Bear Paw Pipeline Project – Additional Information Request

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

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

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EXECUTIVE SUMMARY

Bear Paw Pipeline Corporation Inc. (Bear Paw Pipeline, the Proponent) registered the Bear Paw Pipeline Project (the Project) on March 30, 2016, in accordance with Part IV of the Nova Scotia *Environment Act*. The purpose of the Project is to construct and operate a 62.5 km high-pressure steel natural gas pipeline from Goldboro, Nova Scotia to the future location of the Bear Head LNG liquefied natural gas export facility in Richmond County, Nova Scotia. Bear Paw will interconnect the M&NP mainline, offshore gas and other supplies near Goldboro. The pipeline corridor will parallel an existing pipeline right-of-way (RoW) wherever possible. The Project includes a compressor facility to deliver natural gas at pressure to Bear Head LNG.

The purpose of this report is to provide additional baseline information to assist the Nova Scotia Department of Natural Resources (NSDNR) and other regulatory authorities in their review of the Project environmental assessment. This report has been specifically prepared in response to the memorandum dated May 16, 2016 received from the Nova Scotia Department of Environment (NSE) that identified a need for additional biophysical information related to birds, herptiles (i.e., wood turtle), lichens, vascular plants, wetlands, and mainland moose.

Additional surveys completed in 2016 include: vascular plant surveys; lichen surveys; wetland surveys; breeding bird surveys (point count and species at risk surveys); and herptile surveys.

These surveys were conducted on Crown land and previously inaccessible privately owned properties. Results of the field surveys include:

- 24 migratory bird species of conservation interest were identified
- 2 wood turtles were recorded at the Salmon River
- 373 species of vegetation were recorded, including ten species of conservation interest
- 2 lichen species at risk and 2 lichen species of conservation interest were identified
- 64 wetlands were delineated and assessed for wetland function
- 3 wetlands were identified as being wetlands of special significance based on their association with wood turtle habitat

The report summarizes mitigation proposed in the EA Report and where appropriate additional mitigation is proposed. Monitoring and follow-up recommendations from the EA have also been updated where appropriate.

In consideration of the mitigation commitments detailed in the EA Report, additional mitigation, and the monitoring and follow-up commitments made herein, **the conclusions made in the EA on the significance of residual environmental effects are unchanged.**

Abbreviations

AC CDC	Atlantic Canada Conservation Data Centre
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
EC	Environment Canada
LAA	Local Assessment Area
MBBA	Maritime Breeding Bird Atlas
MBCA	*Migratory Birds Convention Act*
NS *ESA*	Nova Scotia *Endangered Species Act*
NSDNR	Nova Scotia Department of Natural Resources
NSE	Nova Scotia Environment
RoW	right-of-way
SAR	Species at Risk
SARA	*Species at Risk Act*
SOCI	species of conservation interest

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1.0 INTRODUCTION

1.1 BACKGROUND

Bear Paw Pipeline Corporation Inc. (Bear Paw Pipeline, the Proponent) registered the Bear Paw Pipeline Project (the Project) on March 30, 2016, in accordance with Part IV of the Nova Scotia *Environment Act*. The purpose of the Project is to construct and operate a 62.5 km high-pressure steel natural gas pipeline from Goldboro Nova Scotia to the future location of the Bear Head LNG liquefied natural gas export facility in Richmond County, Nova Scotia (Figure 1.1). Bear Paw will interconnect the M&NP mainline, offshore gas and other supplies near Goldboro. The pipeline corridor will parallel an existing pipeline right-of-way (RoW) wherever possible. The Project includes a compressor facility to deliver natural gas at pressure to Bear Head LNG. A Project overview figure is provided as Figure 1.2.

1.2 SCOPE OF THE ADDITIONAL INFORMATION REQUEST

Following a submission of the Environmental Assessment (EA) Report (Stantec 2016) for the Project, a memorandum dated May 16, 2016 was received from the Nova Scotia Department of Environment (NSE) that identified a need for additional biophysical information. In particular, the memorandum indicated that the Wildlife Division of the Nova Scotia Department of Natural Resources (NSDNR) required additional information to support their review of the EA for the Project. The memorandum indicated that "Field work must be designed with methods and techniques that are seasonally timed to ensure optimal detectability for the species, habitats and taxonomic groups of organisms in question." Specific considerations identified in the memorandum related to the need for additional baseline biophysical surveys on crown and private lands for birds, lichen, wetlands and vegetation, and moose.

The purpose of this report is to provide additional baseline information in support of the EA Report. In particular, additional information is provided for birds, herptiles (i.e., wood turtle [*Glyptemys insculpta]*), lichens, and vascular plants. No field surveys have been conducted for mainland moose (*Alces americanus)* in relation to this additional information report. However, as reviewed with NSDNR, Section 6 includes an enhanced discussion on moose and moose habitat management planning, which includes additional commitments for mitigation, pre-construction field surveys, and ongoing regulatory engagement.

Table 1.1 provides an updated concordance of the EA Report and Additional Information Request with the Environmental Assessment Regulations.

Table 1.1 Concordance with the Environmental Assessment Regulations

Requirement	EA Report Section Reference	Additional Information Request Report Section Reference
• the name of the undertaking	Executive Summary	Executive Summary
• the location of the undertaking	1.1 Project Overview	Executive Summary / 1.1 – Background
• 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	1.1 – Background
• the purpose and need of the undertaking	1.2 Purpose and Need for the Undertaking	
• 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	3.0 – Vegetation and Wetlands 4.0 – Birds and Bird Habitat 5.0 – Herptiles (Wood Turtles) 6.0 – Nova Scotia Mainland Moose Appendix A – Nocturnal Owl Survey Report
• 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	

Table 1.1 Concordance with the Environmental Assessment Regulations

Requirement	EA Report Section Reference	Additional Information Request Report Section Reference
• the location of the proposed undertaking and the nature and sensitivity of the surrounding area	1.1 Project Overview 1.6 Environmental Setting	1.1 – Background
• the size, scope and complexity of the proposed undertaking	4.1 Scope of the Assessment	1.2 – Scope of the Additional Information Request
• 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 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	3.0 – Vegetation and Wetlands 4.0 – Birds and Bird Habitat 5.0 – Herptiles (Wood Turtles) 6.0 – Nova Scotia Mainland Moose 7.0 – Brook Floater

1.3 OVERVIEW OF METHODS

Additional baseline surveys were completed to document use of the assessment corridor by Species at Risk (SAR) and other species of conservation interest (SOCI) and employ the use of general census techniques (e.g., point counts) and more species-specific methods. SOCI are defined as those:

- listed under the Nova Scotia *Endangered Species Act* (NS *ESA*) or Schedule 1 of the federal *Species at Risk Act* (*SARA*) as being either *endangered*, *threatened*, *vulnerable*, or of *special concern* (i.e., Species at Risk)
- listed in Schedule 2 or 3 of *SARA*
- not yet listed under provincial or federal legislations but identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as being either *endangered*, *threatened*, or of *special concern*
- listed by the NSDNR (2014) to be *at risk*, *may be at risk*, or *sensitive* to human activities or natural events
- ranked as S1, S2, or S3 by the AC CDC (2014)

Additional baseline studies conducted in support of the Project, and summarized in this document, include those directed at breeding birds, vascular plants, lichens, and wood turtle. In addition, surveys for nocturnal raptors and the mainland moose have also been conducted since filing of the EA Report. A copy of the nocturnal owl survey report is available as Appendix A, and a report on the spring moose pellet group survey undertaken by Stantec Consulting Ltd. was submitted to NSDNR under separate cover.

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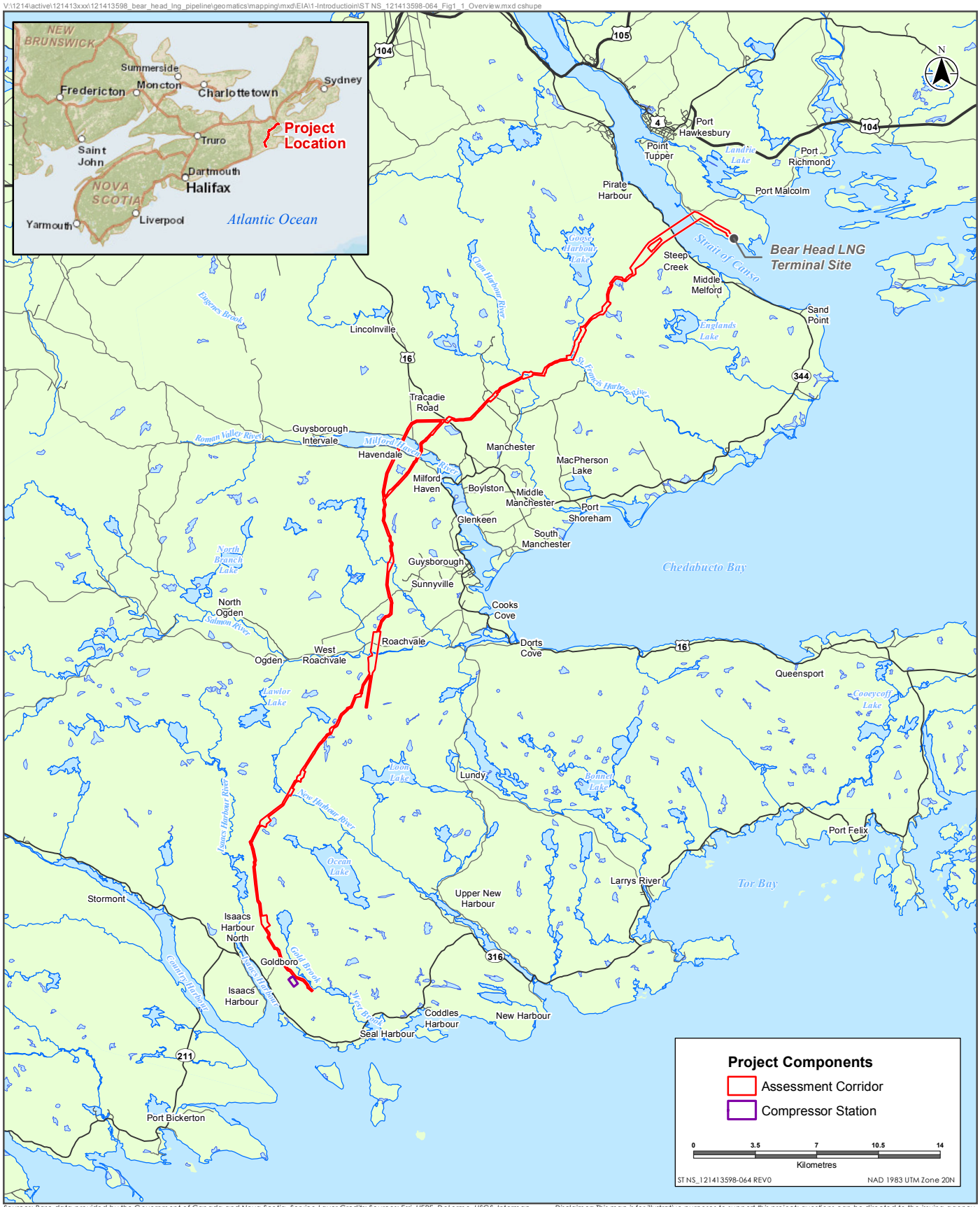

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Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency. Note: Crown lands shown is limited to parcels within a relevant distance of the project.

Bear Paw Pipeline

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BEAR PAW PIPELINE PROJECT

Project Location

Figure 1.1

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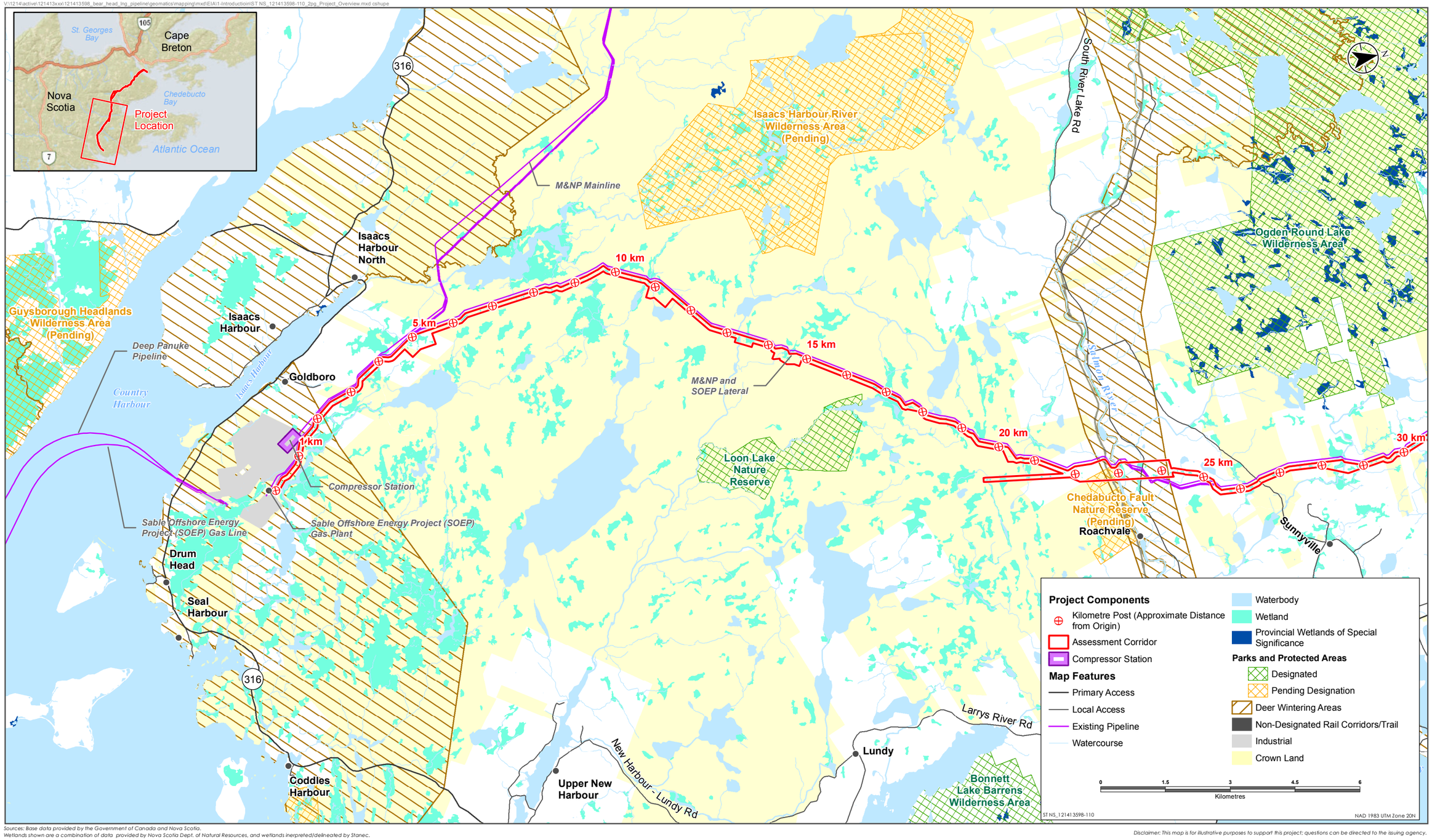

Sources: Base data provided by the Government of Canada and Nova Scotia.
Wetlands shown are a combination of data provided by Nova Scotia Dept. of Natural Resources, and wetlands inerpreted/delineated by Stanec.

