lay method, except that the pipeline is installed into an excavated trench that is then backfilled. The excavation of the trench would not be isolated from the watercourse. This option is being considered for the Milford Haven River because the watercourse is shallow (channel depth of approximately 6 m) and the pipe diameter is large, and therefore the height of a bottom lay in this location could potentially affect flow conditions, or navigation. Pipe installation using this method would take approximately 10 days depending on the depth of bedrock below the river bed.

Horizontal Directional Drilling

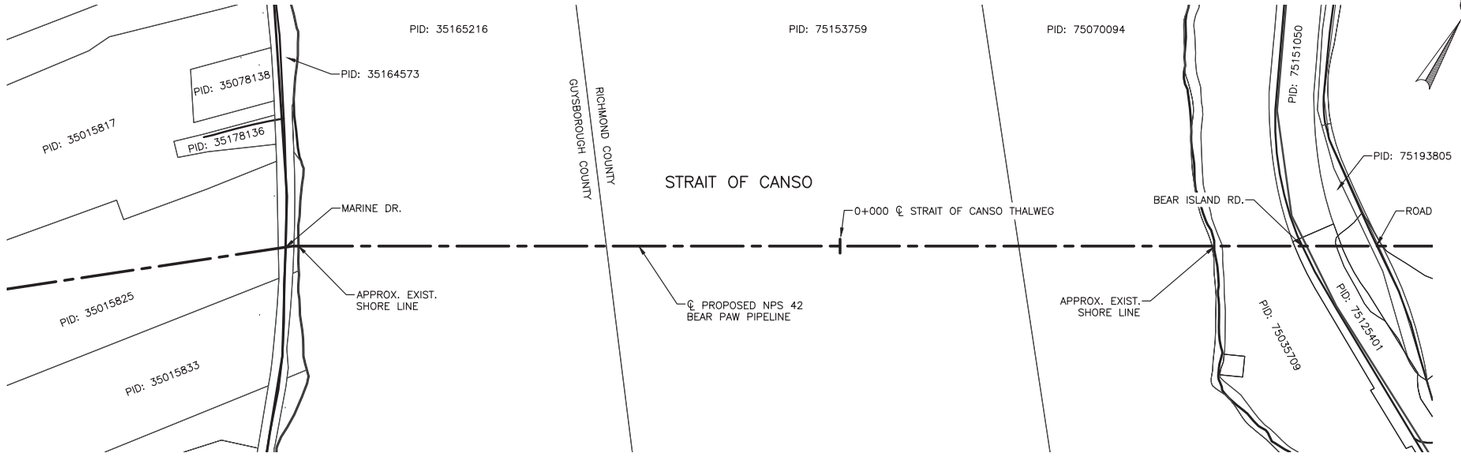
Horizontal Directional Drilling (HDD) involves drilling underneath the watercourse. After a pilot hole is drilled from entry point to exit point, further reaming passes enlarge the hole to the desired diameter, and the pre-assembled pipe string is pulled into the hole. Pressurized mud systems are employed to continually remove cuttings from the hole. Because in-stream activity in the watercourse is avoided completely (trenchless method), HDD results in no disturbance to the watercourse or its banks. The drilling mud used in HDD is typically composed of a mixture of clean freshwater as the base, bentonite (clay-based drilling lubricant) as the viscosifier, and synthetic polymers (DFO 2007a). This method involves using heavy equipment in the vicinity of the watercourse; however, a set-back distance will be established between the drill pad and the watercourse. The set-back distance will depend on the depth of the watercourse and the angle of drilling that can be achieved by the HDD rig. Figures 2.3.3 and 2.3.4 provide typical plan and profile drawings for HDD under a watercourse. HDD would take approximately seven months, depending on the watercourse crossing location.

Micro Tunneling

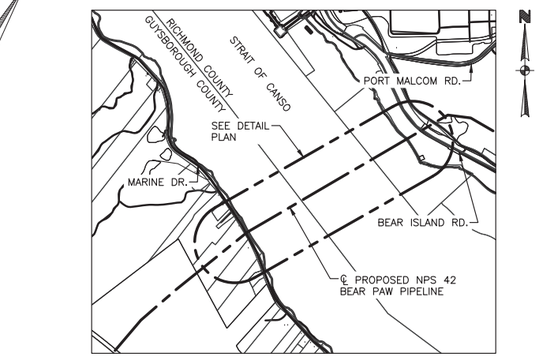
Micro tunneling, like HDD, is a trenchless installation method. Unlike HDD, the pre-assembled pipe follows directly behind the cutting head, allowing the boring of the hole and installation of the pipe to occur in one pass. During micro tunneling, the cuttings are brought to the surface through slurry lines that run through the interior of the pre-assembled pipe. The slurry used for this process is similar to the drilling mud used in HDD. Micro tunneling requires the installation of pits on both sides of the watercourse from which the tunneling equipment and pipe segments are launched, and the tunneling machine is received upon completion. The footprint of onshore activities and pipeline alignment differs little from that of HDD. Micro tunneling at the Milford Haven River would take approximately three months.

NAD 83 UTM COORDINATE ZONE: 20

N: 5046938m E: 629668m
LAT: 45.563898° LONG: -61.338403°



DETAIL PLAN
1:4000



LOCATION MAP
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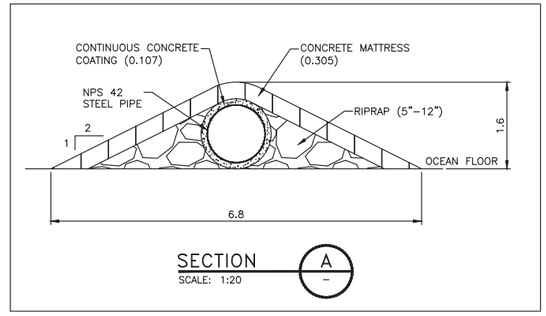
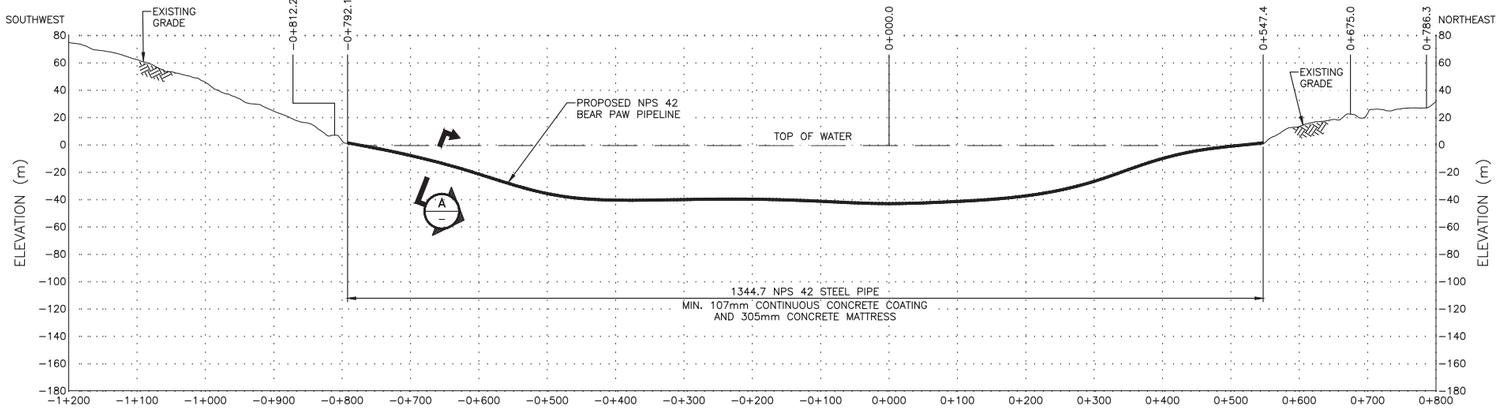




PROFILE ALONG ℄ OF NPS 42 BEAR PAW PIPELINE
HORIZ. 1:4000
VERT. 1:2000

Figure 2.3.2

NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS SPECIFIED OTHERWISE.
2. ALL ELEVATIONS ARE GEODETIC (CGV28 DATUM).
3. CHAINAGES REPRESENT HORIZONTAL DISTANCE.