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

BEAR PAW PIPELINE

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BEAR PAW PIPELINE PROJECT

Project Overview

Figure 1.2
Map 1 of 2

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2.0 OVERVIEW OF PROJECT PLANNING AND ENVIRONMENTAL MANAGEMENT

As described in Section 2.6 of the EA Report, environmental protection has been integrated into the Project as a key feature throughout Project planning. In particular, the pipeline has been routed to parallel an existing pipeline RoW, and avoid known sensitive environmental areas wherever practical. Standard best management practices and mitigation presented in the EA Report is provided in Appendix B.

Bear Paw Pipeline has worked closely with regulatory officials throughout the EA process in the identification of important environmental features, study design, and in the review of results and mitigation development.

2.1 ADAPTIVE MANAGEMENT

The principles of adaptive management reflect the importance and challenges of approaching development in an environmentally responsible manner. Development planning cannot be isolated from environmental planning, and these processes inform each other as the information supporting each increases. This results in the important understanding that good development and good planning must remain adaptive. This principle is also reflected in the ongoing regulatory consultation discussed in Section 2.2. Figure 2.1 is an interpretation of adaptive management as it has been applied to this specific project, and these principles are repeated in the discussion of environmental management throughout this document.

Figure 2.1 Adaptive Management

The adaptive management approach for Bear Paw begins with early engagement and planning, and this continues throughout the adaptive management process. Route selection for Bear Paw first aims to avoid disturbance in sensitive areas where possible, and if these areas cannot be avoided, ways to reduce the footprint of disturbance are considered. Both avoidance and reduction of disturbance are based on site-specific knowledge gathered in the field, and these aspects of adaptive management will continue from planning stages through to construction and operation. Mitigation planning is used to further minimize the potential of negative effects, and will consider industry standards. The implementation of these mitigation measures will be monitored in the field throughout construction and operation, and further mitigation measures will be considered in response to problems encountered. Lastly, Bear Paw will implement a follow-up and monitoring program for the field verification of assumptions made in the EA Report, and efficacy of mitigation implemented for the Project consistent with industry practices.

2.2 ENGINEERING, ENVIRONMENTAL MANAGEMENT, AND REGULATORY CONSULTATION

Since the conceptualization of the Project, Bear Paw Pipeline has initiated early and ongoing communication with First Nations, regulatory authorities and the public. As detailed in the EA Report, numerous meetings have been held with regulatory agencies to seek input on environmental constraint identification, study design, and mitigation options. This process has continued in the development of this report with meetings held on the following topics:

- discussion of the additional information request, including timing requirements and survey design expectations
- regulatory input to the definition and mitigation requirements for wetlands of special significance
- options for future moose field surveys and mitigation
- review and input on moose mitigation commitments
- wood turtle survey design, results of the surveys, and mitigation options
- lichen survey design, results of the surveys, and mitigation options

These discussions had a direct impact on the design of the field surveys undertaken in support of this report, and directly influenced the mitigation commitments that are made herein. Furthermore, these discussions have cemented Bear Paw Pipeline's ongoing commitment to work collaboratively with the appropriate regulatory authorities in the development of the Project, according to the principles of adaptive management. More specifically, the detailed design process, which includes the development of the EPP either concurrently or as a precursor to the detailed design, will provide the next major milestone for regulatory involvement. Consultation with regulators will continue through this process.

Detailed engineering design incorporates field survey and geotechnical data to further refine the location of the pipeline and facilities within the assessment corridor, as well as the related technology (e.g., materials selection, compressor technology). Primary inputs at this stage of the project include:

- additional geotechnical and survey data
- environmental constraints identified through the EA process
- mitigation commitments from the EA process
- conditions of approval on the EA
- regulatory input to meeting the requirements of the conditions of approval, which will include design-based decisions as well as approval of the EPP document

2.3 ENVIRONMENTAL PROTECTION PLANNING

As committed to in the EA Report, 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
- document environmental concerns and appropriate protection measures associated with construction and operation activities
- provide concise and clear instructions for contractors and inspectors regarding procedures for protecting the environment and reducing potential environmental effects
- 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
- communicate changes in the program through the revision process

A draft table of contents for the project-specific EPP is shown below, the final contents of the EPP will be developed with input from the appropriate regulatory authorities including, but not limited to NSE, NSDNR, Transport Canada (TC), and Department of Fisheries and Oceans (DFO):

Environmental Protection Plan Table of Contents

3.0 VEGETATION AND WETLANDS

Vegetation surveys were conducted to supplement the data collected in 2015.

3.1 METHODS

The objectives of the vegetation and wetland surveys were to:

- Record early flowering species that may not have been observed during the vascular plant surveys conducted on Crown lands in September, 2015.
- Conduct early summer vascular plant surveys on accessible private lands based on identification of areas of high priority.
- Perform wetland delineations and obtain information on wetland function on private lands where permission has been granted to access them.
- Perform surveys for boreal felt lichen (*Erioderma pedicellatum*) and other lichen SOCI on Crown lands and accessible private lands based on lichen habitat modeling.

Additional information on the site selection and field methods used for the surveys is provided in the following sections.

3.1.1 Vascular Plant Surveys

Vegetation surveys were conducted on Crown and private lands between June 10 and July 14, 2016 as well as on private lands along the Milford Haven River and Strait of Canso on September 2, 2016 to obtain information on plant communities and SOCI (Figure 3.1). Vegetation surveys were conducted to detect species that would have senesced prior to the September 2015 vegetation surveys. Wetlands and mature hardwood stands have the highest potential to contain spring ephemeral species so these areas were the primary targets for surveys. A total of 21 priority survey sites were identified on Crown lands for targeted surveys, all of which were surveyed. Additional areas and vegetation types (particularly wetlands) were investigated as botanists transited between target areas. In addition to surveys on Crown lands, vegetation surveys were conducted within approximately 13 km of private land. Prior to surveys, a modeling exercise was conducted to identify areas on accessible private lands with relatively high potential to support SOCI. Nine sites were visited during June or July surveys. Four additional sites, located along the coastlines of the Straight of Canso and the Milford Haven River (eastern crossing option), were surveyed in September because of the potential for these areas to provide habitat for plant SOCI that are only reliably identified late in the growing season (e.g., *Suaeda spp*.).

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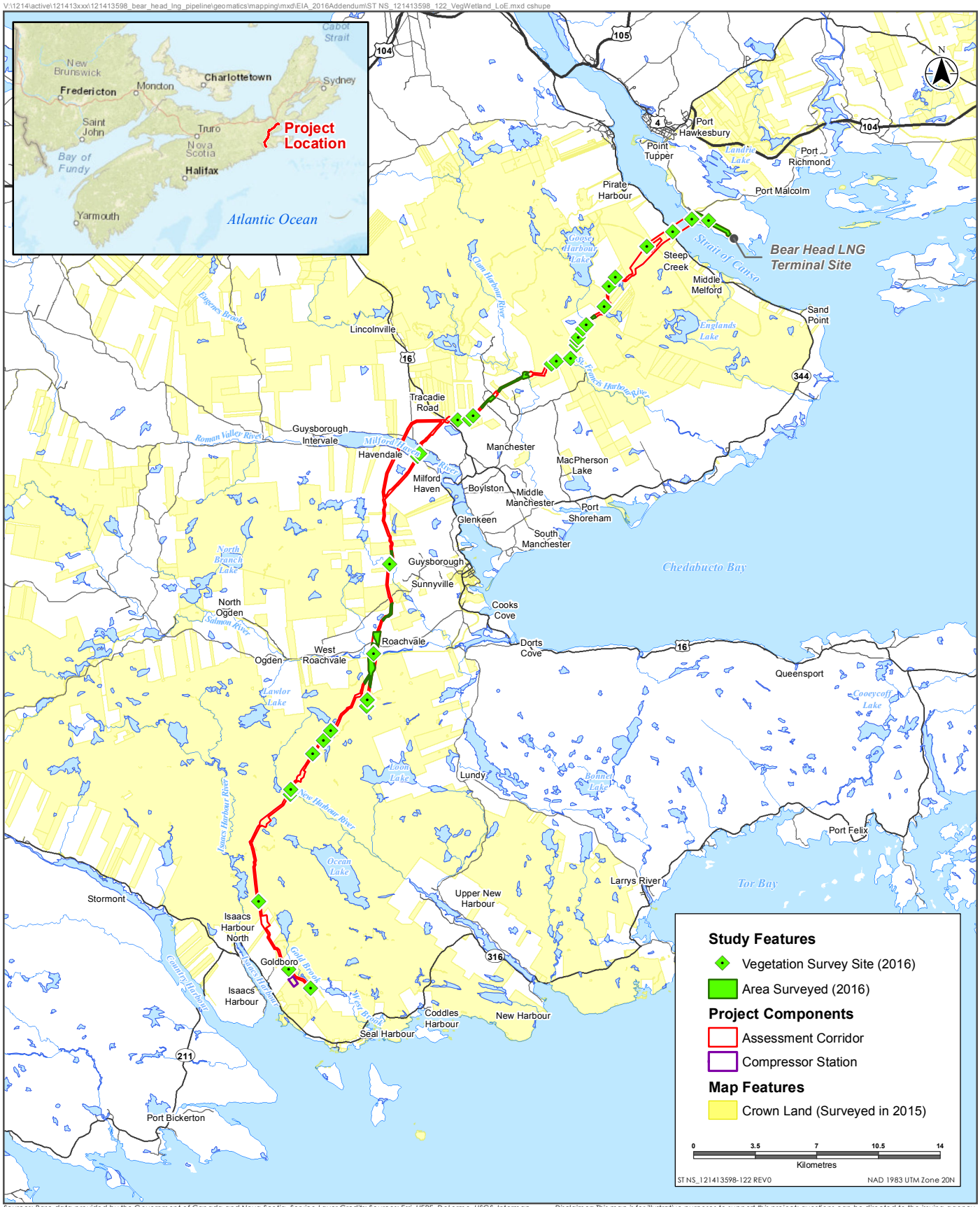

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BEAR PAW PIPELINE

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Overall Field Effort - 2016 Wetland and Vascular Plant Surveys

Figure 3.1

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Vegetation surveys were completed through floristic habitat sampling (described in Newmaster et al. 2005) throughout vegetation communities within the assessment corridor. Where encountered, the locations of SOCI were recorded along with information on population size and associated habitat conditions. Descriptions for new or distinct vegetation communities (i.e., not identified during 2015 surveys) were recorded where encountered. Descriptions included the dominant species in the tree, shrub and ground vegetation strata. Trees are defined as tree species greater than 5 cm in diameter at breast height (DBH); shrubs are tree species less than 5 cm DBH, or woody vegetation greater than 50 cm in height; and ground vegetation is defined as woody plants less than 50 cm in height, or non-woody species.

3.1.2 Lichen Surveys

Lichen surveys were conducted on Crown and private lands between August 22 and 25, 2016 to obtain information on SOCI, including boreal felt lichen and other cyanolichens. Incidental observations of vascular plant SOCI were also recorded. Potential habitat for lichen SOCI habitat was identified in areas of Crown and private lands which supported:

- areas within the assessment corridor which had not been previously surveyed for lichens but for which the provincial boreal felt lichen model (NSE 2010) indicated potential for boreal felt lichen
- forested wetlands (as identified through 2015 field and desktop delineations)
- hardwood and mixedwood upland forest polygons with maturity classes of mature, overmature, or uneven

Priority areas were identified as those areas which supported concentrations of potential lichen SOCI habitat. Areas surveyed for lichen in 2015 and 2016 are shown on Figure 3.2. During the surveys, experienced lichenologists evaluated the potential of habitat to support lichen and documented the occurrence of this species and other cyanolichens of conservation interest. Incidental observations of vascular plant and bryophyte SOCI were also recorded during these surveys.

3.1.3 Wetland Surveys

Wetland surveys were completed along more than 13 km of private lands within the assessment corridor between June 27th and July 14th, 2016 (Figure 3.1). During these surveys, areas meeting the definition of a wetland as outlined by the Nova Scotia *Environment Act* were delineated in the field following principles outlined by the US Army Corps of Engineers (1987) and classified according to the Canadian Wetland Classification System (NWWG 1997). This system classifies wetlands to three levels: class, form/subform, and type. The wetland class places a wetland into one of five categories based on the overall nature of the wetland environment, such as whether the wetland soils are primarily mineral or organic (i.e., peat), their association with groundwater, and whether or not they are dominated by woody plants over 1 m in height. Wetland classes include bog, fen, swamp, marsh, and shallow water. Form and subform indicate the physical morphology and hydrological characteristics of the wetland. Wetland type distinguishes wetland communities based on one of eight groups of dominant vegetation (NWWG 1997). Geographic coordinates were recorded for wetland boundaries.

Information on the functional characteristics of surveyed wetlands was obtained using a simplified variation of the NovaWET method developed by NSE (2011b). The full NovaWET method consists of a field component and a desktop component of analysis for each wetland. The approach focused on collecting information that is obtained through a site visit, such as dominant species and habitat for SAR or other SOCI. Vegetation and wetland surveys were generally conducted concurrently on private lands. Surveys for bird SOCI were conducted as part of a larger breeding bird survey, which included targeted surveys for SAR in association with wetlands (Section 4.1 provides additional detail).

3.2 RESULTS

3.2.1 Vegetation Communities

Forest and wetland vegetation communities observed during 2016 surveys were generally consistent with those observed in 2015, as described in Section 5.5 of the EA Report (Stantec 2016). Of exception, several wetlands were observed which contained relatively unique vegetation communities. Some of these occurrences were associated with relatively nutrient rich conditions whereas others reflected the influence of historical human activities. A general description of these occurrences is provided below.