DRAWING NUMBER	DRAWING NAME
	REFERENCE DRAWINGS

DRAFT - NOT FOR CONSTRUCTION

REV	DESCRIPTION	DATE	DRN	CHK	DSGN	APVD
A	ISSUED FOR REVIEW	15/11/16	DJ			

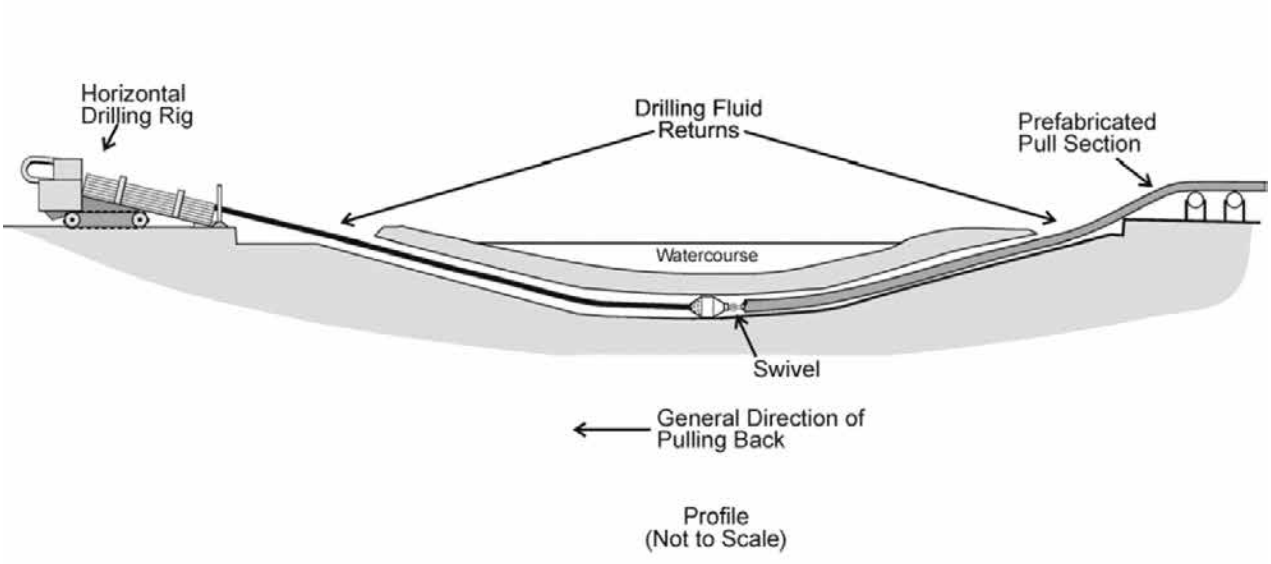
DRN BY	D. JURZYNEK	DATE 15/11/04
CHKD BY		DATE
DSGN BY		DATE
APVD BY		DATE

CLIENT
BEAR PAW PIPELINE CORPORATION INC.
SUITE 1903–1969 UPPER WATER STREET
HALIFAX, NS B3J 1M5

GENERAL INFORMATION – BEAR PAW PIPELINE PROJECT
STRAIT OF CANSO CROSSING
BOTTOM LAY CROSSING METHOD
NOVA SCOTIA

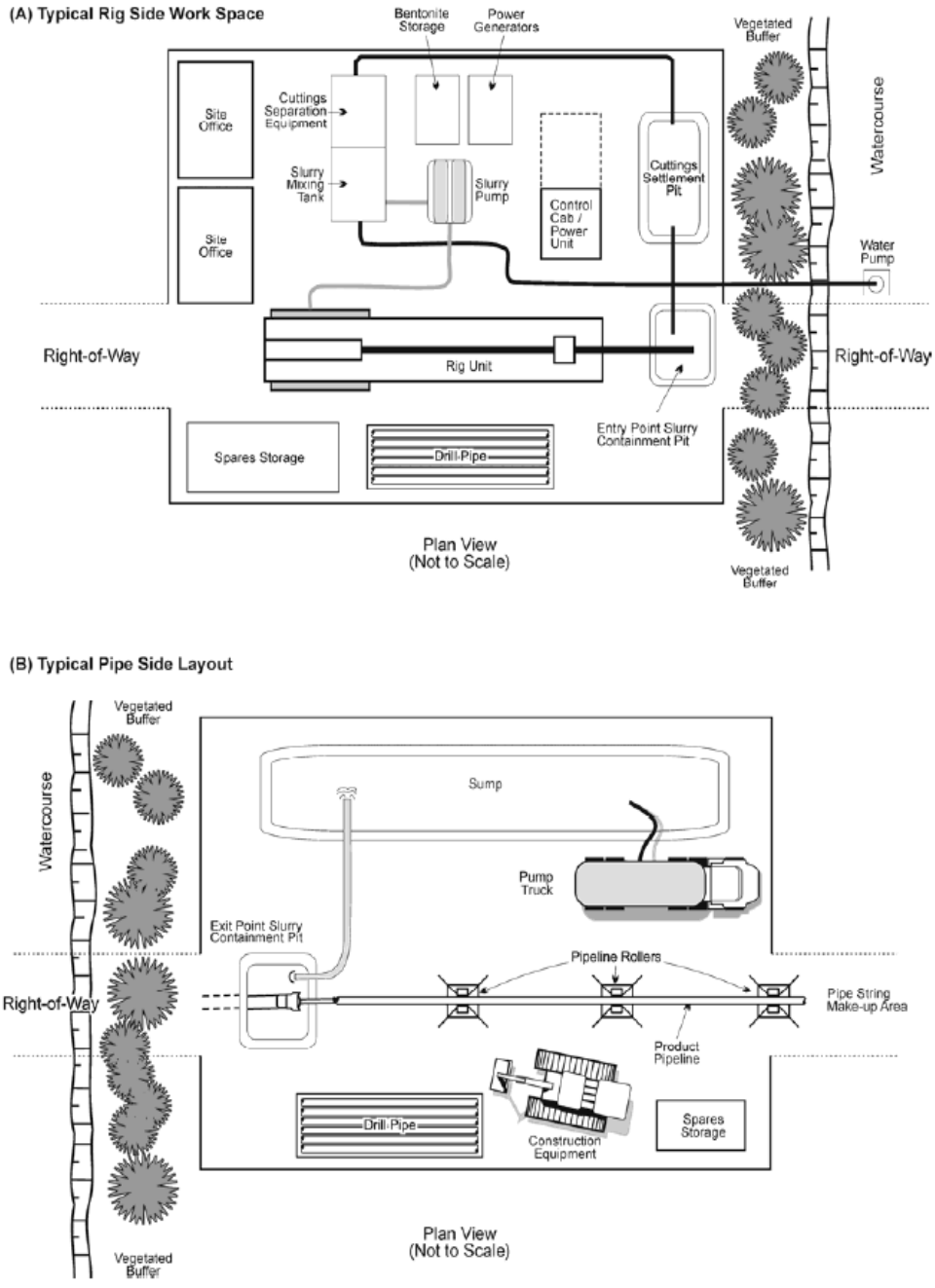
SCALE	PROJECT No	DRAWING No	REV
AS SHOWN	121413598	121413598ED-XNG0001-02	A

CAD FILE: TB
PLOT–DATE



Source: CAPP, CEPA and CGA 2005

Figure 2.3.3 Typical HDD Watercourse Crossing Profile



Source: CAPP, CEPA and CGA 2005

Figure 2.3.4 Typical HDD Watercourse Crossing Method

2.3.1.3.2 Freshwater Crossings

The primary methods of freshwater watercourse crossings will be either open cut (also known as open trench), or isolated crossings.

Open Cut: this method involves working directly in the watercourse without diverting the flow of water around the working area (Figure 2.3.5).

Isolated: this method involves diverting the natural flow of water around the site during construction so that the work can be carried out on the dewatered creek or river bed (Figures 2.3.6 to 2.3.8).

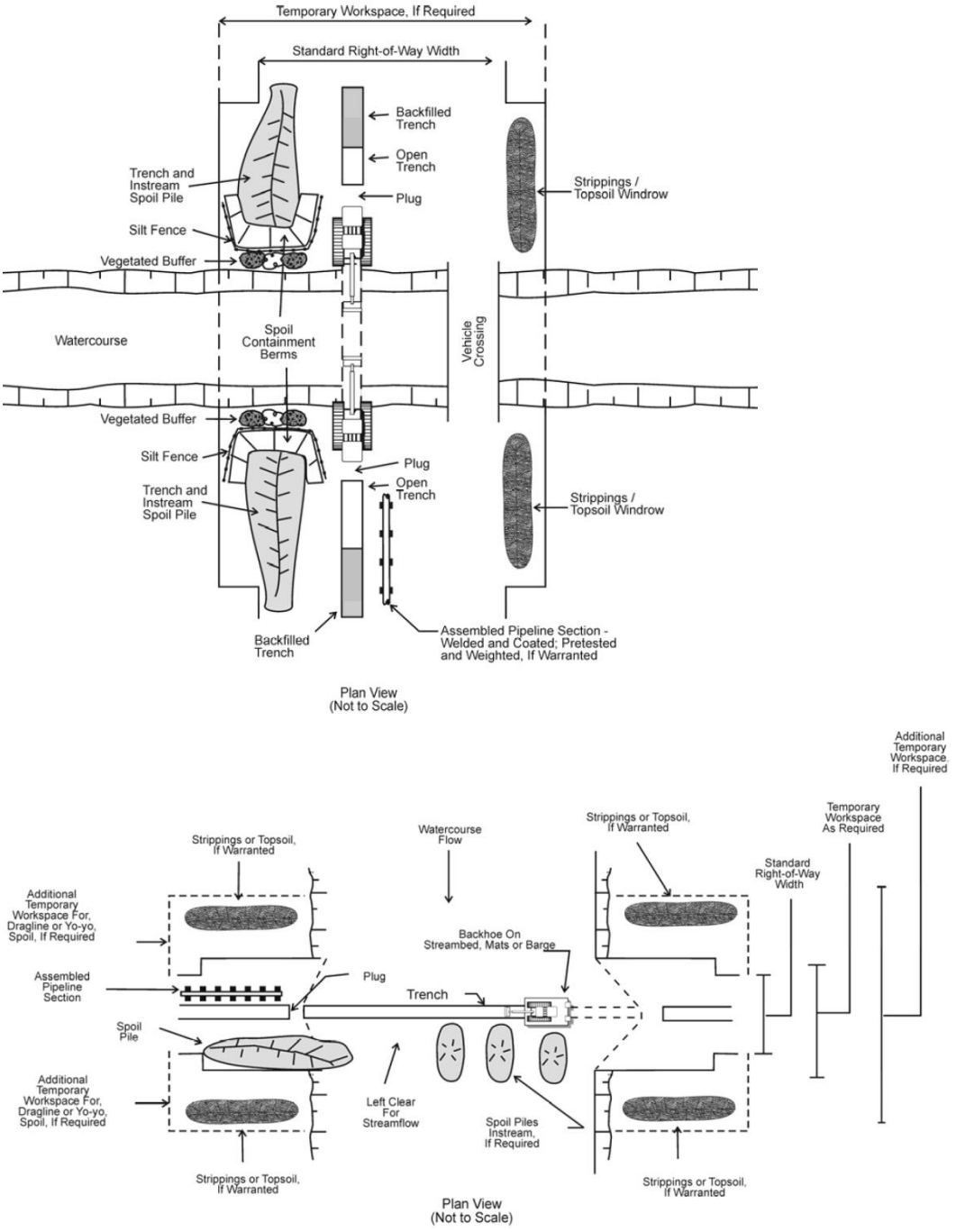
The preferred method of construction at freshwater crossings for Bear Paw will be isolated crossings wherever possible; however open cut methods may also be used where required. The watercourse crossing construction techniques that will be considered for freshwater crossings are summarized in Table 2.3.2.

Table 2.3.2 Summary of Freshwater Watercourse Crossing Methods (adapted from CAPP, CEPA and CGA 2005)

Construction Method	Description
Open Cut / Open Trench (Figure 2.3.5)	Trenching through the channel of a watercourse with one or more excavators. In smaller watercourses this could be done from the banks of a watercourse using an excavator. In larger watercourses this could be done by driving along the streambed or using a barge. Advantages: minimizes the duration of instream works, maintains fish passage, short duration of sediment release. Disadvantages: heavy sediment load during construction.
Isolated Trench – Flume (Figure 2.3.6)	This method blocks upstream flow and directs it through a flume laid in the streambed. Advantages: reduces sediment release, maintains streamflow, water flow diverted around work site. Disadvantages: lengthy construction time results in prolonged potential for sediment release, fish salvage may be required, short term barrier to fish passage, can be a challenge to excavate under and around flumes.
Isolated Trench – Dam and Pump (Figure 2.3.7)	This method blocks upstream flow and pumps water around the working area using hoses. Advantages: reduces sediment release, maintains streamflow, water flow diverted around work site, hose can be routed outside of working area, excavation is simplified. Disadvantages: lengthy construction time results in prolonged potential for sediment release, fish salvage may be required, short term barrier to fish passage.

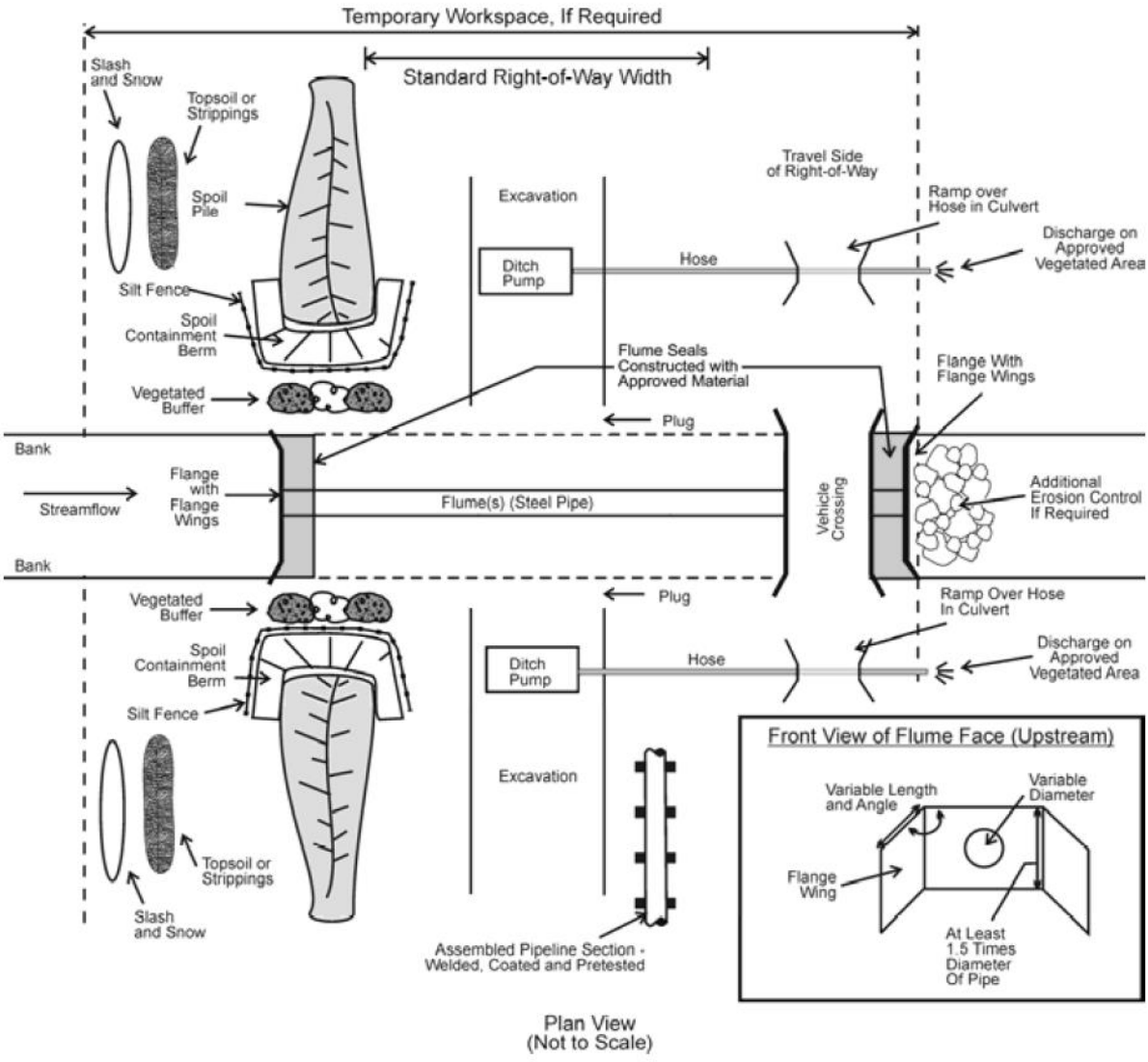
Table 2.3.2 Summary of Freshwater Watercourse Crossing Methods (adapted from CAPP, CEPA and CGA 2005)