Whereas the majority of wetland vegetation within the assessment corridor is dominated by species which are indicative of acidic and nutrient-poor conditions, several wetlands were encountered in 2016 that were relatively nutrient-rich. In particular, the vegetation within a wetland located on the south side of Godfrey Brook (Map 10, Appendix C) indicated that it was relatively nutrient-rich. The wetland may be characterized as a tall shrub swamp and occurred on a boulder field that would be seasonally flooded by the brook in spring, but which is relatively dry for much of the year. The wetland was described as supporting both relatively "dry" and "wet" tall-shrub dominated communities. Beaked hazel (*Corylus cornuta*), mountain maple (*Acer spicatum*), and chokecherry (*Prunus virginiana*) provided a well-developed tall shrub strata within the drier portions of the swamp; with ground vegetation being dominated by evergreen wood fern (*Dryopteris intermedia*), dwarf red raspberry (*Rubus pubescens*), tall meadow-rue (*Thalictrum pubescens*), spotted jewelweed (*Impatiens capensis*), rough-stemmed goldenrod (*Solidago rugosa*), and ostrich fern (*Matteuccia struthiopteris*). Wetter areas of the wetland were dominated by speckled alder (*Alnus incana*) with scattered occurrences of black elderberry (*Sambucus nigra ssp. canadensis*) and a well-developed herbaceous layer comprised of bluejoint reed grass (*Calamagrostis canadensis*), rough-stemmed goldenrod, sensitive fern (*Onoclea sensibilis*), spotted jewelweed, and common lady fern (*Athyrium filix-femina*). One plant SOCI, fringed blue aster (*Symphyotrichum ciliolatum*), was recorded in association with this wetland. Relatively nutrient-rich conditions were encountered within other wetlands in the general vicinity of Godfrey Brook such as within a mixedwood drainageway swamp located to the immediate south; within riparian habitats along portions of the Salmon River (Map 8, Appendix C); and within a wetland characterized as a graminoid slope fen, located to the immediate north of the Salmon River (Map 9, Appendix C).

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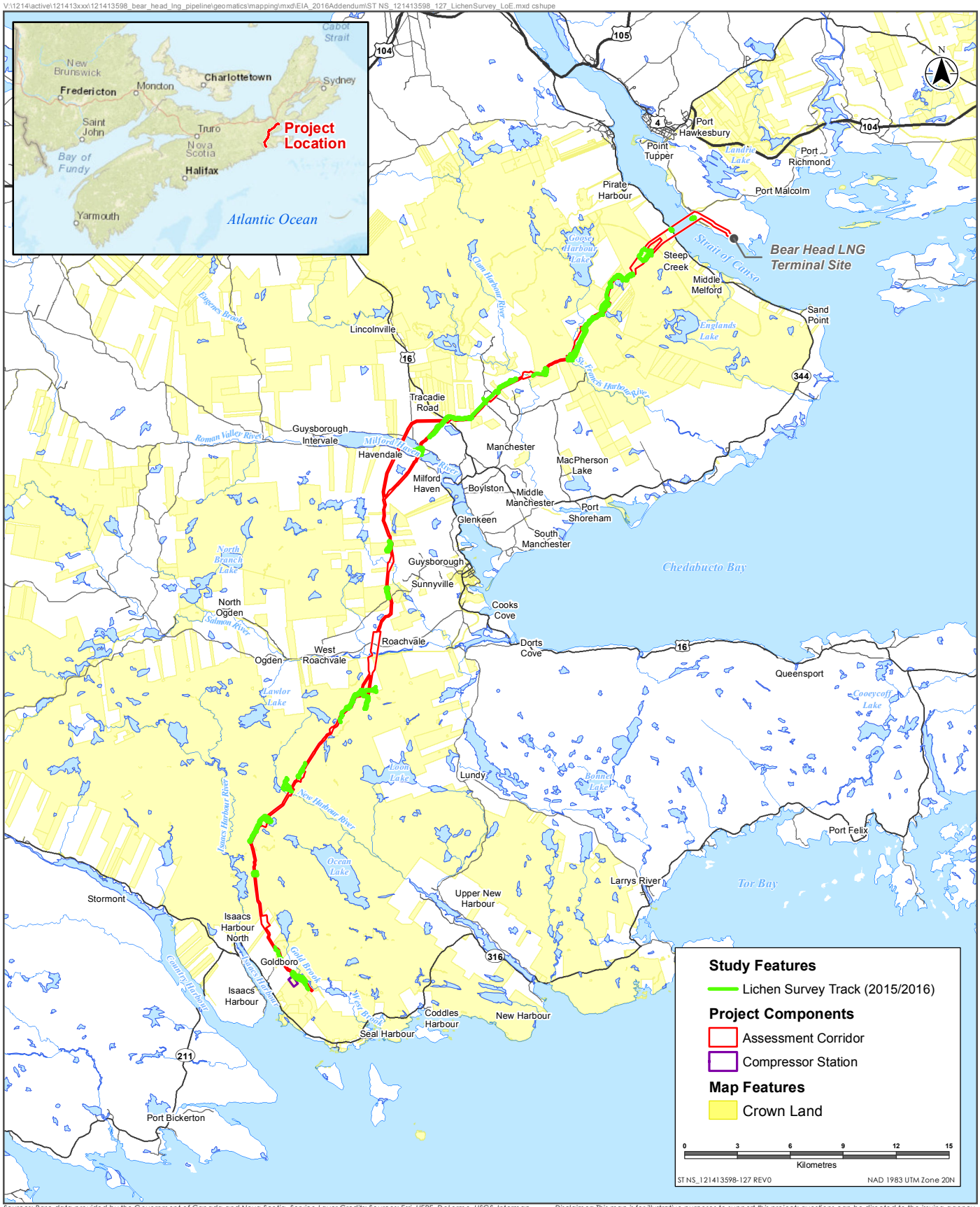

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BEAR PAW PIPELINE

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Overall Field Effort - 2015/2016 Lichen Surveys

Figure 3

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Several swamps encountered during 2016 were recovering from human disturbances as a result of commercial forestry activities and were in a relatively early stage of successional development. Although these wetlands are likely to have had well-developed tree layers, this strata was typically reduced because of clearing activities and / or hydrological modifications. The vegetation composition within these swamps varied considerably but they were typically dominated by varying amounts of shrubs, forbs and graminoids. Most have been classified as shrub-dominated swamps. Wetlands that were recovering from human disturbances occurred throughout the extent of the assessment corridor and were observed in association with old quarry activities, areas that had been grubbed for power lines, ditches, and recent logging activity.

3.2.2 Species of Conservation Interest

3.2.2.1 Vascular Plants

The vascular plant SOCI identified during 2015 and 2016 field surveys are shown in the wetland and plant SOCI mapbook (Appendix C). During field surveys completed in the spring and summer of 2016, 420 vascular plant taxa were observed (listed in Appendix C), twelve of which are SOCI (Table 3.1). Three of the SOCI observed were also encountered during 2015 surveys: running serviceberry (*Amelanchier stolonifera*), Newfoundland dwarf birch (*Betula michauxii*), and northern comandra (*Geocaulon lividum*). The seven species not previously encountered include blunt broom sedge (*Carex tribuloides*), Wiegand's Sedge (*Carex wiegandii*), Acadian quillwort (*Isoetes acadiensis*), southern twayblade (*Listera australis*), Loesel's twayblade (*Liparis loeselii*), blood milkwort (*Polygala sanguinea*), and fringed blue aster (*Symphyiotrichum ciliolatum*).

Table 3.1 Vascular Plant SOCI Observed in 2016

Scientific Name	Common Name	AC CDC S-Rank[1]	NSDNR General Status Rank
Amelanchier stolonifera	running serviceberry	S3?	Secure
Atriplex franktonii	Frankton's saltbush	S3S4	Secure
Betula michauxii	Newfoundland dwarf birch	S2	Sensitive
Carex tribuloides	blunt broom sedge	S3?	Secure
Carex wiegandii	Wiegand's Sedge	S3	Sensitive
Geocaulon lividum	northern comandra	S3	Secure
Isoetes acadiensis	Acadian quillwort	S3	Sensitive
Liparis loeselii	Loesel's twayblade	S3S4	Secure
Listera australis	southern twayblade	S3	Secure
Polygala sanguinea	blood milkwort	S2S3	Sensitive
Suaeda calceoliformis	horned sea-blite	S3S4	Secure
Symphyotrichum ciliolatum	fringed blue aster	S2	Sensitive

Note:
[1] S1 = critically imperiled, S2 = imperiled, S3 = vulnerable (AC CDC 2015b)

Running serviceberry is a shrub that is generally found in sandy areas, rocky barren ground and boggy depressions (Zinck 1998). Although its provincial population is considered *secure* by NSDNR (2014), it has been assigned a rank of *S3?* by the AC CDC (2014), indicating it may be considered vulnerable, but its population status is poorly understood (AC CDC 2015a). Uncertainty regarding its distribution and abundance is likely related to difficulty in identifying species of the genus *Amelanchier*, and the fact that they frequently hybridize. Running serviceberry was encountered within a bog near the central portion of the route in 2016 (Map 8, Appendix C), and was also recorded at two locations near Carter's Lake in 2015 (Stantec 2016).

Frankton's saltbush is a halophytic forb that is typically found in salt marshes, brackish marshes and along seashores (Zinck 1998). This species was observed to be scattered along the both the north and south shores of the Strait of Canso (Maps 20 and 21, Appendix C) during September surveys.

Newfoundland dwarf birch was found in the large Gold Brook wetland complex near the SOEP Gas Plant in 2016 (Map 1, Appendix C), which is the same area it was encountered in 2015. At this location, Newfoundland dwarf birch was found growing near the edge of a fen characterized by a sphagnum moss mat that was punctuated by a variety of graminoids and forbs. Additional information on the abundance and habitat conditions of this species at this site may be obtained from the EA Report (Stantec 2016).

Blunt broom sedge is associated with swales and wet woods (Zinck 1998) and was encountered within a mixedwood forest at the toe of slope on the north side of the Salmon River in 2016 (Map 8, Appendix C). Several clumps of this species were observed scattered amongst the mixedwood forest of this location, which was comprised of a mixture of red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), paper birch (*Betula papyrifera*), and scattered white spruce (*Picea glauca*).

Wiegand's Sedge is reported as being associated with "boggy and peaty soils, conifer and alder swamps" within Nova Scotia (Zinck 1998) and was encountered on the Cape Breton side of the Straight of Canso (Map 21, Appendix C). Several plants were observed scattered in a coniferous treed drainageway swamp at this location. The tree canopy of this swamp was composed of Black spruce (*Picea mariana*) and tamarack (*Larix laricina*) which was otherwise dominated by nearly continuous carpet of peatmoss (*Sphagnum spp.*), a moderately developed shrub layer comprised of regenerating trees and ericaceous shrubs, and a herbaceous layer dominated by cinnamon fern (*Osmunda cinnamomea*).

Northern comandra is an herb that is typically found in association with "sterile soils and damp sands, in acid or peaty locations" of the province (Zinck 1998). This species was encountered at two locations during 2016. Approximately 11 plants were found at the southern end of the route in association with hummocks of a bog (Map 1, Appendix C) and a relatively large population of approximately 300 plants was observed in association with barrens at the northern end near the St. Francis Harbour River (Map 17, Appendix C). Northern comandra was recorded at three locations in the Local Assessment Area (LAA) during 2015 surveys, all of which were in the

general vicinity of Carters Lake (Stantec 2016). Addition historical records for this species are known from the vicinity of Carters Lake, as well as from a bog near the SOEP Gas Plant and near Port Hawkesbury (Stantec 2016).

Acadian quillwort is a small aquatic forb that has been reported to occur in association with "water up to 1 m deep, bordering lakes or ponds, and occasionally along rivers" (Zinck 1998). This species was encountered within waters along the north side of the Salmon River in 2016 (Map 8, Appendix C) where it was associated with a substrate consisting of sand mixed in with a gravel-cobble matrix. Although only recorded in one location, this species is probably more common along the shore of the Salmon River and in similarly sheltered areas than the distribution of current records indicate.

Southern twayblade is a small orchid that is typically associated with the shaded sphagnum moss of bogs or treed swamps (Zinck 1998). This species is only visible above ground for several weeks during early summer (mostly in June) and then it senesces. This species was encountered within swamp habitat at five locations during 2016 field surveys, all of which were in the same general vicinity near the central portion of the route (Maps 7 and 8, Appendix C). This species has been historically recorded in the vicinity of the study area near Eight Mile Lake and on Cape Breton (Stantec 2016). Due to its small stature and the short period within which it may be observed, southern twayblade is likely to occur elsewhere within the study area.

Horned sea-blite is a small prostrate forb found in association with salt marshes and sandy beaches (Zinck 1998) of the province. One horned sea-blite plant was observed on the south side of the Milford Haven River during September surveys (Map 13, Appendix C).

Fringed blue aster is known from scattered locations within the province where it is associated with "open fields, lawns, and the edges of woods" (Zinck 1998). During 2016 field surveys, this species was encountered at one location near Godfrey Brook (Map 10, Appendix C). Although not typically associated with wetland habitats, the fringed blue aster was observed at the edge of a tall shrub dominated swamp. This wetland occurred on a boulderfield that would be seasonally flooded by the brook in spring, but which is relatively dry throughout the majority of the growing season as water levels within the brook subside. The vegetative composition of this area indicated that the wetland was relatively nutrient-rich; with dominant plants including mountain maple, beaked hazel, chokecherry, evergreen wood fern, spotted jewelweed, dwarf red raspberry, tall meadow-rue, rough-stemmed goldenrod, and ostrich fern.

Blood milkwort is typically found in infertile acidic fields, on roadsides, damp slopes, and open woods (Zinck 1998). This species was found on the existing pipeline RoW near the inflow to Little Beech Hill Lake (Map 4, Appendix C).

Loesel's twayblade is associated with wet open habitats including bogs, peaty meadows, moist ditches, cobbly lake shores, the margins of ponds and bogs, as well as behind coastal barrier beaches (Zinck 1998). During the 2016 field surveys Loesel's twayblade was found on a poorly drained area of existing pipeline RoW near West Lake (Map 18, Appendix C).

3.2.2.2 Lichen

The non-vascular plant SOCI identified during 2015 and 2016 field surveys are shown in in the wetland and plant SOCI mapbook (Appendix C). A total of 38 non-vascular plants were recorded during 2016 field surveys (listed in Appendix C), five of which are SOCI.

Two of the lichens encountered are SAR: frosted glass-whiskers (*Sclerophora peronella*), blue-felt lichen (*Degelia plumbea*). The three remaining SOCI include two lichens and one bryophyte: waterside rockshag lichen (*Ephebe lanata*), tree pelt lichen (*Peltigera collina*), and Warnstorf's peat moss (*Sphagnum warnstorfii*). Boreal felt lichen – Atlantic population, was not observed during targeted surveys.

Table 3.2 Species of Conservation Interest Identified during the 2016 Field Surveys

Scientific Name	Common Name	AC CDC S-Rank[1]	NSDNR General Status Rank	SARA / NS ESA
Degelia plumbea	blue felt lichen	S3	Secure	Special Concern (SARA), Vulnerable (NSESA)
Ephebe lanata	waterside rockshag lichen	S3	Sensitive	
Peltigera collina	tree pelt lichen	S2?	Sensitive	
Sclerophora peronella	frosted glass-whiskers	S1?	na	Special Concern (SARA)
Sphagnum warnstorfii	Warnstorf's Peat Moss	S2S3	Sensitive	

Note:

[1] S1 = critically imperiled, S2 = imperiled, S3 = vulnerable (AC CDC 2015b); updated S-Ranks for frosted glass whiskers, blue felt lichen, waterside rockshag lichen provided by T. Neily (pers. comm. 2016)

Frosted glass-whiskers is a stubble lichen that is typically found in sheltered crevices in exposed heartwood of hardwood trees. It is also occasionally found growing on the bark of hardwood trees. It is most often found on red maples but is occasionally found on other hardwood species. Frosted glass-whiskers is sensitive to low temperatures and humidity and as such its distribution is limited to cool, humid, mature hardwood forests. In Canada, frosted glass-whiskers is currently only known from Nova Scotia. As of 2015, 13 populations of frosted glass-whiskers have been recorded in Nova Scotia (Government of Canada 2016). This species is listed as a species of *special concern* under Schedule 1 of the SARA. It is not listed under the NS *ESA*. The AC CDC lists frosted glass-whiskers as *S1?* (i.e., critically imperiled but status uncertain). Frosted glass-whiskers is found at one location near the St. Francis Harbour River (Map 17, Appendix C), where it was growing on a yellow birch (*Betula alleghaniensis*).

Blue felt lichen is a foliose epiphytic cyanolichen that grows on hardwood trees in cool, humid coastal forests. In Nova Scotia, blue felt lichen is typically found in upland and poorly drained areas near the coast that are dominated by red maple (*Acer rubrum*). This species prefers areas where temperatures are cool in the summer and mild in winter, that receive high quantities of

rain throughout the year, and that are exposed to frequent fog (COSEWIC 2010). Red maples are the most frequently used host tree; however, other species including sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*) and yellow birch may occasionally be hosts for this species. As of 2010 there were 100 known populations of blue felt lichen in Canada. Eighty-eight of these populations are found in Nova Scotia. Blue felt lichen is listed as *vulnerable* under the NS *ESA* and although it is not listed under Schedule 1 of the *SARA*, it is designated as a species of *special concern* by COSEWIC. The AC CDC lists this species as *S3* (vulnerable). Blue felt lichen was found at four locations during the 2016 field surveys, all of which were located near the northern end of the proposed pipeline route. Two sites were found to the east of Carters Lake (Map 19, Appendix C) and one site was found near the St. Francis Harbour River (18, Appendix C). The fourth site was located near West Lake (Map 18, Appendix C). Blue felt lichen was associated with mature hardwoods and red maple in all of these areas. AC CDC records indicate that blue felt lichen has also been observed near the southern end of the proposed pipeline route (Map 3, Appendix B).

Waterside rockshag lichen is a fruiticose cyanolichen that grows on rocks in streams and along lake shores. It typically occurs on acidic rocks that are frequently wetted by stream or lake water. It can also be found growing on rocks wetted by groundwater seepage or spray from waterfalls. Waterside rockshag lichen is listed at a *sensitive* species by NSDNR and the AC CDC ranks this species as *S3* indicating that it is vulnerable in Nova Scotia. This species was found on a rock in the St. Francis Harbour River (Map 17, Appendix B).

Tree pelt lichen is a foliose epiphytic cyanolichen. It occurs on a variety of substrates including moss covered soil, humus over boulders and on the mossy bark of trees and rotting logs (Hale 1979). It is typically found in moist habitats in coastal areas. Tree pelt lichen is listed as *sensitive* by NSDNR and as *S2?* By AC CDC, indicating that it is believed to be imperiled in Nova Scotia but the status rank is uncertain. Tree pelt lichen was found at three locations during the 2016 field survey. Two tree pelt lichens were found on red maples while the third was found on a sugar maple. All of the 2016 records occurred at the northern end of the proposed pipeline route. One site was located approximately a kilometer north of the Clam Harbour River (Map 16, Appendix C). The remaining two sites were found near West Lake (Map 18, Appendix C). In 2015, two other tree pelt lichen sites were also found near West Lake (Map 18, Appendix C). AC CDC records identified a sixth tree pelt lichen site at the southern end of the proposed pipeline route approximately one kilometer northeast of the gas plant site (Map 1, Appendix C).

An incidental observation of the bryophyte Warnstorf's peat moss was also recorded during 2016 field surveys, and is ranked as *S2S3* by the AC CDC (2014) and as *sensitive* by NSDNR (2014). This species is typically found in minerotrophic fens. Warnstorf's peat moss was found in a wetland near West Lake (Map 18, Appendix C).

3.2.3 Wetland Surveys

The locations of wetlands identified in 2015 and 2016 are shown in the wetland and plant SOCI mapbook (Appendix C). A total of 64 wetlands, accounting for 37.4 ha, were identified during

the 2016 surveys (Table 3.3). Wetland classes identified during the 2016 field surveys include swamp, bog, fen, marsh and shallow water (Table 3.3). Swamps accounted for the majority of wetland area within the assessment corridor (approximately 88.5%); with softwood-treed, mixedwood treed, and shrub-dominated types being particularly abundant. The dominant vegetation type was not identified for two swamps which were recovering from recent human disturbances, but these areas were dominated by herbaceous plants. The cover of treed bog, open bog, fen, and marsh were relatively similar; all of which accounted for between 2.5% and 3.0% of the 2016 wetland study area; but the shallow water wetland class occupied less than 1% of the total wetland area (Table 3.3).

Table 3.3 Wetland Classes (and Type, for Swamps) Surveyed in the Assessment Corridor in 2016

Wetland Class (Type)	# of Occurences[1]	Area	
		Area (ha)	Percent (%)
Hardwood Treed Swamp	3	0.3	0.8
Mixedwood Treed Swamp	14	4.3	11.6
Softwood Treed Swamp	28	19.8	53.0
Shrub Swamp	16	8.2	21.8
Swamp (other)	2	0.5	1.3
Treed Bog	3	1.1	3.0
Bog	1	0.9	2.5
Fen	2	1.0	2.7
Marsh	7	0.9	2.5
Shallow Water	1	0.3	0.8
All 2016 Wetlands	64	37.4	100.0

Note:
[1] Some wetlands were comprised of multiple classes or types

The functions provided by the 2016 wetlands are similar to those discussed in relation to the various wetland types in Section 5.5 of the EA Report (Stantec 2016).

Results of vegetation and wildlife field surveys were used to identify Wetlands of Special Significance (WSS) within the assessment corridor as follows, with guidance received from NSE (K. Hilchey, pers. comm. 2016):

- Wetlands along the Salmon River were classified as WSS because they are likely to be considered to provide critical habitat for the wood turtle, as defined under the Recovery Strategy for the Wood Turtle (*Glyptemys insculpta*) in Canada (Environment Canada 2016). This includes any wetlands within 200 m of the high water mark of the Salmon River that may be classified as alder thicket / swale, swamp, bog, wet meadow, beaver pond, oxbow / perennial pool, or vernal pool (Environment Canada 2016).

- Wetlands that supported vascular plant or lichen SAR records were considered WSS.

Three wetlands were classified as WSS because they were adjacent or in close proximity (i.e., within 200 m) to the Salmon River, which is known to support wood turtles. One of these wetlands, located on the southern side of the river, is comprised of graminoid dominated riparian marsh and an area of shallow water that forms a backwater and provides potential wood turtle hibernation habitat. Another WSS, located on the north side of the river, is comprised of a tall shrub and mixedwood swamp and provides potential wood turtle foraging habitat. A mixedwood treed basin swamp approximately 120 m from the river was also classified as a WSS because it is within 200 m of the river and may therefore classify as wood turtle critical habitat.

No lichen SAR were observed in association with wetlands. Although signs of mainland moose and several bird SAR were also observed in association with wetlands (i.e., Canada Warbler, Rusty Blackbird, and Olive-sided Flycatcher) these observations were not used to identify WSS following guidance from NSE.

3.3 MITIGATION AND FOLLOW-UP

3.3.1 Mitigation

Mitigation measures to reduce the environmental effects of the Project on vegetation and wetlands were identified in Section 5.5.6 of the EA Report and are reproduced below in Table 3.4. Standard mitigation measures listed in Section 2.5.3 of the EA report is included as Appendix B to this document. Locations for site-specific mitigation will be outlined in the EPP following detailed routing and in consultation with the appropriate regulatory authorities in consideration of the following criteria:

- rarity, status, or function of SOCI or wetland under consideration
- ecology of SOCI under consideration
- hydrological conditions of wetland under consideration
- location of SOCI or wetland relative to the PDA
- alternatives to current design
- temporary or permanent mitigation
- public or landowner support (e.g., existing use/ownership)

Table 3.4 Summary of Mitigation for Vegetation and Wetlands (adapted from Section 5.5.6 of the EA Report)

Effect	Mitigation
Change in SOCI	• Reduce physical disturbance to SOCI through detailed routing during detailed engineering. • Develop mitigation plans for unavoidable effects on SOCI in consultation with regulators. Mitigation measures may include collecting, propagating or transplanting seeds or live plants. • Use snow fencing and signage in areas of SOCI to protect plant occurrences near disturbance activities. If protecting the occurrence is not practical, temporarily cover the site with snow (given the season), geofabric and padding, flex net, swamp mats, or equivalent.

Table 3.4 Summary of Mitigation for Vegetation and Wetlands (adapted from Section 5.5.6 of the EA Report)

Effect	Mitigation
	• Inform users of access restrictions in the vicinity of fenced sites. • Restrict the general application of herbicide near SOCI. Spot spraying, wicking, mowing, or hand-picking are acceptable measures for integrated vegetation management in these areas. • If agreements can be reached, use the existing pipeline RoW for temporarily storing topsoil and subsoil. • Reduce grading in native vegetation communities. • Install cross ditches and berms on moderately steep and steep slopes in non-agricultural areas to prevent runoff along the RoW and subsequent erosion. • In areas with native vegetation, allow for natural regeneration, or seed as directed by the appropriate Land Administrator on Crown lands. Natural recovery is the preferred method of reclamation on level terrain where erosion is not expected. Where appropriate, natural regeneration may be supplemented with seed harvested from the area, or through the salvage and transplantation of sod and plants. • Use bio-stabilization measures such as willow staking and erosion control blankets to reclaim riparian areas, as appropriate. • Where practical, leave stumps in place, particularly on stream banks, to provide surface stability. • All equipment must arrive at the site clean and free of soil or vegetative debris. Equipment will be inspected by the Environmental Inspector(s), or designate.
Change in Wetland Area or Function	• Reduce physical disturbance to wetlands through detailed routing during detailed engineering. • Progressive rehabilitation practices will focus on restoring topography, hydrology and vegetation in disturbed wetland areas where practicable, to reduce permanent loss. • Reduce the removal of vegetation in wetlands to the extent possible. • Conduct ground level cutting, mowing and mulching of wetland vegetation instead of grubbing, wherever practical. • Salvage and store wetland organic layer separately from upland topsoil. • Direct grading away from wetlands. • Reduce grading within wetlands. • Do not use wetlands as temporary workspaces, unless required for site-specific purposes. • When working on saturated soils during non-frozen ground conditions to reduce compaction and admixing, use equipment and techniques that distribute ground pressure (e.g., swamp mats, geofabric and padding, corduroy). • Use ditch plugs or similar water control structures in the trench at either end of wetland crossings where there is the potential of water migration along the trench. • Replace trench material as soon as practicable, and re-establish preconstruction contours within wetland boundary to re-establish drainage patterns. • Install berms, cross ditches, or silt fences between wetlands and disturbed areas when deemed necessary by the Environmental Inspector(s). • Use natural re-vegetation for wetlands. • Per NSE requirements, compensate for residual losses of wetland area in the PDA through the enhancement, restoration, or creation of wetland habitat, as may be arranged through agreement with a third party wetland compensation provider.

As described in Section 2, NSE and NSDNR will be involved in the development of appropriate site-specific mitigation.

Additional mitigation measures recommended as a result of the 2016 field surveys are discussed below with respect to lichen species and WSS.

3.3.1.1 Wetlands of Special Significance

As discussed in Section 3.2.3, critical wood turtle habitat as defined under SARA was identified at the Salmon River, in association with wood turtle observations. The wetlands in this area are also designated as WSS, due to the presence of wood turtles.

As stated in the Nova Scotia Wetlands Policy, the primary objective of the Policy is, "…to manage human activity in or near wetlands, with the goal of no loss in Wetlands of Special Significance and the goal of preventing net loss in area and function for other wetlands".

In keeping with the Policy, Bear Paw Pipeline Corporation's approach to reducing environmental interactions, including with wetlands and Wetlands of Special Significance, is based on the following principles (additional details are provided below):

- avoidance
- reduction of disturbance
- mitigation and monitoring
- compensation

Avoidance

In keeping with the goals of the Policy, the the Project has been routed to capitalize on the presence of existing linear infrastructure in the area (i.e., the existing M&NP and Exxon Mobil pipeline RoW), thereby reducing landscape fragmentation. The area of disturbance may be further reduced through the development of agreements with adjacent pipeline operators to use the existing pipeline RoW for temporarily storing topsoil and subsoil.

In addition to this, preliminary pipeline routing has taken known environmental constraints into consideration through the use of Light Detection and Ranging (LiDAR), orthophotos, and field work. At the time that the existing RoW was routed, care was taken through micro-routing to avoid wetlands and other sensitive features on the landscape. The preferred construction method at Salmon River is Horizontal Directional Drilling (HDD); however, this construction technique cannot be confirmed until additional geotechnical investigations and more detailed engineering is completed.

Reduction of Disturbed Area

Disturbance in wetlands areas will be reduced through the application of the mitigation measures described below (e.g., limiting area disturbance through micro-routing; limiting ground disturbance such as grubbing and stripping to the area of the trench; limiting on-site activity in

wetlands and protecting wetlands soils by working in frozen conditions or the use of mats and corduroy). In addition, efforts will be made to reach agreements with adjacent owners of the existing RoW to use a portion of the existing pipeline RoW for temporarily storing topsoil and subsoil, in consideration of operational and safety requirements of the existing operation.

Mitigation and Monitoring

The mitigation measures presented in Table 3.4 are generally related to the stabilization of soils and consequent reduction in erosion and sedimentation, and the maintenance of hydraulic connectivity within wetlands post construction.

Wetland areas will be flagged ahead of construction, and WSS will be uniquely marked. Construction in WSS will be carried out in frozen ground conditions whenever possible although this may not be feasible for all locations. Where frozen ground construction cannot be accommodated, various methods will be used to protect wetland soils from operating equipment such as wetland mats. The area of disturbance in all wetlands will be limited, with controlled access to the area to reduce the amount of equipment traffic on these sites. The cleared width of RoW within the wetlands of special significance will be reduced to the extent possible for constructability, safety, and operational requirements. The area of grubbing will be limited to the trench width within wetlands. Various erosion and sediment control techniques will be used to control water flow during construction (e.g., trench water management; directing surface water flow through erosion control devices). Wetland soils will be managed on site through the development of a Soil Erosion Contingency Plan and Wet Soils Contingency Plan. Materials will be removed from the trench and stored on site, and will be replaced in their original order in order to reduce the likelihood of an interruption of water flow across the operational trench. Wetland contours will be reestablished during construction through contouring so that on-site drainage patterns are not changed.