Construction Method	Description
Isolated Trench – High Volume Pump Bypass (Figure 2.3.8)	This method involves installing a sump both upstream and downstream from the working area, and high volume pumps move water and discharge downstream. No damming is required for this method. Advantages: reduced sediment release, maintains streamflow, dry working conditions, no dam construction required, excavation is simplified. Disadvantages: sumps are required and these may need to be excavated, fish salvage may be required, short term barrier to fish passage.
Isolated Trench – Two Staged Coffer Dam	This method involves installing a cofferdam into a portion of the watercourse, and pumping the area dry where the trench is to be installed. Once the pipeline is installed in the cofferdam, this section of dam gets removed, and the process is repeated on remaining portion of the watercourse. Advantages: maintains streamflow, maintains fish passage, dry working conditions. Disadvantages: de-waters large section of watercourse, increased water velocity and potential for scour in the open part of channel, fish salvage may be required, lengthy construction time, requires large working areas.
Isolated Trench – Channel Diversion	This method diverts flow into an existing side channel, or a newly constructed by-pass channel, by installing dams upstream and downstream of the working area. This process then gets repeated to install the remainder of the pipeline through the watercourse by diverting flow into the other channel and isolating a work area. Advantages: maintains stream flow, maintains fish passage, dry working conditions. Disadvantages: dries up long section of watercourse, fish salvage may be required.



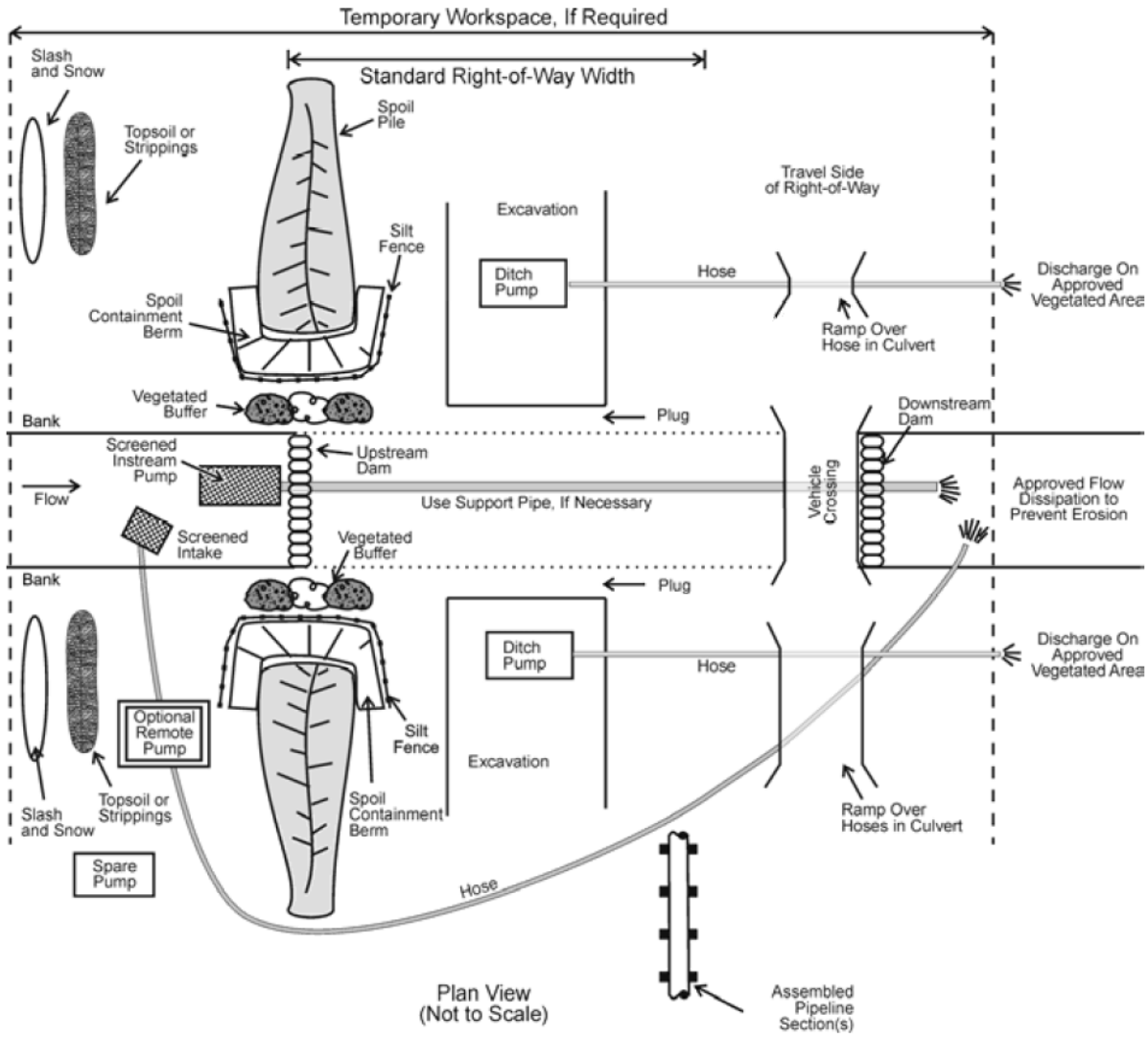
Source: CAPP, CEPA and CGA 2005

Figure 2.3.5 Typical Open Cut Watercourse Crossing Method



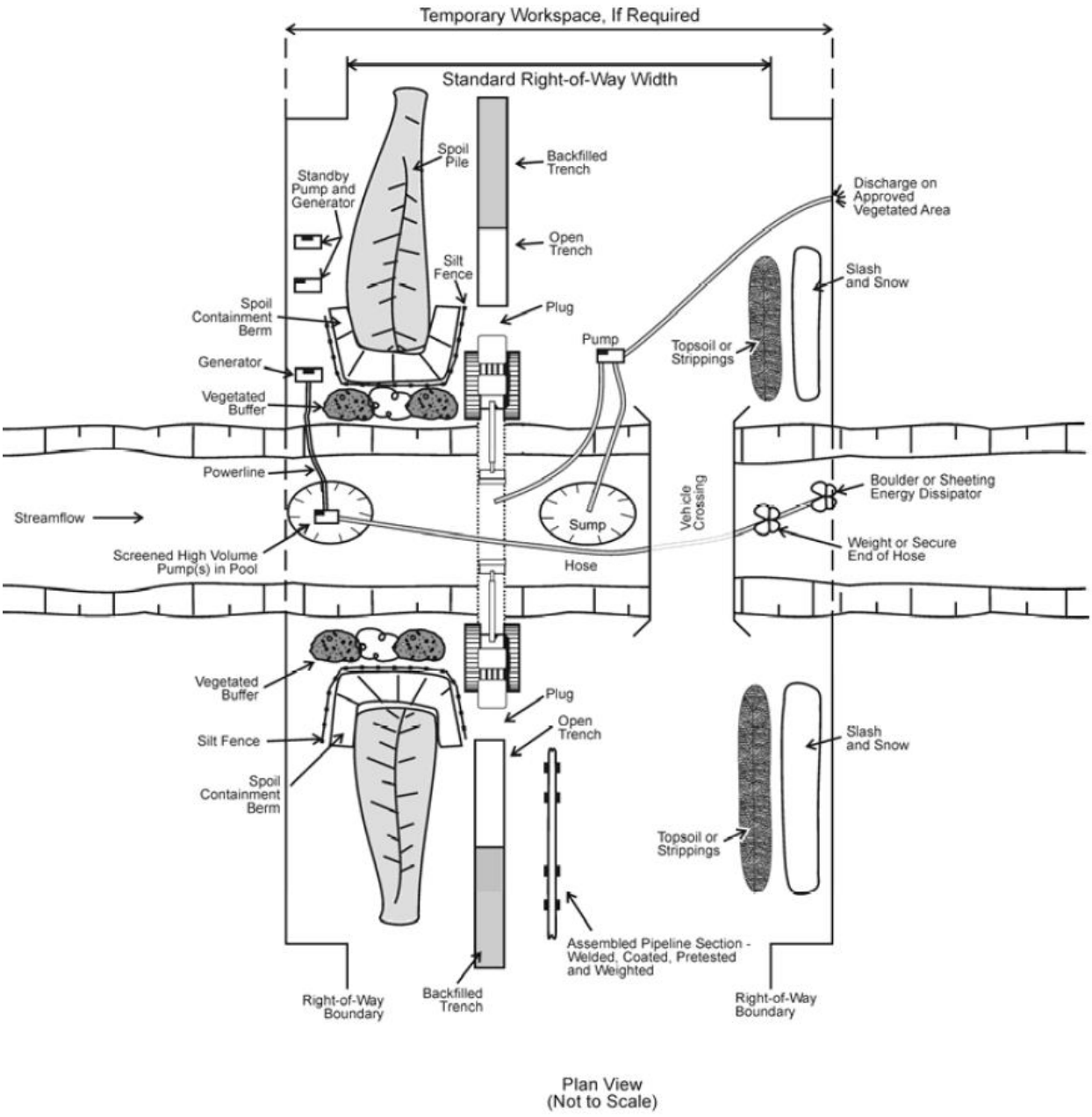
Source: CAPP, CEPA and CGA 2005

Figure 2.3.6 Typical Isolated Trench – Flume Watercourse Crossing Method



Source: CAPP, CEPA and CGA 2005

Figure 2.3.7 Typical Isolated Trench – Dam and Pump Watercourse Crossing Method



Source: CAPP, CEPA and CGA 2005

Figure 2.3.8 Typical Isolated Trench – High Volume Pump and Bypass Watercourse Crossing Method

The largest freshwater crossing that transects the assessment corridor is the Salmon River. The channel width of the Salmon River during a recent survey at the center of the assessment corridor was approximately 20 m, with an approximate wetted width of 15 m and a channel depth of 0.37 m. Due to the size of this watercourse and anticipated water flows, HDD is being considered in addition to the methods identified in Table 2.3.2. HDD at Salmon River would be similar to the HDD operation described for the marine crossings.

2.3.1.4 Right-of-Way Restoration

The RoW will be progressively rehabilitated. The topsoil will be replaced over the stripped area, graded, and stabilized as required.

Large rock not suitable for use as backfill material will be disposed of, either by windrowing along the edge of the RoW, burying on or off the RoW, or hauling from the RoW, depending upon the requirements of the property owner. In bedrock areas, rock will be used to backfill the trench level with the existing bedrock profile. In such areas, the pipe will be protected with rock shield or sand fill prior to backfilling.

2.3.1.5 Pipeline Cleaning and Testing

The completed pipeline is hydrostatically tested with water to check pipeline integrity and to confirm it will be suitable for the intended service and operating pressures. All necessary permits will be obtained from regulatory authorities for the use of water from the selected withdrawal sites.

Once the pipeline test is complete, the pipeline will be dewatered and dried with in-line mechanical tools called drying pigs. The test water will be collected and disposed of at approved locations in accordance with applicable regulations and in consultation with the landowners. Water will be generally released over land at low velocities to prevent flooding or erosion. If released directly to streams, care will be taken to prevent scouring of the stream or riverbeds and banks, and, where practicable, the water will be returned to its original source.

Methanol used in testing for freeze protection will be recovered and disposed of in accordance with local and provincial regulations.

2.3.1.6 Compressor Station Construction

Site preparation for the compressor station will be similar to activities described above for the pipeline including clearing and grading. Attempts will be made to balance the cut and fill during grading; however coarse granular fill material will be brought in from offsite where necessary. Following levelling, a gravel sub-base material (pit-run gravel) will be placed throughout the site, followed by a crushed gravel finish material on the surface.

Pile driving may be required to install the foundations of the compressor units and other large equipment, if bedrock is encountered near the surface; in the latter case concrete spread footings may be used.This will be finalized during the detailed engineering phase

Once the foundations are in place for the compressor units and other equipment, the installation of mechanical equipment will then be completed. The compressor units will be situated within individual steel framed buildings that are constructed in place. The smaller auxiliary buildings required for the operation of the compressor station will likely be pre-fabricated offsite and delivered by transport truck. These buildings will be designed to be easily transported and will meet the legal load size limits.

Once the buildings and equipment are in place, piping (above and below-ground), electrical cables, and control cables will be installed and tested or calibrated prior to facility commissioning. All piping designed to contain natural gas will be hydrostatically tested. Utility piping, typically, is pressure tested using the fluid being transported.

2.3.2 Operation and Maintenance

Bear Paw will be operated and maintained in accordance with standard procedures designed to ensure the integrity of the system, including those specified by CAN/CSA Z662. The pipeline is designed for a minimum 25-year life (length of the export permit). The pipeline will be patrolled by Bear Paw Pipeline representatives on a routine basis and required maintenance will be conducted by qualified personnel. Commercial air services may be used, as required, for routine inspection of the pipeline RoW.

The pipeline RoW will be clearly marked with sign and post markings at public roads, railroad and navigable water crossings, and other areas as required, to reduce the possibility of damage or interference resulting from construction activities or other projects. This will also allow the rapid identification of the pipeline RoW during aerial surveillance.

Typical maintenance or routine activities during pipeline operation may include internal pipeline inspections using electronic inspection tools, aerial surveillance, ground surveys, and cathodic protection monitoring. Excavation, inspection, and replacement of pipe segments will be undertaken, if necessary.

Pipeline RoW maintenance procedures will be consistent with procedures used by other major pipeline companies across Canada, with specific modifications made for the region. Maintenance will be performed by Bear Paw Pipeline personnel or its designated contractors.

Vegetation control on the RoW will be accomplished primarily by mechanical means. Limited chemical spraying may be used, where allowed by regulation, to control vegetation growth within the confines of the compressor station and other pipeline facilities. The use of herbicides for vegetation control may be required in areas where physical vegetation management

techniques are unsuccessful at controlling noxious weeds. Only herbicides of low persistence and low ecological toxicity will be used, and no chemical spray will be used within or adjacent to wetlands or within 30 m of watercourses.

Above ground pipeline facilities will be properly secured to prevent tampering by unauthorized parties. Heavy equipment use will be restricted directly over the pipeline and will only be allowed to cross the pipeline at identified crossings.

Additional safety measures and standard mitigation are described in Section 2.5.3

2.3.3 Decommissioning

The Bear Paw facilities are designed and will be operated and maintained to provide safe and efficient service for a minimum of 25 years. However, should an unforeseen event occur, decommissioning may be required. Options for decommissioning include leaving pipeline structures in place (abandonment), or removing them. Should pipeline structures be abandoned, the necessary work will be undertaken in accordance with the regulatory requirements applicable at the time of decommissioning. An abandonment plan and, if required, a site restoration plan, will be developed in consultation with the NSUARB and other appropriate regulatory authorities.

At a minimum, an abandonment plan would include a schedule for equipment decommissioning and disassembly. The plan would indicate the approximate time required to remove and dispose all abandoned installations, structures, and buildings for which onsite reuse is not possible, and to reinstate the site to a state suitable for subsequent use. Decommissioning planning will be developed in consideration of land use and environmental goals for the area. Activities that support such planning may include a review of baseline and follow-up monitoring data, thorough record keeping, adherence to applicable standards and guidelines during operation, documentation of potential influencing factors, and development of a rehabilitation plan. To protect the public and the environment, surface facilities, particularly valves and metering devices, would be removed. Sites will meet legislative standards and will be left clean and safe.

Disposal of waste will be conducted in accordance with NSE waste management regulations and guidelines. Removal of buildings or structures would have similar effects and considerations as construction and would be conducted in accordance with regulatory requirements applicable at the time of removal.

Removing below-ground pipe may result in environmental effects similar to those experienced during construction. To reduce potential effects, the abandoned pipeline is typically left in the ground and disconnected and isolated from any operating facilities, then filled with an inert medium, such as nitrogen, and permanently sealed. In some cases, the pipe may be removed

and salvaged during decommissioning. If pipe removal becomes necessary, pipe sections under watercourse crossings and wetlands would likely be left in place.

2.4 EMISSIONS AND DISCHARGES

Bear Paw will meet or exceed the compliance standards outlined in applicable regulations and guidelines with respect to liquid and gaseous emissions and discharges, sedimentation, and waste management. Where no standards exist, industry best practices will be adopted, where applicable. Volumes of wastes and concentrations of contaminants entering the environment will be reduced through best management practices, following applicable legislation, and mitigation planning including the development of an EPP. A Waste Management Plan (WMP) will be developed for all phases of the Project and will be included in the EPP.

2.4.1 Air Emissions

Air emissions associated with construction and operation activities are discussed in detail in Section 5.1.4 and Section 5.1.7. The air emissions of concern are classified as Criteria Air Contaminants (CACs) and include carbon monoxide (CO); mono-nitrogen oxides (NO_X); sulpher dioxide (SO_2); and particulate matter (PM). The majority of emissions from construction activities will include SO_2, CO, NO_2 and particulate matter and from operational activities $PM_{2.5}$, NO_x and CO. The level of sulphur present in the natural gas that will be combusted at the compressor station is considered minimal.

Emissions during construction are generally related to the generation of dust and routine emissions from the operation of construction equipment. Equipment used for pipeline construction will generally consist of trucks, bulldozers, graders, backhoes, ditchers and other heavy equipment; similar to what may be seen on many industrial construction sites. Control measures, such as use of dust suppression techniques, will be used in construction zones as required to reduce the fugitive dust, and routine inspection and maintenance of construction equipment will reduce exhaust fumes. Waste wood will be mulched and spread on the RoW, or used in the installation of rollbacks. Should the burning of waste brush/slash material be required, applicable permits will be obtained, and burning will be completed in accordance with conditions and standard mitigation provided in Section 2.5.3.

During operation, the activities have the potential to release CACs into the atmosphere include operation of the compressor station; operation of the pipeline including fugitive emissions; and maintenance activities.

During operation, depressuring of the main pipeline is not expected. Routine maintenance may infrequently require natural gas (methane) to be released to the atmosphere. In-line inspection operation, likely to occur every 5 years, will require a minor amount of gas venting to load and unload the internal inspection tools from the pipeline at the pig traps.

During operation of the compressor station, depressuring of the gas piping is required from time to time for maintenance of the equipment, or as part of a response of the station's safety systems. The piping around each individual unit may be expected to vent 2-4 times per year, and the entire station piping about 1 time per year. A very small amount of continuous methane emissions will occur from the dry gas seals around each compressor shaft. There are no flares planned at the compressor and metering stations.

All blow downs and controlled releases of natural gas will be carried out in accordance with the operating procedures and the Emergency Response and Contingency Plan (ERCP) which, will be filed with the NSUARB prior to the pipeline service.

Potential air emissions during decommissioning and abandonment will be similar to emissions associated with construction should the pipeline be removed. If the pipeline is left in place, air emissions will be associated with removal of above-ground facilities and purging of the system. A decommissioning and abandonment plan that includes details of potential sources of air emissions will be filed with the NSUARB prior to decommissioning and abandonment of the pipeline.

During all stages of the Project, all air emissions will be maintained within the Nova Scotia *Air Quality Regulations* (*Environment Act*) and *Canadian Environmental Protection Act* Ambient Air Quality Objectives.

An assessment of Project-related effects from air emissions is provided in Section 5.1.

2.4.2 GHG Emissions

GHG emissions associated with construction and operation activities are discussed in detail in Section 5.1.4 and Section 5.1.7. The primary sources of GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and carbon dioxide equivalent (CO_2e).

The Project will interact with the atmospheric environment to result in a change in GHGs through the release of GHGs into the atmosphere during construction and operation as defined above for air quality.

An assessment of Project-related effects from GHG emissions is provided in Section 5.1.

2.4.3 Noise Emissions

Noise emissions during construction are generally associated with operation of construction equipment and activities and blasting and pile driving, if required. Construction noise will be intermittent, as equipment is operated on an as-needed basis and mostly during daylight hours.

There will also be elevated noise emissions during HDD operation, where this method is selected for construction at watercourse crossings. Some activities will involve 24-hour a day operation for a period of 7 to 12 months, and will emit near continuous noise emissions during drilling.

During operation, there will be continuous noise emissions from the compressor and metering stations. These facilities will be designed to comply with applicable noise guidelines. Continuous noise sources are from the compressor units, aerial coolers, generator-sets, and HVAC equipment. Noise sources will be mitigated through a combination of building design, the use of silencers on the compressor and generator set air inlets and exhausts, and acoustical treatment on building ventilation openings.

An assessment of Project-related effects from noise emissions is provided in Section 5.1.

2.4.4 Liquid Wastes

Liquid wastes generated during construction include oils and greases from the construction equipment and solvents. These wastes are considered dangerous goods and will be collected and disposed of in accordance with applicable local and provincial regulations. Other liquid wastes, including sewage and domestic waste water, will also be collected and disposed of offsite consistent with local and provincial standards.

Liquid wastes typically produced during operation will be primarily from domestic water use. Glycol used for the heat medium system and generator sets will be changed approximately every three to five years, brought into the site and removed in barrels; the waste glycol will be taken to an approved disposal facility. Lube oil for the compressors will be changed approximately every 10 years, brought into the site and removed in barrels; the waste product will be taken to an approved disposal facility.

Liquid wastes associated with decommissioning and abandonment will be similar to construction and operation wastes should the pipeline be removed. A decommissioning and abandonment plan which includes details of potential sources of liquid waste will be filed with the NSUARB prior to decommissioning and abandonment of the pipeline.

An ERCP will be developed and implemented to reduce the potential of spills of hazardous materials. This plan will also include mitigation measures to reduce impact if a spill occurs and reaches a waterbody. This topic is further addressed in Chapter 7.

2.4.5 Surface Run-off and Sedimentation

There is potential for erosion and sedimentation of freshwater systems associated with land-based construction activities as well as sediment re-suspension associated with in-water construction activities. The EPP will include plans for erosion and sediment control measures and will be developed prior to commencement of construction activities. On-land measures will

include, but are not limited to, standard erosion and sedimentation control mitigation provided in Section 2.5.3.

2.4.6 Solid and Hazardous Wastes

Solid wastes generated during construction will include brush, extra subsoil and rock, temporary fencing, signs, metal containers, canisters as well as scrap pipe, cables, welding rods, and domestic wastes. Scrap paper and other office wastes will also be generated. During operation, a limited amount of solid wastes may be generated, such as grease containers used for the maintenance of valves. Other solid wastes will be produced during daily operation of Bear Paw and contractor offices.

Bear Paw Pipeline will actively cooperate with municipal waste reduction and recycling programs and will encourage conservation throughout its facilities. Solid wastes will be collected and disposed of in a manner consistent with local and provincial standards. Non-hazardous wastes will be separated as recyclable and non-recyclable, with recyclable material collected and transported to a licensed recycling facility. An effort will be made to reduce the amount of waste generated by the application of 4-R principals (reduce, reuse, recycle, recover) to the extent practical. Waste management procedures will be outlined in the WMP (Waste Management Plan) and comply with provincial solid waste resource management regulations as well as additional municipal and disposal facility requirements. Non-recyclable wastes will be transported offsite to a permitted landfill.