In addition to the mitigation measures presented in Table 3.4, the following more specific mitigation will be applied to all construction activities in wetlands.

- A pump will be installed as required to dewater open trenches in a manner that maintains existing drainage patterns.
- Trench water will be pumped onto a stable sediment filtering device or management areas and will not be permitted to flow directly into a watercourse or wetland.
- Where appropriate, sediment control fences will be installed and maintained along the edges of exposed soil within wetlands.
- Grubbing in wetlands will be delayed until necessary for construction access, and limited to the trench width.
- Grubbing will include the removal of the upper ~30 cm of vegetated topsoil from the wetland area within the trench width to be set aside for salvaging during restoration.
- Soils will be stored in such a way as to avoid the mixing of topsoil with sub-surface soils;
- Subsurface materials excavated during trenching in wetlands will be stored outside of the wetland where possible.
- Materials for backfilling trenches after pipeline installation will be stored along the corridor or in a temporary work area a minimum of 30 m from wetland boundaries where practical.

- Backfilling will be done as soon as possible following pipeline installation.
- Trench material and vegetated topsoil will be replaced in a way that reduces the mixing or loss of materials.
- All temporary drainage devices will be removed after construction to restore hydrology.
- Vegetated topsoil material will be replaced in the same wetland where it was removed.
- Temporary access through wetlands will be removed or altered after construction to allow wetland functionality and protection.

These commitments will be included in the project-specific EPP and presented in contractor training. Work within WSS will be monitored during construction.

3.3.1.2 Lichen

In addition to standard mitigation and mitigation practices specific to vegetation and wetlands described above, there are occurrences of lichen SAR and SOCI that warrant special attention.

The current alignment was carefully chosen based on proximity to the existing RoW, in consideration of known environmental constraints (e.g., wetland, rare plants), as well as constructability considerations. Wherever possible, the lichen occurrences will be avoided through detailed routing during design, and micro-routing on the ground. Lichen-bearing trees will be buffered as much as feasible during construction, in consideration that any micro-routing decisions could impact other lichen or other environmentally sensitive receptors.

In cases where lichen cannot be avoided or appropriately buffered, Bear Paw Pipeline will work with NSDNR on alternative mitigation through the detailed design phase and routing, as described in Section 2. This may include identification of priority-trees based on the health and abundance of the species. Specimen samples may also be collected for cataloguing.

3.3.2 Follow-up Monitoring

3.3.2.1 Wetlands of Special Significance

Construction within WSS, if required, will be monitored.

Wetlands will be monitored post-construction to record any changes to wetland function as a result of construction, and operation and maintenance activities by choosing a subset of the wetlands to represent the different wetland types affected. Monitoring will focus on wetland function, based on the functional assessments carried out in support of the EA and this Additional Information Request Report. Monitoring in WSS will focus on the characteristics that define the wetland as having special significance (e.g., habitat for SAR).

Per NSE requirements, compensation will be sought for permanent residual losses of wetland area in the PDA through the enhancement, restoration, or creation of wetland habitat, as may be arranged through agreement with a third party wetland compensation provider.

3.3.2.2 Lichen

Lichen occurrences will be monitored post-construction to record any changes to health and abundance. The frequency and duration of monitoring will be determined in consultation with NSDNR.

4.0 BIRDS AND BIRD HABITAT

Bird surveys were not undertaken in 2015 due to seasonal constraints. Therefore, these surveys were planned and undertaken in 2016 on both private and Crown land, according to the methods below.

4.1 METHODS

Breeding bird surveys were conducted in the spring of 2016 to document bird communities within the LAA. Particular effort was made to document the presence of SAR and other SOCI. Objectives of the breeding bird survey program were to:

- collect information that can be used to document relative breeding bird densities and species richness by land cover type
- systematically and incidentally record observations of SAR and other SOCI
- gather presence / not detected information on SAR within wetlands

Information on the use of the assessment corridor by breeding birds was obtained through a variety of survey techniques, including:

- point count surveys
- incidental observations of SAR and other SOCI
- dedicated surveys for SAR, including wetland passerines, nightjars, and short-eared Owls (*Asio flammeus*)

The entire length of the Project was walked and observations of SAR and SOCI were recorded when detected. Where access to private lands was not granted, surveyors listened-in from the adjacent existing pipeline RoW to obtain information on SAR and SOCI. Prior to surveys, areas with high potential to support SAR were identified based on knowledge or the study area and reference to historical species record. Effort was also dedicated to identifying raptor nests during these surveys.

Additional information on the point count and SAR survey methodologies is provided below.

4.1.1 Point Counts

As recommended by Environment Canada (CWS 2007; Hanson et al. 2009), surveys were designed to determine which species regularly use the area for breeding purposes and to obtain measures of their abundance in association with particular land cover types. Point counts were used for these objectives - particularly for obtaining information on breeding songbirds and other passerines. Point count sites were distributed to obtain representative sampling in each major land cover type using data on vegetation structure and composition (i.e., forest cover and maturity) from the NSDNR (2015) and wetland delineations conducted for the Project within

the assessment corridor. Site locations were randomly identified within mapped land cover types on Crown and private lands, including those that have high potential to support bird species of conservation concern (i.e., areas supporting mature stands of timber, riparian areas and wetlands). Site locations were constrained to be at least 75 m away from the edges of mapped land cover units, but have also been placed along an existing pipeline Row in order to characterize bird assemblages for linear features. Additional point counts were manually added in locations to target important or under-represented land cover types, particularly wetlands (i.e., in some cases the center of these point counts were placed < 75 m away from mapped land cover boundaries). In addition to surveys along the pipeline route itself, two point counts were conducted within the footprint of the compressor station.

A total of 143 point count sites, representing 11 land cover classes, were surveyed (Figure 4.1, Table 4.1). The land cover classes were derived from NSDNR land cover mapping, as presented in Section 5.6 of the EA Report (Stantec 2016), but some classes were grouped. Upland forest types were amalgamated based on age class in order to reduce the number of land cover classes. For each forest type (hardwood, softwood and mixedwood), two age classes, 'regeneration – young' and 'immature – pole', were combined to form 'regeneration – pole'. Similarly, the age classes 'uneven' and 'mature – overmature' were combined to form 'mature - overmature and uneven'. These groupings allowed for a greater selection of point count locations in the landscape, which is highly fragmented by logging activities, while maintaining important forest structural characteristics. Wetlands were classified into one of two classes: open peatlands (including bogs and fens) and treed/shrub-dominated wetlands (typically swamps). Marshes and shallow water wetlands in the LAA were too small to accommodate point counts, and were generally associated with the existing RoW. In order to capture information on SOCI use of these features, marshes and shallow water wetlands were visited in the field and incidental data was collected.

At each point count site, the numbers of birds heard or observed over a ten minute period were recorded. Specific data recorded for each observation include the species, distance from the observer, angle from survey location, breeding evidence encountered, the type of observations (i.e., visual, auditory, fly-over), whether an observation was of a pair, and other notes on behavior when applicable. Other information collected during the surveys included the location, survey time, temperature, wind speed using the Beaufort scale, wind direction, cloud cover, visibility, and habitat type (including approximate stand age and height, where applicable. Each point count was surveyed once during the breeding season.

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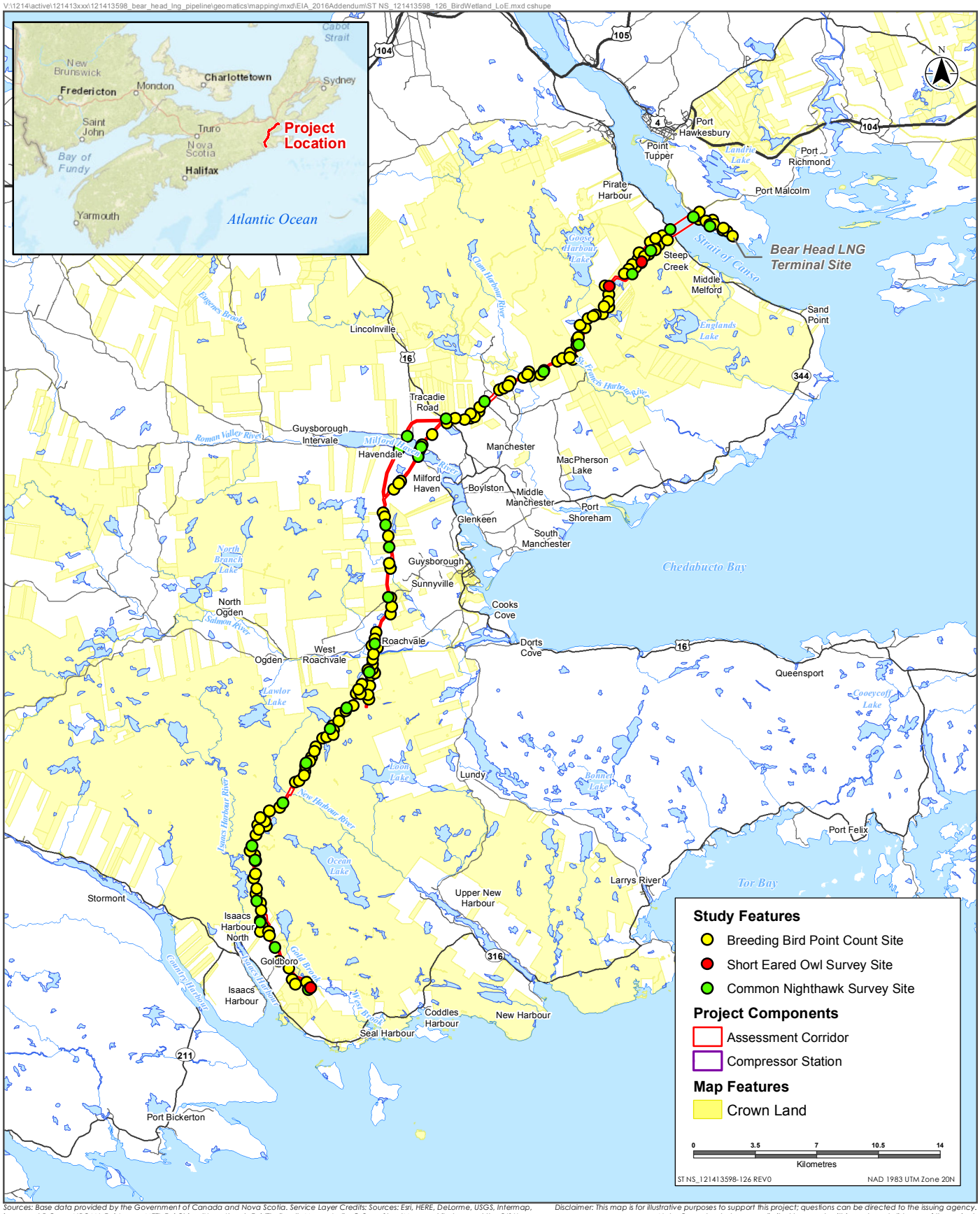

Sources: Base data provided by the Government of Canada and Nova Scotia. Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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

BEAR PAW PIPELINE

Stantec

BEAR PAW PIPELINE PROJECT

Overall Field Effort - 2016 Bird Surveys

Figure 4.1

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Table 4.1 Number of Breeding Bird Point Count Stations completed in each Land Cover Class

Land Cover Class		Point Counts		Percent of Total Land Cover in LAA (%)[1]
		Number Completed	Percent of Total Point Counts (%)	
Forest	Mature – Overmature and Uneven Hardwood	4	2.8	2.9
	Mature – Overmature and Uneven Softwood	9	6.3	8.4
	Mature– Overmature and Uneven Mixedwood	10	7.0	4.8
	Regeneration – Pole Hardwood	11	7.7	7.4
	Regeneration – Pole Softwood	24	16.8	26.4
	Regeneration – Pole Mixedwood	12	8.4	11.7
	Forestry Other	14	9.8	11.5
Wetland	Open Peatland (Bogs and Fens)	6	4.2	6.3
	Treed/Shrub Wetland	22	15.4	7.6
Other	Developed	2	1.4	2.3
	Corridor	29	20.3	1.4
	Total	**143**	**100**	**90.7**

Note:

[1] Additional land classes identified in the LAA include open water, marsh, shallow water wetland, unknown wetland, barren, beach, agriculture and other non-forest. These classes make up the remaining 9.3% of total land cover.

4.1.1.1 Field Methods

Breeding bird surveys were conducted between June 9 and July 7, 2016. Weather conditions greatly influence the level of bird activity/song, as well as the observer's ability to detect birds. As such, breeding bird surveys were delayed or suspended if the temperature was below 0° Celsius, sustained wind was above Beaufort 3 (>20 km/h), visibility (due to fog) was less than 50 m, or precipitation was any heavier than light, intermittent drizzle (CWS 2007). Surveys began at sunrise and continued until approximately 10:00 a.m.

The protocol used was based on a modified fixed-radius point count sampling procedure (Bibby *et al.* 2000). At each site, the procedure below was followed:

- Upon arrival, observers waited for 2 minutes to let effects of disturbance subside. This time was used to record location, weather, and habitat data. Birds observed during this period, but not during the actual count, were recorded as incidentals, as were those encountered during the approach or departure from the point (but not observed during the count itself).
- A silent 10-minute survey was conducted, identifying all birds by sight and sound. Effort was concentrated on the 100 m radius around the point of observation, but observations beyond this distance were also recorded, particularly for SOCI.

At each point count site, the numbers of birds heard or observed over a ten minute period were recorded. Observers recorded the following information for all point counts: date, names of observers, time, weather conditions (temperature, % cloud cover, Beaufort wind scale, visibility, and precipitation), location, general habitat conditions, and species observed. Although the point counts targeted breeding birds, non-breeding bird observations were also recorded. Birds documented as flyovers or otherwise not using the study area as nesting habitat were indicated as such at the time of observation. These birds were later excluded from habitat associations.

For each bird observed, information was collected on sex (male, female, or unknown); age (adult, juvenile, or unknown); whether it was seen, heard, or both; distance from the observer; and highest observed breeding evidence. Additional information on behaviour was recorded for all birds where applicable. Specific effort was made to capture information relating to breeding status (e.g., carrying food, incubating, distraction display).

4.1.1.2 Analyses

Songbird data collected using point counts were used to estimate densities of species (number of territories / 100 ha) within individual land cover types and to calculate their species richness. For these analyses, only data for birds recorded within 100 m of the center of point counts were used, with observations recorded farther away being treated as incidental observations.