Dangerous goods will be stored onsite in a separate temporary dangerous goods storage area provided with full containment. Dangerous goods will be removed from the site by a licensed contractor and recycled or disposed at an approved facility. Other control measures for dangerous goods include developing and implementing an ERCP to avoid impacts from the release of potentially dangerous materials.

If decommissioned, wastes generated would be similar to those produced during construction and operation. The pipe itself will be salvaged or disposed of according to relevant regulatory requirements. Should the pipeline be left in place, wastes generated will be associated with purging operation and will include items such as welding rods, metal containers and signs. A decommissioning and abandonment plan which includes details of potential sources of solid wastes will be filed with the NSUARB prior to decommissioning and abandonment of the pipeline.

2.4.7 Sulphide Bearing Materials

The *Sulphide Bearing Material Disposal Regulations* under the *Environment Act* will be adhered to as necessary in the event that acid generating bedrock is encountered during the course of activities.

Special measures will be required for handling of sulphide-bearing material including testing requirements, and handling and disposal procedures. These will be developed subject to the requirements of the *Sulphide Bearing Material Disposal Regulations* and included in a Sulphide Bearing Materials Management Plan, to be included in the EPP.

2.5 ENVIRONMENTAL AND SAFETY PROTECTION SYSTEMS

This section provides information safety and environmental protection systems.

Bear Paw Pipeline is committed to an HSSE culture that has as its overriding objective of zero harm to people and the environment. We believe that all incidents and injuries are avoidable and unacceptable. Bear Paw Pipeline's objective is to design, build and operate its assets with sustained integrity and efficiency through the successful realization of occupational and process safety and the stewardship of the physical environmental in which we are operating. We will develop a comprehensive Project specific Environmental Protection Plan (EPP), supported by pragmatic management taking into account operational integrity, regulatory requirements and the interest of stakeholders including land owners.

2.5.1 Safety Management

2.5.1.1 Safety and System Integrity

Canadian pipeline companies operate approximately 830,000 km of underground natural gas gathering, transmission, and delivery pipelines (CEPA n.d.), and have maintained an exceptional safety record. Pipeline safety and reliability are achieved primarily through prudent design, construction, and maintenance practices.

Bear Paw is being designed and will be constructed and operated by personnel employed or contracted by Bear Paw Pipeline. Construction procedures will be based on extensive experience on similar projects. Canadian pipeline industry involvement in research and development of pipeline safety and system integrity-related projects has resulted in:

- up-to-date regulations, codes, and material standards (e.g., Nova Scotia *Pipeline Act* and regulations, and CAN/CSA Z662, Oil & Gas Pipeline Systems);
- techniques and procedures for non-destructive examination, inspection, and testing;
- operational procedures including monitoring, surveillance, Call-Before-You-Dig programs, and supervisory control; and
- an ERCP.

Bear Paw Pipeline will comply with CAN/CSA Z662 standards and safety and environmental protection guidelines and regulations. Other standards that apply directly to the compressor station are provided in Section 2.2.2.

Bear Paw Pipeline is committed to an HSSE culture, with an objective of zero harm to people and environment. We believe that all incidents and injuries are avoidable and unacceptable. Bear Paw Pipeline's objective is to design, build and operate its assets with sustained integrity and efficiency, through successful realization of occupational and process safety, and environmental interaction reduction elements.

2.5.1.2 Incident Probability

Pipelines are an efficient method of transporting natural gas. The main reasons for pipeline incidents are:

- accidental damage, usually by third-party encroachment;
- external corrosion; and
- manufacturing material or construction defects.

Education and vigilance are the main tools used by pipeline operators to avoid third-party encroachment. Bear Paw Pipeline will incorporate the following in its operating and maintenance plans:

- periodic aerial or ground patrols of the RoW;
- direct contact with landowners, contractors and local authorities;
- Call-Before-You-Dig program will be implemented and include RoW warning markers;
- monitoring of pipeline pressures and remotely operated gas shut-off; and
- public awareness programs in accordance with Nova Scotia regulations.

While corrosion is one of the main reasons for reportable incidents, such as ruptures and leaks, the frequency of such incidents is dropping due to continual improvements in protection and monitoring. Bear Paw Pipeline will incorporate the following design, construction, and operation elements to produce a state-of-the-art pipeline that will exhibit a very low probability of failure by corrosion.

- The external surface of the pipe will be coated with fusion bonded epoxy or extruded high density polyethylene which are highly resistant to disbonding and provide a durable primary protection against galvanic corrosion.
- The pipeline will include an impressed current cathodic protection system as a secondary protection in addition to external coating. Monitoring procedures will be used to optimize the complete corrosion protection system.
- Provision for launchers and receivers will be installed on the pipeline system to allow for periodic inspection with in-line electronic inspection tools.

Material and construction defects are being reduced as technology improves. Defects of critical dimensions will be eliminated by the post-construction pressure test at pressures higher than the maximum operating pressure, as well as a post-construction internal inspection for

deformation. The probability of an uncontrolled rupture of the pipeline is extremely low (Chapter 7). Bear Paw Pipeline will develop an ERCP in consultation with local and provincial emergency response organizations to enable a rapid and effective response in the unlikely event of a serious accidental gas release.

2.5.1.3 Release Behavior of Methane

Methane, the primary component of natural gas, is colourless, odourless, and is not toxic. The specific gravity of methane is 0.61; therefore, it is buoyant in air at atmospheric pressures and temperatures and tends to dissipate in the atmosphere. Methane has an ignition temperature of 540°C and is flammable at concentrations between 5% and 15% in air. A flammable concentration in the presence of an ignition source can explode.

2.5.1.4 Emergency Shutdown System

The largest accumulation of dangerous goods is the natural gas that is contained in the pipeline; it constitutes a substantial fuel source. As long as this gas remains in the pipeline, it is not a concern, as neither oxygen nor a heat source, are available to create conditions suitable for combustion. The hazard occurs if natural gas is accidentally released. Much of the safety effort is therefore directed towards eliminating any possible loss of containment, and secondly to reduce the amount of any loss.

The compressor station will have a safety system that will monitor the facility operation and shutdown and isolate either an individual compressor unit or the entire station in the event of an abnormal operating condition or emergency situation. The safety system electrical power will be backed up by an Uninterruptible Power Supply (UPS) for adequate power for the safety system to complete any shutdown. The safety system will also initiate a shutdown in the event that it detects a low voltage level from the UPS system. There will also be three valve stations located intermittently along the pipeline. Each valve station will be equipped to close automatically, isolating targeted sections of the pipeline in the event of a leak or fire.

Potential hazards are thoroughly identified in the applicable standards so that they may be addressed with corrective designs, controls or operating procedures.

2.5.2 Environmental Management Planning

Environmental protection has been integrated into Bear Paw as a key feature throughout Project planning. In particular, the pipeline has been routed to parallel an existing pipeline RoW, and avoid sensitive environmental areas wherever possible (Section 2.6). The pipeline has been designed to comply with all current codes and standards reflecting the most current knowledge about pipeline safety and integrity (Section 2.5.1).

A Project-specific EPP will be prepared. The purpose of the EPP is to:

- identify the company's commitments to reduce environmental effects in general and to meet specific regulatory commitments;
- provide concise and clear instructions regarding procedures for protecting the environment and reducing potential environmental effects;
- document environmental concerns and appropriate protection measures associated with activities;
- provide a reference document for planning and conducting specific activities that may have an effect on the environment;
- function as a training document and guide for environmental education and orientation;
- detail reporting and communication requirements; and
- communicate changes in the program through the revision process.

Bear Paw is commited to an HSSE culture, with an objective of zero harm to people and environment.

A sample table of contents for a typical EPP is shown below:

Environmental Protection Plan Table of Contents

The EPP will serve as an umbrella document that includes standard and Project-specific mitigation; management plans (e.g., WMP); the ERCP and associated response plans. Some of the standard mitigation measures that will be implemented for Bear Paw and included in the EPP are provided in Section 2.5.3.

2.5.2.1 Management and Mitigation Plans

A number of management plans will be developed for Bear Paw, including the following:

- Waste Management Plan;
- Sulphide Bearing Materials Management Plan;
- GHG Management Plan;
- Heritage Resource Contingency Plan;
- Erosion and Sediment Control Plan;
- Moose Management Plan; and
- Bird Nest Mitigation Plan.

2.5.2.2 Emergency Response and Contingency Plan (ERCP)

A Project-specific ERCP for unplanned events will be prepared. This will include spill management and response procedures to prevent and respond to spills. In the case of an accidental release of materials, reporting and clean-up procedures will follow provincial emergency spill regulations as required. Lubricants and other petroleum products will be stored and waste oils will be disposed of in accordance with provincial regulations. Small spills will be contained by onsite personnel using spill kits kept at the site.

Typical elements of the ERCP include:

- purpose and scope of plan coverage;
- general facility identification information (e.g., name, owner, address, key contacts, phone number);
- facility and locality information (e.g., maps, drawings, description, layout);
- discovery/initial response;
- sustained action;
- termination and follow-up actions/prevention of recurrence;
- notification (internal, external, and agencies);
- response management system (e.g., incident commander, safety, liaison, evacuation plan);
- assessment/monitoring, discharge or release control, containment, recovery, and decontamination;
- logistics – medical needs, site security, communications, transportation, personnel support, equipment maintenance and support, emergency response equipment (e.g., Personal Protective Equipment (PPE), respiratory, fire extinguishers, first aid);
- incident documentation (accident investigation and history);

- a description of biological and human-use resources that could be impacted;
- an inventory of oil and chemical products and associated storage locations for both construction and operation phases;
- the identification of spill response equipment that will be onsite or available in case of emergency events;
- procedures for responding to operational spills and releases;
- an incident reporting system, including notification and alerting procedures;
- a list of responsible organizations and clarification of the roles of each organization;
- clean-up and disposal procedures;
- training and exercises/drills;
- plan review and modification;
- prevention; and
- regulatory compliance.

The ERCP will also reference relevant and appropriate standards to supplement code requirements as applicable. Bear Paw Pipeline commits to submitting the ERCP to appropriate regulatory agencies for review.

The capacity of local fire and ambulance services to respond to incidents will be evaluated. Bear Paw Pipeline will work closely with related agencies on the issue of public safety.

2.5.3 Standard Mitigation Measures

The following sections summarize standard mitigation to be employed, as applicable to reduce or eliminate adverse effects associated with activities. Additional VC-specific mitigation will be identified in Chapter 5.

2.5.3.1 General Construction

- All components will be constructed according to all applicable regulations, safety codes, and standards.
- Safety exclusion zones will be required to manage access to construction sites.
- Existing infrastructure and previously developed areas (e.g., existing roads, rights-of-way, clear-cuts) will be used where feasible to reduce additional site clearing and the need for new materials.
- Construction activities will be restricted to the approved PDA including the surveyed RoW, approved temporary workspace, the compressor station boundaries and existing roads.
- Natural vegetation will be preserved where feasible.
- Whenever feasible, clearing activities will be scheduled outside the normal breeding season for most species of migratory birds in Nova Scotia (generally April 1 to August 31).
- Natural vegetation buffers will be maintained, where feasible, around wetlands and riparian zones. Watercourse and wetland buffers will be at approximately 30 m, wherever feasible.

- Material will be sourced from existing, approved pits or quarries, if required to establish grades along the RoW or compressor station site.
- All deliveries to the site and transportation of construction and waste materials will be managed within the legal loading requirements and according to spring weight restrictions.
- Roads frequently traveled will be upgraded and repaired as necessary.

2.5.3.2 Blasting and Noise Control

- If blasting is required, it will be limited to daytime hours, if feasible.
- Pre-blast surveys will be completed to evaluate the potential for ground vibration and identify potentially affected structures (e.g., wells and foundations).
- Blasting will be conducted according to provincial legislation, and will be subject to terms and conditions of applicable permits.
- Blasting near watercourses will follow the requirements of the *Fisheries Act* and the *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters* (Wright and Hopky 1998).
- All equipment will be maintained in good working order to maintain noise suppression.
- Idling of vehicles will be limited. Vehicles and equipment will be turned off when not in use, unless required for effective or safe operation.
- Nearby residents will be given a construction schedule for key noise-generating activities including blasting, and provided with contact information in case of complaints.