Species for which vocalizations are not reliable indicators of the number of breeding pairs (e.g., raptors, waterfowl, corvids, and colonial species) were omitted from the analyses of densities but were included in that for species richness. Most birds detected on breeding birds surveys are singing males, and singing males were assumed to represent an active territory (Bibby *et al.* 2000). However, all other records were scrutinized to determine whether they should be included in density calculations, with valid indicators of territoriality being considered to be:

- male singing or performing territorial display
- female incubating, carrying food, or performing distraction display
- adult of either sex carrying food or faecal sac, building or entering a nest, or behaving agitatedly and giving anxiety calls in response to the observer's presence
- active nest (eggs or young), even if neither adult is present during the period of observation

Where multiple individuals of a species were recorded at a point, total territories were calculated as the number of territorial males, or if sex is unknown, as half of the total number of adults observed, rounding up for odd numbers (Bibby *et al.* 2000). To calculate density for species in a given land cover class, the following equation was used:

$$\text{Density (\# territories/100 ha)} = \frac{\text{sum of all territories counted}}{\text{number of points surveyed}} \times 31.83$$

The factor of 31.83 represents the number of point count circles within 100 ha, assuming a standard count radius of 100 m, which has an area of 3.14 ha.

Density estimates were derived by treating all data within the 100 m circle equally and do not incorporate a measure of species detectability, as may be determined through use of distance measurements or repeat surveys over the breeding season. The density estimates calculated for this report are meant to be used as relative measures of species affinity and abundance within particular land cover class.

4.1.2 Species at Risk Surveys

Specific survey effort was directed at obtaining information on the distribution of SAR within the assessment corridor. Specifically, dedicated surveys were conducted for species which are known to breed in the vicinity of the Project or have high potential to do so, including: Canada warbler (*Cardellina canadensis*), olive-sided flycatcher (*Contopus cooperi*), rusty blackbird (*Euphagus carolinus*), common nighthawk (*Chordeiles minor*), and short-eared owl (*Asio flammeus*). Information on the presence of other SAR, such as eastern wood-pewee (*Contopus virens*), and barn swallow (*Hirundo rustica*) was also collected during the breeding bird surveys through a combination of point counts and incidental observations. For incidental observations, distance estimates were made to the nearest 10 meters and were based on where the individual was first observed (Ralph *et al.* 1993). For SAR, the bearing to the observation was also recorded.

4.1.2.1 Wetland Passerines

Several passerine SAR are known or have high potential to occur in association with wetlands in the assessment corridor. In particular, results of the wetland functional assessment surveys conducted in support of the Project in 2015 indicate that potentially suitable SAR habitat is present within at least 46 of the field-delineated wetlands (i.e., on Crown lands), including for Canada warbler (19 wetlands), olive-sided flycatcher (30 wetlands), and rusty blackbird (7 wetlands). Information on the presence of these species was obtained by visiting each of the wetlands identified as having potential to support SAR. Incidental observations of SAR and other birds were recorded during each of the wetland surveys. In addition to SAR surveys for field-delineated wetlands (i.e., which occur on Crown lands), areas on private lands with high potential to support SAR (wetland passerine and otherwise) were identified through a review of historical records and desktop imagery and are were visited during the bird surveys to the extent possible (i.e., where private land access was not granted, observations were being made by listening-in from the adjacent pipeline RoW).

4.1.2.2 Common Nighthawk and other Nightjars

A total of 29 surveys for common nighthawk and other nightjars were conducted within the LAA (Figure 4.1). These surveys were performed near areas that have high potential to provide breeding opportunities for this species. Common nighthawk nesting habitat is extremely diverse compared to many other migratory birds. Survey locations were determined based on the availability of potentially suitable breeding habitat and site access (survey sites were located on roads). In particular, clear-cuts, agricultural lands, barrens, non-productive forest, disturbed areas of mining and quarry operations, rock outcrops, and other open environments were considered to provide potentially suitable ground-nesting opportunities for this species.

Roadside surveys were conducted between June 13 and June 23, 2016 using a modified version of the newly released Canadian Nightjar Survey Protocol (CWS 2016). Nightjar surveys began approximately 30 minutes before sunset continued until up to two hours after sunset. As weather conditions can greatly influence the level of nightjar activity, and may also affect the ability of observers to detect them, surveys were delayed or suspended if sustained wind was above Beaufort 3 (>20 km/h) or if there was any precipitation.

Common nighthawk survey methodology followed that outlined by CWS (2016) but included the use of playback. The survey consists of a 6-minute silent listening period at each station, followed by two minutes of playbacks, and two minutes of silent listening (i.e., 10 minutes total). Surveyors recorded the period during the survey in which any observations of common nighthawks were made (i.e., first three minutes, second three minutes, 2- minute playback, or last 2 minutes), information on their behaviour, evidence of breeding status, and location (i.e., distance and angle from the observation point) was recorded. Visual or auditory observations of other SOCI were also recorded during these surveys.

4.1.2.3 Short-Eared Owl

A total of three short-eared owl surveys were conducted within the LAA (Figure 4.1). Potential breeding habitat for short-eared owls was identified with reference to historical observations for this species and aerial imagery. Surveys were conducted in late June (i.e., between June 20 and June 23, 2016), which overlaps with the time period when activities for provisioning young are expected to be greatest and followed the general methodology outlined in short-eared owl occupancy, detectability and habitat use across seasons on Amherst Island and Wolfe Island in eastern Ontario (Keyes 2011). Point counts were located along the edge of potentially appropriate habitat (e.g., large open bogs in the Carters Lake area and near the Goldboro gas plant site). Surveys began 60 minutes before sunset and finished 30 minutes following sunset. Visual point counts of 10 minute duration were used to survey a 180° range. Surveys were not conducted during sustained windy conditions greater than three on the Beaufort scale and / or heavy precipitation.

4.2 RESULTS

Field surveys conducted for the Project identified 24 migratory bird SOCI as occurring within the study area (Table 4.2). The locations of observed migratory bird SOCI are shown in the wildlife SOCI mapbook (Appendix D). The most frequently encountered SOCI included ruby-crowned kinglet (*Regulus calendula*), golden-crowned kinglet (*Regulus satrapa*) and yellow-bellied flycatcher (*Empidonax flaviventris*) (Table 4.3). Of the 24 species identified, six are considered SAR: common nighthawk, olive-sided flycatcher, Canada warbler, rusty blackbird, Eastern-wood pewee, and barn swallow. Canada warbler was the most commonly encountered SAR, with a total of 49 records (Table 4.3). No short-eared owls were observed. Further information on the distribution and abundance of migratory bird SOCI encountered during field surveys is provided below in Table 4.3, and in Appendix D.

Table 4.2 Bird SOCI Observed

Common Name	Scientific Name	*SARA*	COSEWIC	NS *ESA*	NSDNR General Status Rank	AC CDC S-Rank
Common Loon	*Gavia immer*		Not at Risk		May Be At Risk	S3B,S4N
American Bittern	*Botaurus lentiginosus*				Sensitive	S3S4B
Northern Goshawk	*Accipiter gentilis*		Not at Risk		Secure	S3S4
Greater Yellowlegs	*Tringa melanoleuca*				Sensitive	S3B,S5M
Spotted Sandpiper	*Actitis macularius*				Sensitive	S3S4B
Wilson's Snipe	*Gallinago delicata*				Sensitive	S3S4B
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened	At Risk	S3B
Black-backed Woodpecker	*Picoides arcticus*				Sensitive	S3S4
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened	At Risk	S3B
Eastern Wood-Pewee	*Contopus virens*		Special Concern	Vulnerable	Sensitive	S3S4B
Yellow-bellied Flycatcher	*Empidonax flaviventris*				Sensitive	S3S4B
Tree Swallow	*Tachycineta bicolor*				Sensitive	S4B
Barn Swallow	*Hirundo rustica*		Threatened	Endangered	At Risk	S3B
Gray Jay	*Perisoreus canadensis*				Sensitive	S3S4
Boreal Chickadee	*Poecile hudsonicus*				Sensitive	S3
Golden-crowned Kinglet	*Regulus satrapa*				Sensitive	S4
Ruby-crowned Kinglet	*Regulus calendula*				Sensitive	S4B
Gray Catbird	*Dumetella carolinensis*				May Be At Risk	S3B
Tennessee Warbler	*Oreothlypis peregrina*				Sensitive	S3S4B

Table 4.2 Bird SOCI Observed

Common Name	Scientific Name	*SARA*	COSEWIC	NS *ESA*	NSDNR General Status Rank	AC CDC S-Rank
Blackpoll Warbler	*Setophaga striata*				Sensitive	S3S4B
Wilson's Warbler	*Cardellina pusilla*				Sensitive	S3S4B
Canada Warbler	*Cardellina canadensis*	Threatened	Threatened	Endangered	At Risk	S3B
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Endangered	May Be At Risk	S2S3B
Pine Grosbeak	*Pinicola enucleator*				May Be At Risk	S3?B,S5N

Atlantic Canada Conservation Data Centre

S1 = Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences). May be especially vulnerable to extirpation.

S2 = Imperiled in the province because of rarity due to very restricted range, very few populations (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.

S3 = Vulnerable - Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer).

S4 = Uncommon but not rare; some cause for long-term concern due to declines or other factors (80+ occurrences).

S5 = Common, widespread, and abundant in the province.

'-' = Not included in AC CDC species list.

Table 4.3 Abundance, Habitat Association and General Distribution of Bird SOCI

Species	Number of Observations[1]		Habitat Association and General Distribution
	Systematic	Incidentals	
Common Loon	1	4	Records are distributed along the length of the route and are generally associated with waterbodies. One record is associated with the Milford Haven River.
American Bittern	1	1	Both individuals were observed in wetlands associated with Godfry Brook, in the central portion of the route.
Northern Goshawk	1	0	This individual was recorded in regenerating forest located just over 1 km southwest of the Strait of Canso.
Greater Yellowlegs	2	3	Three of these records are associated with wetlands, while the other two are associated with regenerating softwood. Three records are located near the Gold Brook, east of Goldboro. One record is in Cape Breton at the northeast end of the route, east of the Strait of Canso.
Spotted Sandpiper	0	3	All three spotted sandpiper sightings occurred along the Salmon River.
Wilson's Snipe	4	4	These observations are distributed throughout the length of the route. The majority occurred in regeneration – pole softwood (3 records) or along an existing pipeline RoW (3 records).
Common Nighthawk	3	3	These records are distributed through the central and northeastern section of the route. Two of the records occur in swamps, one is along an existing pipeline RoW, and four are in regeneration/immature forest.
Black-backed Woodpecker	0	2	These observations occurred in the central portion of the route, relatively close to the Eight Mile Lake Road. Both records are located in coniferous treed swamps.
Olive-sided Flycatcher	2	9	These records are distributed along the route, with a higher concentration at the northern end. Olive-sided flycatchers were observed in several land classes, including coniferous treed swamps and regeneration/immature softwood.
Eastern Wood-Pewee	2	1	Two occurrences occurred approximately 2 km south of the Salmon River, while the third record was further north, approximately 3.5 km south of the Milford Haven River. These records occurred in immature/pole mixedwood, immature/pole hardwood and a coniferous treed swamp.

Table 4.3 Abundance, Habitat Association and General Distribution of Bird SOCI

Species	Number of Observations[1]		Habitat Association and General Distribution
	Systematic	Incidentals	
Yellow-bellied Flycatcher	51	37	Yellow-bellied flycatchers were commonly observed throughout the route, although no records occurred in the vicinity of the Milford Haven River. The majority of these records occurred in regeneration-pole softwood, softwood treed swamps or along the existing ROW.
Tree Swallow	11	9	Tree swallows were observed throughout LAA, and were most commonly found in regeneration – pole softwood and along the existing ROW.
Barn Swallow	0	2	Both barn swallow records occurred just north of the Salmon River, in regeneration-pole softwood and hardwood.
Gray Jay	5	11	Gray jays were observed throughout the LAA. They most commonly occurred along the existing pipeline RoW.
Boreal Chickadee	6	10	Boreal chickadees occurred throughout the LAA in a variety of land classes, including mature - overmature and uneven softwood and along the existing pipeline RoW.
Golden-crowned Kinglet	29	29	Golden-crowned kinglets are commonly found throughout the LAA in a variety of land classes. They are most common in regeneration – pole softwood.
Ruby-crowned Kinglet	71	43	This species is ubiquitous throughout the LAA and are found in a wide variety of land classes. They occur most frequently in regeneration – pole softwood.
Gray Catbird	1	2	Two of these observations were just north of the Milford Haven River, while the third occurred just south of South River Lake Road. They occurred in regeneration – pole softwood and along the existing RoW.
Tennessee Warbler	0	1	This bird was observed just north of Highway 16 in regeneration – pole softwood.
Blackpoll Warbler	1	4	All but one of these records are concentrated around the Gold Brook. Two records were in a fen, while the remaining three were in regeneration-pole forest.
Wilson's Warbler	0	4	These records all occurred in the southwestern half of the LAA. Three observations occurred in regeneration – pole softwood, while the fourth occurred on the existing pipeline RoW.

Table 4.3 Abundance, Habitat Association and General Distribution of Bird SOCI

Species	Number of Observations[1]		Habitat Association and General Distribution
	Systematic	Incidentals	
Canada Warbler	12	37	Canada warblers were observed throughout the LAA wherever suitable habitat occurred. The majority of these records occurred in coniferous treed swamps or regeneration – pole softwood.
Rusty Blackbird	1	5	These records were distributed between the Eight Mile Road and the Strait of Canso. Three observations occurred in wetlands.
Pine Grosbeak	1	1	One record occurred just north of Eight Mile Road in a swamp. The other record occurred off Pirate Harbour Road in mature – overmature softwood.

Note:

[1] Multiple records of some SOCI were obtained in close proximity to one another during surveys and because it was not possible to know if individual birds were counted more than once, some of these are likely duplicates and the numbers presented in this table likely over-represent the occurrences of some SOCIs.

One raptor nest and two suspected nest sites were observed during 2016 field surveys (Maps 3 and 8, Appendix D). A pair of highly agitated sharp-shinned hawks (*Accipiter striatus*) were encountered in a regeneration - pole softwood stand south of Guysborough, and were likely to be defending their nest (Map 3, Appendix D). A red-tailed hawk (*Buteo jamaicensis*) nest was also suspected approximately 600 meters east of Carters Lake in mature – overmature mixedwood forest (Map 8, Appendix D). Although a search for this nest was unsuccessful, the red-tailed hawks were repeatedly observed in the same area throughout the season. An osprey nest was observed on a powerline platform at the very north end of the route in an open developed area in 2016 (Map 8, Appendix D). Previous records of known or suspected raptor nests include an osprey at the south end of the route near the SOEP Gas Plant and a possible bald eagle nest along the Milford Haven River (Stantec 2016). A search was conducted for the bald eagle nest in 2016 but was unsuccessful.

Weather observations from the breeding bird point counts indicated that air temperature ranged from 7 to 18°C during surveys. There was no precipitation during the majority of surveys, although some were completed in the fog and / or light drizzle. Wind ranged between Beaufort 1 and Beaufort 4, with the vast majority of surveys occurring in a Beaufort 3 or lower.