2.5.3.3 Dust and Air Emissions Control

- Idling of vehicles will be limited. Vehicles and equipment will be turned off when not in use, unless required for effective or safe operation.
- The burning of brush or slash will only be permitted if the necessary permits and approvals are obtained.
- Cleared areas will be stabilized.
- Natural vegetation will be preserved where possible.
- When dust is a concern, dust suppressants (e.g., water) will be applied to exposed surfaces. Petroleum products will generally not be applied as a dust suppressant.

2.5.3.4 Traffic Management

- Project-related traffic will be managed in accordance with the Nova Scotia Temporary Traffic Control Manual (e.g., traffic control persons, signage, temporary markings) (NSDTIR 2009).
- During construction activities, advance public notice will be given for any necessary detours or road closures.
- Planning for required traffic delays will avoid peak traffic times when possible, and will consider other traffic disruptions in the area.
- Vehicles will yield to wildlife and will be operated at appropriate speeds.

- Flag persons, detours, safety barricades, fences, signs and/or flashers will be used as required.

2.5.3.5 Erosion and Sedimentation Control

- The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) will be reduced through scheduled work progression.
- Erosion and sedimentation control structures will be used and maintained throughout construction activities.
- Erosion and sedimentation control structures will be inspected regularly, especially before and after heavy rain events.
- Erosion and sedimentation control structures will remain in place until the disturbed area is stabilized or natural revegetation occurs.
- Dewatering of excavated areas will control the release of sediment-laden water (e.g., filtration through vegetation or engineered erosion control devices). For large sites, settling ponds may be required.
- Overburden storage piles and exposed topsoil will be covered, or seeded and revegetated, as soon as practicable.
- Engineered surface water drainage and diversion channels will be constructed to direct flow around the construction site and away from watercourses and wetlands.
- Construction material (e.g., gravel) placed in or next to watercourses will be free of debris, fine silt and sand, and chemical contaminants.
- All watercourse crossings will be conducted according to the terms of provincial water approvals including site-specific erosion and sediment control plans.

2.5.3.6 Clearing and Disposal

- During clearing, trees will be felled towards the RoW, wherever possible. Trees that inadvertently fall into adjacent undisturbed vegetation will be recovered.
- Environmentally sensitive features will be avoided during clearing as identified by appropriate signage and fencing.
- Salvageable timber will not be bulldozed.
- Subject to regulatory approval, wooden mats or equivalent in areas of wet soils will be installed to reduce terrain disturbance and soil structure damage. These materials will be removed during clean-up.
- In consultation with the landowner(s) or appropriate regulatory agency, potential rollback locations and the material to be used will be determined.
- Rollback will be placed in a manner that does not create or enhance a fire hazard along the RoW.
- All timber material not salvaged for merchantability will be disposed of through mechanical chipping.

- Applicable permits will be obtained prior to burning and all applicable regulations will be followed.
- Burning will not take place within 30 m of a waterbody.

2.5.3.7 Topsoil/Strippings Salvage and Grading

- Soil storage areas will be located in the approved right-of-way and temporary workspaces.
- Following the salvage of the topsoil, if warranted, topsoil windrows and stockpiles will be stabilized.

2.5.3.8 Watercourse Crossings

- The clearing of extra temporary workspace will be avoided within 10 m of a watercourse to protect riparian areas. This area shall be clearly marked prior to clearing operation. The RoW will be narrowed through the riparian area, if possible.
- Clearing at watercourse crossings will be limited to the removal of trees and shrubs to the ditch line and work side areas required for vehicle crossings.
- Trees will be felled away from watercourses.
- If the working surface is unstable, clearing equipment will not be permitted within the 10 m riparian buffer.
- Grading of the primary banks of watercourses will be delayed until immediately before construction of the crossing.
- Grading will be directed away from waterbodies. No fill material will be placed in a waterbody during grading.
- To reduce the length of time of instream activity, the contractor shall make every effort to ditch, lower-in, and backfill water crossings during the same working day.
- Earthen berms will not be used to isolate the crossing construction area.
- Downstream flow will be maintained at all times when constructing an isolated crossing.
- Water and pump intakes will be installed in a way that reduces or avoids the disturbance of the streambed. The screens will be maintained free of debris.
- Clean coarse material (gravel or rock), or native material removed from the trench, will be used preferentially as the final 0.5 m of backfill.

2.5.3.9 Pipe Activities

- The amount of open trench at any one time will be minimized.
- Trenches will be backfilled as soon as practical, following lowering-in, to minimize hazards to wildlife.
- Topsoil and subsoil removed during trenching will be stored in separate spoil piles to avoid mixing. Spoil piles will be managed so that spoil does not spread off of the RoW.
- Where feasible, the RoW will be graded to divert surface water away from the open trench.
- Where the open trench has the potential to dewater a wetland, methods will be used to prevent the flow of water along the trench.

- If the trench requires dewatering, water will be filtered through vegetated areas or other appropriate sediment filtering devices.
- Dewatering will be completed in a manner that does not cause erosion or allow sediment to enter a watercourse.
- Trench water will not be allowed to flow directly into any watercourse.

2.5.3.10 Pressure Testing

- The rate of water withdrawal for hydrostatic testing will follow appropriate regulatory agency guidelines.
- Water hauling trucks used for test water will be clean.
- Water intakes will be screened in accordance with the Freshwater Intake End-of-Pipe Fish Screen Guideline published by DFO. Screens will be maintained so they are clear of debris.
- Shunt test water ahead from test section to test section to the extent possible to reduce water hauling, water usage and number of dewatering points.
- Prior to the discharge of hydrostatic test water, the appropriate testing and treatment measures will be implemented in accordance with local regulatory requirements.
- Hydrostatic test water will be discharged into the same drainage basin from which it was withdrawn, unless otherwise approved by the appropriate authority.
- Test water will be discharged into vegetated areas or other appropriate sediment filtering devices.

2.5.3.11 Dangerous Goods Management

- All fuels and lubricants used during construction will be stored in designated areas. Storage areas will be located at least 100 m from watercourses, wetlands and water supply areas (including known private wells), where possible, except where secondary containment is provided.
- Equipment used will be well-maintained and free of fluid leaks. Equipment to be used in or adjacent to a watercourse or waterbody will be clean or otherwise free of external grease, oil or other fluids, mud, soil and vegetation, prior to entering the waterbody.
- When practicable, refuelling of machinery will not occur within 30 m of watercourses and water supply areas (including private wells). Where stationary equipment is situated near a wetland, special precautions will be implemented to prevent spills during refuelling (e.g., absorbent pads will be placed below nozzles, and spill response kits will be placed at the refuelling site).
- Storage of all dangerous goods will comply with the Workplace Hazardous Materials Information System (WHMIS) requirements.
- Transportation of dangerous goods will comply with Transport Canada's *Transportation of Dangerous Goods Act*.
- Emergency response procedures will be in place for spill response, with trained personnel present onsite at all times.

2.5.3.12 Waste Management

- All sites will be kept free of loose waste material and debris.
- Solid wastes, including waste construction material, will be disposed of in approved facilities.
- Temporary storage of waste materials onsite will be located at least 30 m from watercourses, wetlands and water supply areas (including known private wells).
- Temporary onsite sewage systems will be installed and operated according to relevant provincial legislation.
- Food and food waste will be stored and disposed of properly to avoid attracting wildlife.

2.5.3.13 Fire Prevention

- Proper disposal methods for welding rods, cigarette butts and other hot or burning material will be used.
- Smoking will only occur in designated areas.
- Appropriate fire-fighting equipment will be kept on site.
- The burning of slash will only occur if permission is granted from the regulating authorities and if conditions permit. If burning is delayed, slash will be stored along the RoW, in approved push-outs.

2.6 PROJECT ALTERNATIVES

2.6.1 Pipeline RoW Selection

Bear Paw will parallel the existing M&NP NPS 8 NG pipeline and SOEP NPS 8 NGL pipeline to the extent feasible. By paralleling an existing RoW, it will reduce the area of new disturbance, and avoid potential environmental constraints as much as practicable. The final location of the pipeline RoW has not yet been determined, however an assessment corridor has been established (Figure 1.1.1). Since Bear Paw will require a pipe that is larger in diameter than those in the existing corridor, the final pipeline corridor will deviate from the existing RoW in some locations for constructability reasons. Areas where it may be difficult to follow the existing RoW include:

- sharp bends;
- steep and/or rocky terrain;
- water crossings;
- wetlands;
- other sensitive habitat; and
- near structures/buildings.

Identification of a final pipeline RoW within the assessment corridor will follow during detailed design. The assessment corridor has been widened in areas with additional constraints to allow flexibility in facility siting.

2.6.2 Compressor Station Site Selection

The preferred location of the compressor station was selected within close proximity to the assessment corridor and the supply sources, as well as being located on generally flat terrain and within an area designated for industrial land use. This location is currently the preferred site; however, Bear Paw Pipeline is continuing to pursue proximate alternative locations in case this preferred site does not work for technical, operational, constructability, commercial, environmental or other factors.

2.6.3 Marine Watercourse Crossing Locations and Methods

Alternative watercourse crossing locations and methods are being considered for both the Strait of Canso (Figure 5.4.2) and the Milford Haven River (Figure 5.4.3). The options and alignments being considered are described in Table 2.3.1 and the watercourse crossing construction methods are described in more detail in Section 2.3.1. In addition to carrying alternative construction methods, the assessment corridor is sufficiently wide to allow some flexibility in the exact location of the pipeline within it, allowing for changes in response to environmental, construction, and operational constraints.

2.7 PROJECT SCHEDULE

Construction of Bear Paw is currently scheduled to begin as early as 2017, pending regulatory approval and receipt of landowner agreements. Construction will take up to two years with the pipeline and facilities scheduled to be commissioned as early as 2019.

3.0 STAKEHOLDER CONSULTATION AND ABORIGINAL ENGAGEMENT

This section summarizes the consultation and engagement that Bear Paw Pipeline has undertaken to date with regulators, Mi'kmaq representatives, the public and stakeholders, as well as providing a synopsis of the issues and concerns raised.

3.1 OVERVIEW

From the outset, Bear Paw Pipeline has engaged in a comprehensive consultation program to:

- provide timely information with regard to the Project to interested stakeholders, elected officials, First Nations, land owners and the public at large; and
- receive feedback from all interested and involved parties on their views and concerns with respect to the Project.

Bear Paw Pipeline has developed a detailed consultation and engagement program with the above objective in mind. More specifically, the objectives of the consultation and engagement program were to:

- provide information about the project;
- inform and engage stakeholders;
- listen and respond to stakeholders' concerns;
- address concerns from residents and stakeholders; and
- promote a positive presence in the community.

At the outset, key stakeholders with a potential interest in Bear Paw were identified; these included, but were not limited to, the following:

- government regulators;
- provincial, federal and municipal elected officials;
- municipal and provincial staff;
- Mi'kmaq of Nova Scotia;
- residents; and
- other stakeholders.

Stakeholders and communities members were consulted through public presentations, one-on-one meetings, the website, open houses and through the local office.

3.2 REGULATORY CONSULTATION

Bear Paw Pipeline has engaged regulatory agencies as part of Project planning including Nova Scotia Environment (NSE), The Office of Aboriginal Affairs (OAA) and the Nova Scotia Department of Energy (NSDOE). A meeting was held on July 20, 2015 with representatives from Bear Paw Pipeline, Stantec, NSE EA Branch, NSDNR, DFO and TC. The purpose of the meeting was to provide information about Bear Paw, identify and discuss issues and concerns, and discuss the proposed schedule and regulatory approvals process.

Follow-up meetings were held with NSDNR to discuss concerns regarding moose mitigation and lichen surveys. Follow-up meetings were also held with DFO and TC. Meetings held with regulators are provided in Table 3.2.1. Bear Paw Pipeline will continue to engage and consult with all stakeholders as the Project progresses.

Table 3.2.1 Meetings with Key Regulators

Stakeholder	Purpose of Meeting	Timing
Nova Scotia Environment (NSE); Fisheries and Oceans Canada (DFO); Transport Canada (TC)	Project introduction	Jul 2015
Transport Canada (TC)	Project introduction and navigation discussions	August 2015
Fisheries and Oceans Canada (DFO)	Follow-up discussions re: marine surveys	August 2015
Nova Scotia Department of Natural Resources (NSDNR)	Follow-up discussions re: lichen and habitat surveys	September 2015
Nova Scotia Utility and Review Board (NSUARB)	Project briefings and updates as well as permitting confirmation	October 2015
Nova Scotia Department of Energy (NSDOE)	Project briefings and updates for information	October 2015
Office of Aboriginal Affairs (OAA)	Project update and discussion of easement on Crown land	February 2016

3.3 ABORIGINAL ENGAGEMENT

Engagement with the Mi'kmaq of Nova Scotia early in a project planning process is important to the success of a project. There are 13 First Nation communities with Chiefs in Council in Nova Scotia. The Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO) represents the negotiations between the Mi'kmaq of Nova Scotia, the Province of Nova Scotia and the Government of Canada. The Sipekne'katik (Shubenacadie) First Nation, however, is not represented by the KMKNO. Mi'kmaq people living off-reserve are represented by the Native Council of Nova Scotia (NCNS).

Bear Paw Pipeline, from the outset of the Project, has been proactive in its intent to keep interested parties, including First Nations, informed about Bear Paw. It is the intent of Bear Paw Pipeline to build upon the work that has been undertaken for Bear Head. On March 27, 2015, a Memorandum of Understanding was signed between Bear Head LNG and the KMKNO and steps are presently underway to establish a Mutual Benefits Agreement between the parties for the active involvement of First Nations in the development and operation of Bear Head. Following the signing of the Mutual Benefits Agreement with respect to Bear Head, It is the intent of Bear Paw Pipeline will initiate the necessary discussions with KMKNO to establish a comparable Benefits Agreement with respect to Bear Paw.

In the interim, Bear Paw Pipeline representatives have had meetings with KMKNO, NCNS and the Nova Scotia Office of Aboriginal Affairs. At a meeting with representatives from KMKNO and the Cape Breton chiefs in the project office in Point Tupper on September 21, 2015, with respect primarily to the LNG export facility at Point Tupper, an agenda item addressed the proposed pipeline and the fact that the proponent had decided to design, build and operate the pipeline from Goldboro to Bear Head. This would be undertaken under a separate company, namely Bear Paw Pipeline. Further engagement with respect to the pipeline is detailed in Table 3.3.1.

Table 3.3.1 Engagement with First Nations

Name	Organization	Date	Engagement	Observations
Melissa Neven and Heather MacLeod	KMKNO	21/09/2015	Meeting	• Provided status and overview of the Project. • Discussed the regulatory process. • Discussed the archaeological work that had been undertaken in the study area and the work that was planned for this Project. • There are hunting encampments that are of importance to First Nations in the vicinity of the alignment. • Possibility of directional drilling raised as an option at the larger crossings. • Matter of Crown Lands discussed.
Jennifer McGillvery		16/11/2015	Phone call	• Provided overview of the Project and indicated that Stantec were doing the environmental assessment.
Kelly Peters		11/02/2016 18/02/2016	Phone call Meeting	• Indicated intent to hold two • Project overview discussion of need for easement on Crown

Table 3.3.1 Engagement with First Nations

Name	Organization	Date	Engagement	Observations
				land • Review of Crown land mapping • Open Houses in December. • Undertook to forward project information to KMKNO.
Heather Potter and Beata Dera	Nova Scotia Office of Aboriginal Affairs	08/10/15	Meeting	• Provided status and overview of the project. • Constitutional responsibility for the OAA to engage with KMKNO with respect to the use of Crown Lands. • Discussed the regulatory process. • Indicated that the Mi'kmaq Ecological Knowledge study had been commissioned.
Roger Hunka	Native Council of Nova Scotia	12/11/2015	Meeting	• Provided status and overview of the Project. • Discussed regulatory process. • Hunting, primarily for deer and birds, takes place in the general vicinity of the corridor. • Concern expressed about migratory birds given the extent of the wetlands in the area. • Interest in employment opportunities and training requirements.
Chief Grace Conrad, Roger Hunka, Joshua McNeely & Jessica Seward		07/01/2016	Meeting	• Harvesting and hunting likely to occur in the fall. • Fishing can occur throughout the year. • Key commercial fish landings at Jarvrin Wharf in Chedabucto Bay. • Supportive of development and the employment opportunities that it generates.

3.4 PUBLIC CONSULTATION

The consultation program focused and remains focused on reaching everyone with interests near the assessment corridor including property owners, residents, businesses and business groups, community leaders and elected representatives. Consultation to date has included:

- public presentations;
- direct consultation;
- open Houses;
- meetings with stakeholders; and
- web page.

Bear Paw Pipeline will continue to consult with interested parties, including property owners and stakeholders, and to provide updated information on a timely basis.

3.4.1 Stakeholder Meetings and Outreach

Bear Paw Pipeline has made presentations to and met with a wide range of organizations. This includes members of the councils for the MODG, the Municipality for the County of Richmond and the towns in the area. Additional meetings have been held with labour organizations, First Nations representatives and others. A complete list of stakeholder meetings is presented in Table 3.4.1.

Table 3.4.1 Stakeholder Meetings

Name	Organization Type
First Nations Groups	Refer to Section 3.3
Cape Breton Island Building and Construction Trades Council	Labour
Strait Area District Labour Council	Labour
Cape Breton Partnership	Business-Government Coalition
Strait of Canso Superport	Shipping Interests
Municipality of the County of Guysborough	Municipal Government
Municipality of the County of Richmond	Municipal Government
Town of Port Hawkesbury	Municipal Government
Town of Mulgrave	Municipal Government
Minister of Economic Development	Provincial Government
Minister of Energy and officials	Provincial Government
Minister of Environment and officials	Provincial Government
Minister of Natural Resources and officials	Provincial Government
Nova Scotia Community College	Educational Institution
Guysborough Inshore Fishers Association	Fishers

3.4.2 Open Houses

Two open houses were held in early December 2015. The first took place in Goldboro on Tuesday December 8, 2015 and the second in Mulgrave on Wednesday December 9, 2015. These open houses increased awareness and understanding of Bear Paw and of the environmental assessment process that was being undertaken. As a result of these events, Bear Paw Pipeline gained an understanding of local matters of importance and input that is of value to both the environmental assessment and project planning. A full accounting of both events is provided in Appendix A.

The project scope, including the assessment corridor of the proposed pipeline, was displayed on a series of storyboards. Project personnel, including the scientists responsible for the environmental assessment and the land agents responsible for the interface with property owners, were on hand to respond to questions and to explain the materials displayed on the storyboards.

Both open houses were advertised in two newspapers, the Chronicle Herald and the Guysborough Journal, and on the local radio channel. In addition, through direct contact with local representatives and some members of the business community, word about the open houses was disseminated to a wide audience. The atmosphere at the open houses was informal and visitors were encouraged to discuss their concerns and aspirations. While some viewed the storyboards and maps, collected the hand-out and stayed a relatively short time, others lingered and took the opportunity to ask questions, to discuss what was proposed and to talk about the issues and challenges confronting the area. Everyone was encouraged to register and to complete a short questionnaire.

A copy of the newspaper announcements, the storyboards and the handout are provided in Appendix A.

Approximately 40 people attended the open house in Goldboro and between 55 and 60 the open house in Mulgrave. Overall, there was strong support for Bear Paw from those attending; the following identifies the primary issues raised:

- employment and contracting opportunities that would be created;
- property issues;
- width of the RoW and concern that the appropriate procedures would be put in place to ensure that there were no negative consequences arising from the need to cross numerous streams along the RoW;
- preference for HDD at the two major crossings, namely Milford Haven and the Strait of Canso;
- consequences to fish and fishing; and
- source(s) of natural gas.

3.4.3 Dialogue with Property Owners

Bear Paw is located on both private properties and Crown Land. The instigation of the dialogue with all involved parties with respect to negotiating and acquiring the necessary easements is therefore central to the implementation of the Project.

Bear Paw Pipeline has established a defined protocol that directs their actions with respect to how they proceed with private land-owners. This protocol includes, but is not restricted to, the following:

- early meetings with all potentially involved land owners;
- completion of a land ownership contact report that contains data pertaining to ownership, unique topographical features of the land involved, environmental considerations, present land use, property history and the land-owners' suggestions and opinions on the proposed pipeline alignment; and
- negotiation at the outset of a land access permit and thereafter with respect to all aspects leading to an agreement.

As a matter of courtesy, the land agents involved took the steps necessary to contact and meet with as many private property owners as possible within the assessment corridor prior to the open houses in December. This provided the landowners with early notice of the proposed project and the opportunity to consider preliminary information prior to the open houses. A number of property owners took the opportunity to attend one of the open houses and to talk with the land agents and Bear Paw Pipeline.

With respect to attaining easements across Crown lands, Bear Paw Pipeline has initiated the regulatory process with the Land Services Branch of NSDNR. In parallel, Bear Paw has met with both representatives of the Nova Scotia Office of Aboriginal Affairs and KMKNO to ensure that the appropriate engagement with First Nations is initiated in accordance with the Mi'kmaq-Nova Scotia-Canada Consultation Terms of Reference.

3.4.4 Dialogue with Fishers

As part of its consultation program for Bear Head, Bear Head LNG has established a Fishers Group that includes representation of the Guysborough County Inshore Fishermen's Association and the Strait of Canso Fishermen's Association. This group meets approximately twice a year to review the status of Bear Head and to raise matters of mutual interest. At a meeting in early January, 2016 in Mulgrave, Bear Paw was added to the agenda. Bear Paw Pipeline representatives provided an overview of Bear Paw and referenced the meetings that had been initiated with landowners and the open houses that had been held in Goldboro and Mulgrave.

Questions were raised by fishers at this meeting about the crossing of the Strait of Canso and a strong preference articulated that the pipeline should be directional drilled in this location. It was stated by the fishers that a pipe of the size proposed, if laid on the bed of the Strait, would have negative consequences on commercial fishing, including the gill netting that takes place in the Strait. Bear Paw Pipeline stressed that detailed engineering had yet to be done and that a decision was yet to be made as to whether the pipeline would, in this location, be directionally drilled or bottom laid.

Attendees also raised questions about the integrity and safety of the pipeline including questions about the pressure of the gas, the proposed diameter of the pipeline and the nature and thickness of the pipe walls. Again it was stressed that considerable engineering had yet to be done and assurances were made that Bear Paw would be designed to meet all applicable codes. It was pointed out that during detailed engineering, the design would be independently reviewed by the NSURB's certifying authority, as a requirement of the Licence to Operate a pipeline in Nova Scotia.

Concern was also raised about the levels of noise that would be generated by the installation and subsequent operation of the pipeline in the Strait and its potential to have a detrimental impact on fish and marine mammals. It was explained that this matter was being addressed in the environmental assessment and that, based on the work that had been undertaken, significant adverse effects on fish and marine mammals were not anticipated. Reference was also made to work undertaken with respect to noise on comparable pipelines offshore. A number of attendees remained unconvinced that noise would not be an issue.

Several attendees stated that they do not want a 42" natural gas pipeline laid on the bottom of the Strait. This, however, would appear to be a minority view as many in attendance acknowledged that new investment and development is needed in the area.

3.4.5 Ongoing Consultation

Bear Paw Pipeline is committed to an approach that keeps stakeholders and the public informed on an ongoing basis. As work proceeds, Bear Paw Pipeline will continue to have meetings and direct contact with stakeholders including property owners, fishers, First Nations and other interested parties.