Habitat descriptions taken in the field indicated that the mapped land cover classes were not always accurate. For example, many sites mapped as regeneration to pole hardwood were identified as mature hardwood in the field. Other land classes had higher levels of accuracy when field verified, including the wetland, corridor and developed classes. For the purposes of these analyses and to provide consistency in classification throughout the LAA, the mapped land classes were used to summarize the breeding bird data.

Average species richness within the mapped land cover classes ranged from 6.2 to 9.6 species/point count (Table 4.4). The highest average species richness was observed for the corridor, forestry other, and mature – overmature and uneven softwood land classes, with values of 9.6, 8.2 and 8.1 species/point count, respectively. Land classes with the lowest species richness included mature – overmature and uneven mixedwood, mature – overmature and uneven hardwood and open peatland (bogs and fens), with values of 6.2, 6.3 and 6.6 species/point count, respectively. Maximum species richness ranged from 10 to 15, which the highest value being associated with the regeneration – pole softwood land class.

Table 4.4 Species Richness within Land Cover Classes

Land Cover Class		Species Richness	
		Average	Maximum
Forest	Mature – Overmature and Uneven Hardwood	6.3	13
	Mature – Overmature and Uneven Mixedwood	6.2	10
	Mature - Overmature and Uneven Softwood	8.1	12
	Regeneration - Pole Hardwood	6.4	10
	Regeneration - Pole Mixedwood	7.1	10

Table 4.4 Species Richness within Land Cover Classes

Land Cover Class		Species Richness	
		Average	Maximum
Forest	Regeneration - Pole Softwood	8.0	15
	Forestry Other	8.2	13
Wetland	Open Peatland (Bogs and Fens)	6.2	12
	Treed/shrub Wetland	7.9	13
Other	Corridor	9.6	14
	Developed	7.5	14

Density results were calculated for each species per land cover class. These results are presented in Appendix D. Densities ranged from 0 to 49.2 territories/100 ha (for ovenbird (*Seiurus aurocapilla*) in regeneration to pole hardwood). The density results indicate that some species are found in a variety of habitat types and may be considered generalists, such as American redstart (*Setophaga ruticilla*), black-throated green warbler (*Setophaga virens*), magnolia warbler (*Setophaga magnolia*) and white-throated sparrow (*Zonotrichia albicollis*). Conversely, other species were observed to have much more limited habitat preferences, such as pine grosbeak (*Pinicola enucleator*) (found only in mature – overmature and uneven softwood) and swamp sparrow (*Melospiza georgiana*) (found primarily in wetlands).

4.3 MITIGATION AND FOLLOW-UP

Mitigation to reduce the environmental effects of the Project on wildlife and wildlife habitat (including birds) was identified in Section 5.6.6 of the EA Report – the mitigation that is specific to birds and bird habitat is reproduced below in Table 4.5. Standard mitigation measures listed in Section 2.5.3 of the EA report is included as Appendix B to this document.

Table 4.5 Summary of Mitigation for Wildlife and Wildlife Habitat (birds) (adapted from Section 5.6.6 of the EA Report)

Effect	Mitigation Measures
Change in Habitat Availability Change in Habitat Connectivity Change in Mortality Risk	• Conduct vegetation disturbance activities outside of the breeding season for migratory birds (April 1 to August 31; Environment Canada 2014) during both construction (e.g., vegetation clearing) and operations (e.g., vegetation management). Where this is not possible, develop a Bird Nest Mitigation Plan (prior to construction) in consultation with Environment Canada and provincial regulators. Include this plan in the final EPP. General wildlife habitat management mitigation is also protective of bird habitat: • Reduce the area of direct habitat disturbance by: o Reducing the operational RoW width to 10 m with natural regeneration, where feasible, in areas where important wildlife habitat has been identified ((i.e., summer foraging, thermoregulation habitat; moose shelter)

Table 4.5 Summary of Mitigation for Wildlife and Wildlife Habitat (birds) (adapted from Section 5.6.6 of the EA Report)

Effect	Mitigation Measures
	• Allow full vegetation regeneration (natural and active regeneration methods will be identified in the EPP) within the RoW, leaving a 10 m controlled vegetation regrowth width across the pipeline ditch, where important wildlife habitat has been identified: o Bank restoration and shrub staking at watercourse crossings to restore vegetation, reduce human use of access roads and trails, and reduce line-of-sight. o Provide line-of-sight breaks via vegetation regeneration and management and through use of berms to reduce human use of access roads and trails. o Berms may be considered at access control points along the RoW where coarse woody debris and excavator mounding treatments are not practical. o Permit regeneration across sections of the RoW and plan three year rotational clearing pending consideration of pipeline integrity, safe operation, and regulatory approval. • Reduce indirect loss of habitat / sensory disturbance through traffic management: o adhere to posted speed limits; o use of multi-passenger vehicles for the transport of crews to and from job sites; o install signage where specific wildlife concerns have been identified. • Facilitate habitat restoration by reducing surface disturbance and soil stripping in sensitive areas during construction: o work in frozen-ground conditions where feasible; and o use matting to protect soil and vegetation from compaction by heavy equipment. • Monitor the open cut for trapped wildlife before the daily start of construction, or prior to resuming work after a shutdown, and remove wildlife before startup. • Reduce potential for interactions with wildlife through traffic management • Reduce potential for interactions with wildlife by limiting site access

No new mitigation or follow-up measures have been recommended as a result of 2016 field surveys.

5.0 HERPTILES (WOOD TURTLES)

5.1 METHODS

Based on Stantec's familiarity with the watercourses and associated riparian habitats that are crossed by the Project, the Salmon River was identified to have relatively high potential to support wood turtle, a species that is listed as *Threatened* under the NS *ESA* and as *Vulnerable* under the federal *SARA*. No other sites were identified where wood turtle surveys were considered warranted and the AC CDC data records obtained (AC CDC 2015b) do not indicate any wood turtle records within 5 km of the Project (the closest ACCDC record is approximately 20 km from the Project). In consideration of the above, a wood turtle survey program was conducted with the following objectives:

- Determine whether or not wood turtles are present along the Salmon River
- Identify and map the distribution of potentially important wood turtle habitat features (e.g., nesting sites and hibernaculum) within the assessment corridor

Surveys consisted of searches for wood turtles along the Salmon River and mapping potentially important habitat. Additional information on the methods used during the searches and habitat assessment is provided in the following sections.

5.1.1 Wood Turtle Basking Survey Methods

Wood turtle surveys were conducted along the portion of the Salmon River extending 500 m upstream and 500 m downstream of the proposed crossing site for the pipeline. Five visits were made to the Salmon River for the purpose of searching for wood turtles (Table 5.1). Two of these surveys were restricted to the south side of the river, two to the north, and one of the surveys included both the north and south sides. As a result of restricted access on privately-owned lands, a portion of the study area on the north side of the river was not surveyed during the June 13 site visit (access was later obtained).

Table 5.1 Wood Turtle Survey Effort

Date	Time			Air Temp (˚C)		Water Temp (˚C)	Cloud Cover (%)	Precipitation	Extent of Survey
	Start	End	Duration	Start	End				
June 13, 2016	16:22	18:33	~2 hours	14	14	20	10	none - light drizzle	1000 m along north side of river, excluding no-go property.
June 20, 2016	15:00	17:00	~2 hours	26[1]		na	na	none	1000 m along south side of river.

Table 5.1 Wood Turtle Survey Effort

Date	Time			Air Temp (°C)		Water Temp (°C)	Cloud Cover (%)	Precipitation	Extent of Survey
	Start	End	Duration	Start	End				
June 21, 2016	15:30	17:30	~2 hours	23	na	19	50	none	1000 m along north side of river.
June 23, 2016	14:30	16:40	~2 hours	20[1]		na	na	none	1000 m along south side of river.
June 28, 2016	13:00	18:30	~5.5 hours	26	24	24	10	none	1000 m along north and south sides of river.

Note:
[1] Temperature obtained from historical data for Guysborough

Survey methods followed regional guidance documents and research. Protocols primarily followed those outlined in the Coordinated Monitoring Strategy for Wood Turtles (*Glyptemys insculpta*) in the Northeastern United States (Massachusetts Cooperative Fish and Wildlife Research Unit and the Northeast Wood Turtle Working Group 2013), with regional recommendations for timing and weather based on Flanagan et al. (2013) and additional suggestions by NSDNR (M. Pulsifer, pers. comm. 2016):

- Surveys were completed during daylight hours when air temperatures were 10 – 25 °C.
- Surveys were conducted by teams of at least two people. The most experienced person for each survey was identified as the "lead observer" (observer #1); this person had right of way to walk the stream in front of other observers.
- Observers maintained independent tracks (turtles observed by one observer should not be visible to the other observer) with observer #1 surveying where they wants to (i.e., based on experience to maximize the detection rate).
- Turtles were searched for on land proximal to the watercourse and where practical, in areas of shallow water. Observers primarily surveyed within 20 m of the stream bank, but explored farther afield in association with riparian features, such as backwaters.
- The number and location of all wood turtle observations were recorded. Photographs were taken of each encountered turtle and preferentially included a lateral head shot and limbs/tail, as well as obvious injuries or deformities.

5.1.2 Habitat Characterization Methods

Wood turtle habitat surveys were conducted to identify the presence of potentially important nesting and hibernation sites, and to characterize the quality of foraging habitat. In general, the habitat characterization included a consideration of the:

- types of vegetation present adjacent to the watercourse (foraging habitat)
- presence of plant and animal species indicative of rich riparian habitats (foraging habitat)

- Type of substrate present on the bottom of the watercourse (hibernation habitat)
- water depth in the portion of the watercourse located within the survey area (hibernation habitat)
- presence of backwater pools and large rocks and sunken logs (hibernation habitat)
- presence of depositional beaches including the substrate type and vegetation cover associated with these beaches (nesting habitat)
- presence of disturbed areas such as gravel pits and road beds with substrates suitable for nesting (nesting habitat)

Particular attention was given to the identification of potential nesting and hibernaculum sites within and adjacent to the assessment corridor. Potentially suitable nesting habitat was identified as un-vegetated areas comprised of a sand-gravel matrix that were above the regular high water mark. Potentially suitable hibernation habitat was identified as deep pools (>40 cm based on White 2013) not associated with fast flowing waters or substrates comprised of coarse (i.e., cobble or boulder) materials; and which ideally included cover objects such as woody debris. A variety of vegetation types were considered potentially appropriate for wood turtle foraging purposes, including riparian meadows, shrub thickets, and deciduous and mixedwood forests.

5.2 RESULTS

5.2.1 Wood Turtle Observations

Wood turtles were observed on two occasions during field surveys; both observations being of single turtles on the north side of the river (Figure 5.1), approximately 175 m apart. On June 13, 2016, a female wood turtle was encountered within a riparian meadow dominated by rough-stemmed goldenrod (*Solidago rugosa*), fringed black bindweed (*Polygonum cilinode*), nodding sedge (*Carex gynandra*), red raspberry (*Rubus idaeus*), avens (*Geum sp.*), Virginia clematis (*Clematis virginiana*), and Virginia rose (*Rosa virginiana*). The carapace of this individual was estimated to be 14 cm in width, 21 cm in length, and had over 37 slightly worn annuli. The meadow in which this turtle was encountered is directly adjacent to an open area of sand-gravel beach that is considered to provide potential nesting habitat (Figure 5.1). Another female wood turtle was observed in association with a vegetated gravel bar on June 21, 2016 and was estimated to have a carapace measuring approximately 13.3 cm in width, 19.5 cm in length, and had over 17 slightly worn annuli. Neither of the wood turtles were notched or showed evidence of physical injuries. The turtles were observed by the same individual, who also counted the annuli. Although there is subjectivity involved in counting annuli, it is likely that these observations represent two distinct individuals. Photos of the observed wood turtles are provided in Appendix E.

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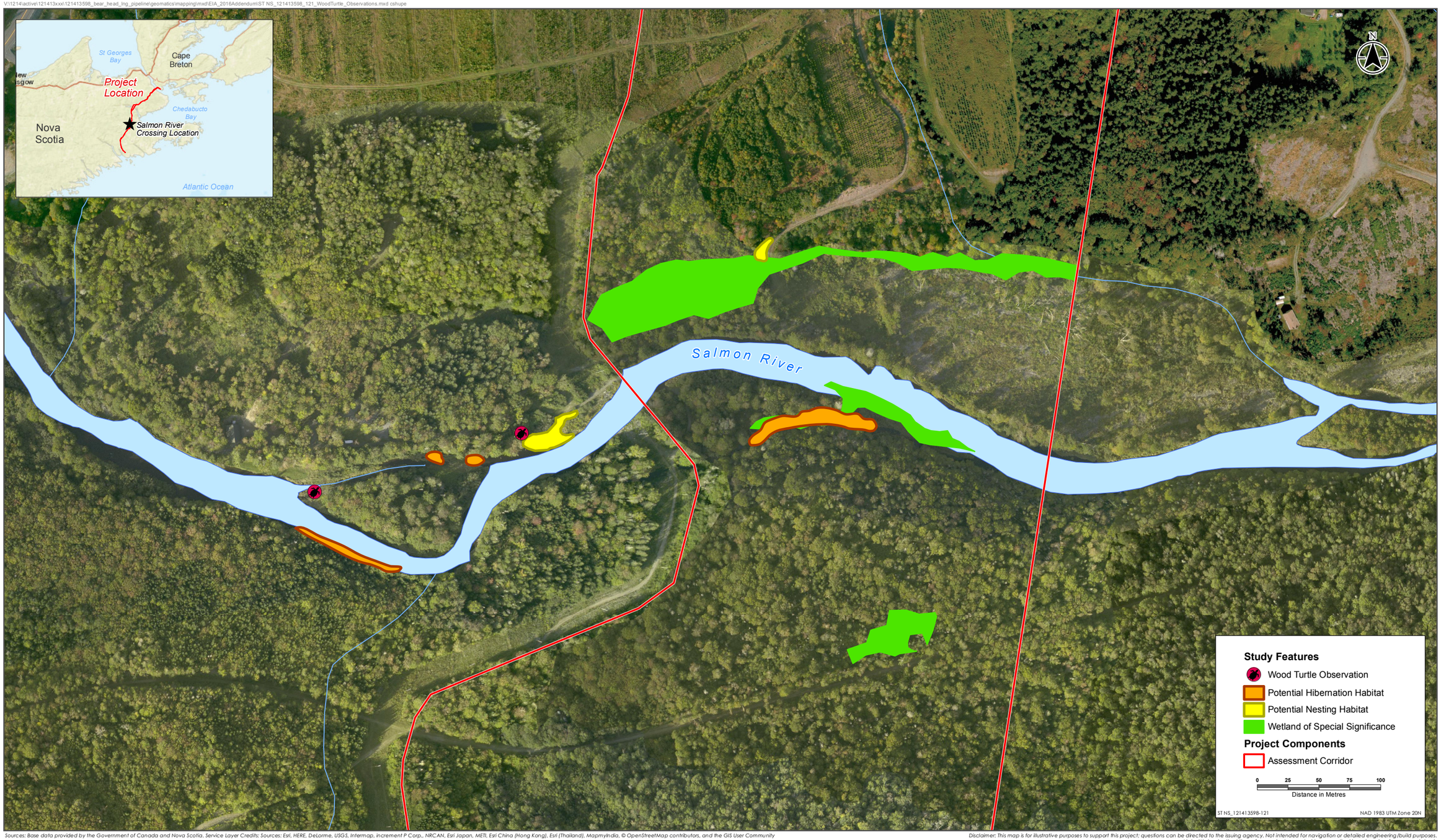

Sources: Base data provided by the Government of Canada and Nova Scotia. Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Disclaimer: This map is for illustrative purposes to support this project; questions can be directed to the issuing agency. Not intended for navigation or detailed engineering/build purposes. Note: Water depth at time of survey (not corrected to any vertical benchmark, reference or datum).