As referenced above, a Fishers Group has been established as a forum through which to exchange information primarily on Bear Head, but the agenda has been and will be expanded as warranted to provide information on Bear Paw. A Community Liaison Committee will be established to provide a forum at which Bear Paw can be discussed. Since this committee will have a broad spectrum of community representation from both sides of the Strait of Canso, Bear Paw Pipeline envisages that the mandate for this committee can be expanded to provide a forum through which dialogue on the status of the pipeline can also be raised and discussed.

3.4.6 Comments Received

Bear Paw Pipeline has been open to all feedback and the concerns expressed throughout the consultation process. Many topics have been raised and questions posed, but overwhelmingly at the local meetings and open houses that have been held substantial support has been expressed. Table 3.4.2 identifies the primary issues that have been raised.

Table 3.4.2 Primary Issues Identified

Issue type	Detail	Response
Property Related Matters	Relationship of possible alignment of RoW to property, access etc.	Addressed through land agents; information received will also be considered in the final alignment of the RoW.
Environmental Matters	Two recurring issues are: i) potential sedimentation resulting from construction in water courses; and ii) impacts on fish and fishing activity.	Adoption of best crossing techniques and appropriate mitigation and attaining all necessary approvals. See also Chapter 2.
Economic Factors	Many seek employment and contracting opportunities and look forward to improved economic conditions in the area.	The benefits of the project to the local economy are discussed in Section 5.8.

3.5 SUMMARY

The consultation that has been undertaken to date demonstrates that Bear Paw Pipeline is aware of the issues that are of importance to the communities and other involved parties with interests in the area and has used this knowledge to focus the environmental assessment. Generally, the feedback that has been received from those consulted demonstrates the level of public acceptance that exists for Bear Paw.

4.0 ENVIRONMENTAL ASSESSMENT SCOPE AND METHODS

4.1 SCOPE OF THE ASSESSMENT

4.1.1 Scope

The scope of the undertaking that is the subject of the environmental assessment is described in Chapter 2; it includes:

- 62.5 km pipeline with an outside diameter of 1067 mm (NPS 42);
- compressor station;
- 3 valve stations including a small building (2 m x 3 m) enclosed in a fence at the surface and small power source; and
- marshalling yards, storage areas, and temporary or permanent access roads to the RoW.

The scope of the assessment does not include Bear Head LNG facilities, the sourcing and procurement of materials offsite, including quarries and disposal facilities.

4.1.2 Valued Component (VC) Identification

An important part of the assessment process is the early identification of Valued Components (VCs) upon which the assessment can be focused for a meaningful and effective evaluation. The selection of VCs was carried out in consideration of:

- issues raised by regulatory agencies, key stakeholders, and the public (refer to Section 3);
- issues raised by the Mi'kmaq People, including traditional ecological knowledge obtained through completion of a Mi'kmaq Ecological Knowledge Study (MEKS) for Bear Paw (refer to Section 5.7; Appendix B);
- technical aspects of Bear Paw (i.e., the nature and extent of Bear Paw's components and activities) (refer to Chapter 2);
- existing environmental conditions in the area and interconnections between the VCs and the biophysical socio-economic environment;
- experience and lessons learned from similar pipeline projects (e.g., Alton Gas Pipeline Project); and
- the professional judgment of the Study Team.

Table 4.1.1 presents the VCs assessed in this report and the rationale for the selection or exclusion of environmental components as VCs.

Table 4.1.1 Selection of Valued Components

Environmental Issue	Scoping Considerations	Selected VC
Air Quality	Activities will result in release of air emissions (particularly dust during construction and emissions from the operation of the compressor station) and may have the potential to affect human and ecological health. Air quality is regulated by the Province of Nova Scotia under the *Environment Act*.	Atmospheric Environment Section 5.1 of this report
Noise	Activities will cause increases in noise levels potentially resulting in annoyance to people and wildlife close to noise producing activities. Noise levels are addressed by NSE noise guidelines and local municipal noise bylaws.	Atmospheric Environment Section 5.1 of this report
Fish and Fish Habitat	Freshwater fish and fish habitat are protected by the federal *Fisheries Act*. There are several watercourse crossings along the pipeline route.	Freshwater Environment Section 5.2 of this report
Groundwater	Groundwater is important in the hydrologic cycle and provides an important ecological function (e.g., surface water discharge), as well important as a water supply, particularly to rural users.	Groundwater Resources Section 5.3 of this report
Surface Water Resources	Surface water resources in terms of water quality are inherently linked to habitat quality for aquatic species.	Freshwater Environment Section 5.2 of this report
Marine Environment	Activities in or near the marine environment may result in direct or indirect effects to benthic habitat, marine fish and marine mammals.	Marine Environment Section 5.4 of this report
Wetlands and Wetland Functions	Activities will result in direct and indirect effects to several wetlands within or immediately adjacent to the pipeline route. Wetlands are valued resources, protected by the Nova Scotia *Environment Act* and regulations.	Vegetation and Wetlands Section 5.5 of this report
Vegetation	Activities or components have the potential to directly or indirectly affect vegetation including species at risk or of conservation interest. Species of special concern are protected under the *Species at Risk Act* and Nova Scotia *Endangered Species Act*. The focus of concern is on protection of species biodiversity, unique species assemblages, mature forest habitats and uncommon habitats.	Vegetation and Wetlands Section 5.5 of this report

Table 4.1.1 Selection of Valued Components

Environmental Issue	Scoping Considerations	Selected VC
Mammals	Activities or components have the potential to directly or indirectly affect mammals and their habitat including species at risk or of conservation concern. Protection of species biodiversity for mammals is administered through the *Species at Risk Act*, Nova Scotia *Endangered Species Act*, and Nova Scotia *Wildlife Act*. There is also scientific and public concern as well for habitats that are important to mammal species, such as deer wintering areas.	Wildlife and Wildlife Habitat Section 5.6 of this report
Birds and Bird Habitat	Protection of migratory species and species mandated by the *Migratory Birds Convention Act*, *Species at Risk Act*, Nova Scotia *Endangered Species Act* and Nova Scotia *Wildlife Act*. The focus of concern is on the protection of species diversity, migratory and non-migratory birds, rare or sensitive species potentially feeding, breeding, moving and/or migrating through the area and their habitat.	Wildlife and Wildlife Habitat Section 5.6 of this report
Archaeological and Heritage Resources	Ground disturbance associated with construction activities could affect subsurface archaeological or heritage resources that may be present.	Heritage Resources Section 5.9 of this report
Land and Resource Use for Aboriginal Peoples	First Nations current use of lands and resources is included as a VC in the assessment in recognition of the potential interest of First Nations traditional use of land and resources.	Traditional Land and Resource Use Section 5.7 of this report
Land Use	It is important to consider the compatibility of Bear Paw with existing land uses, municipal land use plans and zone designations.	Land and Resource Use Section 5.68 of this report
Commercial and Recreational Fishery	There is a potential concern of effects to commercial, recreational and Aboriginal (CRA) fisheries in areas where the pipeline may cross a stream or waterbody.	Land and Resource Use Section 5.68 of this report
Human Health	Concern exists for human health and safety in communities surrounding the facility in the event of a malfunction or accidental event.	Potential effects on human health are addressed through the assessment of air, noise and land and resource use as well as with design protection measures and compliance engineering as noted in Section 2.5.

The following VCs have therefore been selected and are addressed in detail in Chapter 5:

- atmospheric environment;
- freshwater environment;
- groundwater resources;
- marine environment;
- vegetation and wetlands;
- wildlife and wildlife habitat;
- traditional land and resource use;
- land and resource use; and
- heritage resources.

4.2 ENVIRONMENTAL ASSESSMENT METHODS

The EA methods for Bear Paw have been developed to meet the regulatory requirements of a Class I Registration under the Nova Scotia *Environment Act* and *Environmental Assessment Regulations*.

This report focuses the assessment on environmental components of greatest concern to the public, other stakeholders, Mi'kmaq communities, regulators and those identified through professional judgement. In general, the assessment:

- is focused on issues of greatest concern;
- addresses regulatory requirements;
- addresses issues raised by the public and stakeholders;
- integrates engineering design and mitigation and monitoring programs into a comprehensive environmental management planning process; and
- concludes with an assessment of residual environmental effects.

The EA method for Bear Paw includes an evaluation of the potential environmental effects of each phase (construction, operation and maintenance and decommissioning) as well as accidents and malfunctions, with regard to VCs. VCs are broad components of the biophysical and socio-economic environments that, if altered by Bear Paw, may be of concern to regulatory agencies, the Mi'kmaq People, scientists, and/or the general public. Project-related effects are assessed within the context of temporal and spatial boundaries established for the assessment.

4.2.1 Outline of the Environmental Effects Assessment

This section provides key considerations in evaluating each of the VCs. Detailed environmental assessments of each VCs are presented in Chapter 5.

4.2.1.1 Boundaries

Temporal and spatial boundaries include those periods during which, and areas within which, the VCs are likely to interact with, or be influenced by, Bear Paw. Environmental effects are evaluated within spatial and temporal boundaries. The spatial and temporal boundaries may vary among VCs, depending on the nature of potential environmental effects. The spatial boundaries reflect the geographic range over which Bear Paw's potential environmental effects may occur, recognizing that some environmental effects will extend beyond the Project area. Temporal boundaries identify when an environmental effect may occur. The temporal boundaries are based on the timing and duration of Bear Paw's activities and the nature of the interactions with each individual VC. Spatial and temporal boundaries are developed for each VC in consideration of:

- timing/scheduling of activities for Project phases of development, construction and operation;
- known natural variations of each VC;
- information gathered on current and traditional land and resource use; and
- the time required for recovery from an environmental effect.

The temporal boundaries considered for this assessment include the construction and operation of Bear Paw. Decommissioning is not envisioned at this time and would be undertaken in consideration of requirements and regulations in place at that time; decommissioning is not being carried forward in the assessment. General decommissioning activities are discussed in Section 2.3.3. This EA assesses potential effects of Bear Paw throughout the year. Temporal boundaries also address other temporal issues such as seasonal sensitivities (e.g., bird migration). Spatial boundaries for the assessment vary according to the VC and are defined in Chapter 5.

4.2.1.2 Significance Determination

Each VC includes a threshold criteria or standard for determining the significance of the environmental effect, beyond which a residual environmental effect is considered significant (an unacceptable change). The threshold for significance is defined within each VC and is defined based on information obtained in issues scoping, available information on the state and characteristics of the VC, existing standard or regulations, and professional judgement. In particular, regulatory standards are used, where appropriate, to determine thresholds. Where regulatory standards are not available, other key factors such as the sustainability of biological populations, and rarity of species and critical habitats, have been used as indicators of significance. Significance for environmental effects is predicted after application of mitigation (i.e., residual effects).

4.2.1.3 Description of Existing Conditions

Existing conditions (i.e., pre-Bear Paw) are described for each VC to characterize the setting for Bear Paw, support an understanding of the receiving environment, and provide sufficient context for the effects assessment. The description is restricted to a discussion of the status and characteristics of the VC within the boundaries established for the assessment. This section includes a brief summary of field surveys and additional data analysis, as applicable to the VC.

4.2.1.4 Assessment of Project-Related Environmental Effects

The assessment of Project-related environmental effects follows a sequence where potential interactions between each VC and Bear Paw are first identified, and where such interactions may exist, a more detailed assessment of those effects is completed. Effects are analyzed qualitatively, and, where possible, quantitatively, using existing knowledge, professional judgment and other analytical tools, where appropriate and applicable. Where existing knowledge indicates that an interaction is not likely to result in an effect, certain issues may not warrant further analysis.

The specific steps in the assessment of potential environmental effects include:

- identification of environmental effects pathways (i.e., identification of the means by which Bear Paw could result in an environmental effect on the VC);
- description of the mitigation measures proposed to reduce or eliminate potential environmental effects, including industry standards, best management practices and environmental protection measures that the Proponent will implement;
- identification of residual environmental effects (those that remain after mitigation and control measures are applied) as determined through a number of factors including magnitude, geographic extent, duration, frequency, reversibility and context; and
- determination of significance of the residual effects.

A determination of the significance of residual Project-related effects is included for each VC. Following the determination of significance, follow-up and monitoring measures are recommended, where required, to verify environmental effects predictions or to assess the effectiveness of proposed mitigation measures.