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Wood Turtle Observations, Habitat, and Wetlands of Special Significance

Figure 5.1

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5.2.2 Wood Turtle Habitat

Nesting Habitat

The majority of beach present along the shoreline of the Salmon River is dominated by a gravel-cobble matrix and is therefore largely unsuitable for wood turtle nesting purposes. However, one exposed area comprised of a sand-gravel matrix was encountered within the study area along the river. This area is located upstream of the assessment corridor on the north side of the river and occurs in proximity to an old logging road and the existing pipeline crossing (Figure 5.1). This area was observed to have several holes in it that may have been dug by wood turtles for nesting purposes (i.e., as test holes for egg-laying purposes). Other sand areas encountered along the shore of the Salmon River were well-vegetated and therefore unsuitable for nesting purposes. Several holes were also encountered in an area supporting a matrix of sand-gravel material along the western shoulder of an old road, approximately 60 m to the north of the river and within the assessment corridor (Figure 5.1). An abundance of exposed sand was observed along the bank of the same road further to the northeast but was considered unlikely to provide suitable wood turtle nesting habitat as a result of the steep angle of the bank.

Hibernation Habitat

The majority of the portion of the Salmon River within the study area does not provide suitable wood turtle hibernation habitat as a result of its shallow and fast-flowing waters, and cobble substrate. However, a backwater is present on the south side of the river within the assessment corridor and provides relatively good potential hibernation habitat (Figure 5.1) Waters within this backwater exceeded 40 cm in areas and were underlain by a substrate of fine sediment. A small watercourse enters the backwater at its western end and contributes to the value of this area as potential hibernation habitat. Another backwater, located on the north side of the river upstream of the assessment corridor was generally considered to have limited value as hibernation habitat. It was observed to be too shallow to support wood turtle hibernation habitat, with the exception of small pools at its eastern end. During high water events water flow through the back water may be sufficient to dislodge wood turtles attempting to hibernate at this location. Additional potential wood turtle hibernation habitat was limited to undercut banks found along a portion of the south bank of the river, located upstream of the assessment corridor opposite an island and the aforementioned backwater (Figure 5.1). However, this area may be considered to only provide marginal potential habitat because it is subject to strong currents and may at times be exposed above water levels in winter.

Foraging Habitat

The quality of wood turtle foraging habitat along the portion of the Salmon River within the study area is varied but the area does provide relatively good quality foraging opportunities. Vegetation along the north side of the river in particular is fairly nutrient-rich and comprised of a mixture of open and closed canopy meadow, shrub thicket, and mixedwood forest. In contrast,

much of the south side of the river provides limited foraging opportunities because it is dominated by a steep coniferous-dominated forest slope, with little floodplain habitat.

As outlined in the Recovery Strategy for the Wood Turtle (*Glyptemys insculpta*) in Canada (Environment Canada 2016), critical habitat for this species is identified using two criteria: habitat occupancy and habitat suitability. Habitat suitability includes consideration of all aspects of the wood turtle's life cycle and critical habitat for this species is subdivided according to life cycle considerations (e.g., nesting, overwintering). Although not confirmed, it is likely that the wood turtles observed are different individuals; which would satisfy the following occupancy criteria used in partial identification of critical wood turtle habitat: "when a minimum of two distinct Wood Turtle individuals have been observed in any year within the last 40 years" (Environment Canada 2016). Although confirmed nesting or hibernation sites were not identified during surveys, critical wood turtle habitat would occur in portions of the main stream up to the high water mark and extend 2000 m upstream and downstream from wood turtle records (Environment Canada 2016). Critical habitat also encompasses those areas of the adjacent lands up to 200 m from the watercourse that may be classified as waterbodies, wetlands, deciduous and / or mixedwood forest, beaches, riverbanks or other areas with bare ground (Environment Canada 2016).

5.3 MITIGATION AND FOLLOW-UP

5.3.1 Mitigation

Mitigation to reduce the environmental effects of the Project on wildlife and wildlife habitat, and vegetation and wetlands is relevant to the protection of wood turtles and wood turtle habitat. Relevant mitigation from Sections 5.5.6 and 5.6.6 of the EA Report is presented in Table 5.1. Standard mitigation measures listed in Section 2.5.3 of the EA report are included as Appendix B to this document. New mitigation for wood turtles is discussed below Table 5.2.

Table 5.1 Summary of Mitigation for Wildlife and Wildlife Habitat (wood turtles) (adapted from Section 5.6.6 of the EA Report)

Effect	Mitigation

Change in Habitat Availability
 	
Change in Habitat Connectivity
 	
Change in Mortality Risk
	General wildlife habitat management mitigation is also protective of wood turtle habitat:
	
	• Reduce the area of direct habitat disturbance by:
	  ○ Reducing the operational RoW width to 10 m with natural regeneration, where feasible, in areas where important wildlife habitat has been identified (i.e., summer foraging, thermoregulation habitat; moose shelter)
	• Allow full vegetation regeneration (natural and active regeneration methods will be identified in the EPP) within the RoW, leaving a 10 m controlled vegetation regrowth width across the pipeline ditch, where important wildlife habitat has been identified:
	  ○ Bank restoration and shrub staking at watercourse crossings to restore vegetation, reduce human use of access roads and trails, and reduce line-of-sight.

Table 5.1 Summary of Mitigation for Wildlife and Wildlife Habitat (wood turtles) (adapted from Section 5.6.6 of the EA Report)

Effect	Mitigation
	○ Provide line-of-sight breaks via vegetation regeneration and management and through use of berms to reduce human use of access roads and trails. ○ Berms may be considered at access control points along the RoW where coarse woody debris and excavator mounding treatments are not practical. ○ Permit regeneration across sections of the RoW and plan three year rotational clearing pending consideration of pipeline integrity, safe operation, and regulatory approval. • Reduce indirect loss of habitat / sensory disturbance through traffic management: ○ adhere to posted speed limits; ○ use of multi-passenger vehicles for the transport of crews to and from job sites; ○ install signage where specific wildlife concerns have been identified. • Facilitate habitat restoration by reducing surface disturbance and soil stripping in sensitive areas during construction: ○ work in frozen-ground conditions where feasible; and ○ use matting to protect soil and vegetation from compaction by heavy equipment. • Monitor the open cut for trapped wildlife before the daily start of construction, or prior to resuming work after a shutdown, and remove wildlife before startup. • Reduce potential for interactions with wildlife through traffic management • Reduce potential for interactions with wildlife by limiting site access

Additional mitigation specific to wood turtles recommended as a result of 2016 field surveys is presented below.

The results of wood turtle surveys have identified critical habitat, as defined in the Recovery Strategy for the Wood Turtle in Canada (Environment Canada 2016), in the portion of the assessment corridor at the Salmon River crossing. The preferred mitigation to reduce potential effects to critical habitat for wood turtles at Salmon River is to avoid surface ground disturbance in this area through the use of HDD. HDD is the preferred watercourse crossing method for the Salmon River, however a final determination of feasibility will be made pending additional surveys (e.g., topographic surveys, geotechnical testing). Therefore, as a contingency in the event that HDD is not feasible, the following mitigation would be implemented to reduce potential effects of the Project on wood turtles and wood turtle habitat at the Salmon River crossing.

Mitigation for Wetlands of Special Significance: Wetlands associated with wood turtle habitat are considered significant under the provincial wetlands policy. Section 3.3 of this report details the proposed mitigation for construction within WSS.

Avoidance through Micro-routing: Should HDD be determined not to be feasible, pipeline routing across the Salmon River will be micro-routed to avoid known nesting, hibernation, and foraging habitats where feasible in consideration of other environmental and constructability constraints.

Timing Restrictions: If an open cut (constructed in dry conditions) is required at the Salmon River, timing restrictions would be established to reduce potential effects during critical life stages for wood turtles. Restrictions pertaining to some of these life cycles are provided below, and would be further refined in consultation with NSDNR and DFO, where the timing restrictions for working near water for the purposes of the reduction of harm to fish may contradict those for the wood turtle:

- Overwintering – Work within potential hibernation habitat will not occur between October and the end of April.
- Breeding, basking and foraging- where practical, construction or operation of equipment will not occur near potential wood turtle nesting sites (i.e., sand and gravel beaches, disturbed areas with coarse grained soil) from April through to October, which is the period when these activities are known to occur. If construction is required during this window due to other timing restriction (e.g., wood turtle hibernation, *Fisheries Act* restrictions), NSDNR will be consulted to develop a plan to reduce potential effects on this species.

Site-Rehabilitation: Areas of ground disturbance near the Salmon River will be rehabilitated following construction. A pre-construction survey will be completed to document existing conditions (i.e., topography, hydrology, vegetation, and soil conditions) and a site-rehabilitation plan will be developed prior to ground disturbance. The site rehabilitation plan will include requirements for follow-up monitoring (discussed further below).

Other Considerations: In addition to the timing restrictions, the following mitigation will be included in the wood turtle management plan as part of the EPP.

- Erosion and sediment control plans will consider important wood turtle habitat to reduce the potential for siltation in areas where turtles are known to overwinter.
- Temporary watercourse crossing locations will be chosen in advance to avoid disturbance of wood turtles and will not be located within 100 m upstream and downstream of potential nesting sites from April to October.
- Wet areas (e.g., wetlands, seepages, vernal pools, ephemeral streams) should be flagged and avoided by machinery and onsite travel.
- Where practical, brush piles should be left to provide cover in cutover areas.
- In addition to training for all workers (described below), an environmental inspector with will be located on site for all construction activities within 200 m of the high water mark of Salmon River.

Wood Turtle Management Plan and Training: A wood turtle management plan will be implemented for all construction activities near the Salmon River. This plan will include site-specific mitigation and timing restrictions as well as on-site monitoring requirements, and a wood turtle chance discovery plan. This plan will include required training, as part of EPP training, for all construction personnel on how to identify wood turtles, and response procedures to be followed if a wood turtle is discovered within the construction area.

5.3.2 Follow Up and Monitoring

Habitat for wood turtles will be monitored post-construction to record any changes to habitat, especially in areas that are important for specific life cycles (e.g. hibernation, nesting). Follow-up monitoring will take place periodically, as determined in consultation with NSDNR, following site-rehabilitation to verify that vegetation has re-established as planned and that habitat is transitioning towards pre-construction conditions.

6.0 NOVA SCOTIA MAINLAND MOOSE

Bear Paw Pipeline recognizes the mainland moose as an important and protected species in Nova Scotia. In the preparation of the Class I environmental assessment and this report, Bear Paw Pipeline has strived to address the conservation and protection of this species in a responsible manner that is consistent with the Recovery Plan for Moose in Mainland Nova Scotia (NSDNR 2007). It is also recognized that Bear Paw Pipeline will have ongoing obligations with respect to this species as the project progresses to detailed engineering, routing, and the preparation of the EPP, which will include a Moose Habitat Management Plan (MHMP).

The goals of the following sections are to:

- reference the regulatory context for moose management and protection
- articulate construction and operational requirements
- summarize work completed to date in support of the EA Report
- expand on the mitigation proposal set forth in the EA Report
- acknowledge the results of the evaluation and confirm the commitment to further work as an integral part of adaptive management planning

6.1 REGULATORY CONTEXT

The Nova Scotia *Endangered Species Act* is the key legislation by which species in Nova Scotia are identified for protection and management. This work is coordinated by the Wildlife Division of NSDNR.

Mainland moose was designated in 2003 as Endangered. The mainland population is small and is declining. This is occurring as a result of several complex and poorly understood, but interrelated, factors including the following (NSDNR 2007):

- disease
- habitat loss and fragmentation
- poaching
- vehicular collisions
- climate change
- deficiencies in trace elements and/or elevated levels of these elements and how they interact with one another

The stated goal of the provincial Action Plan for the Recovery of the Mainland Moose is to maintain populations within their current range. This range includes the inland areas of Guysborough County, where moose numbers are known to be low. The recovery objectives include maintaining and enhancing current populations and habitat; mitigating threats to recovery; and identifying research priorities.

The Act's provision prohibits destroying or disturbing core habitat, which is defined as habitat that is essential for the long-term survival and recovery of the endangered or threatened species. Core habitat as defined under the Act has not been identified to date within the boundaries of the assessment area for any wildlife species at risk, including moose.

6.2 CONSTRUCTION AND OPERATION REQUIREMENTS

Construction activities will require a cleared RoW width of approximately 35 m. This space is required to provide workspace for personnel and equipment; laydown areas for materials; and safe access. Bear Paw Pipeline is in discussions with the two existing pipeline operators to potentially reduce the distance between the existing and new RoW's. This may allow for the existing cleared RoW to be used to accommodate some of the activities described above, which could reduce the clearing-width requirement for Bear Paw during construction, in some areas.

Regulations governing pipelines do not prescribe vegetation management requirements such as maintained RoW widths or how such areas should be reclaimed or maintained. The Pipeline Regulations state that the RoW and temporary work areas, '…shall be restored to a condition similar to the surrounding environment…". The Canadian Standards Association (CSA Z662) states that where the easement permits, vegetation and RoWs should be controlled, '…to maintain clear visibility from the air and provide ready access for maintenance crews".

It is imperative that the pipeline operator has access over the pipeline ditch to conduct regular maintenance and integrity inspections. This is critical for maintaining pipeline safety, which translates to the stakeholders, the public and employees.

6.3 WORK COMPLETED IN SUPPORT OF THE ENVIRONMENTAL ASSESSMENT

In the preparation of the environmental assessment, and in consultation with NSE and NSDNR, Bear Paw has undertaken the following activities to assess potential project interactions with moose and moose habitat. These activities also support the identification of mitigation and establish baseline conditions for an adaptive Moose Habitat Management Plan for the Project:

- consulted with expert ungulate ecologists and pipeline experts
- designed mitigation into the project such as the reduction of habitat fragmentation by paralleling as closely as practical the existing pipeline RoW
- compiled and analysed data from available provincial databases including moose observational data from NSDNR
- executed field programs as were practical:
    - incidental observations of moose sign were recorded during field surveys undertaken in support of vegetation, wetlands and aquatic programs in the summer and fall of 2015 and the summer of 2016

- transect surveys were conducted in December, 2015
- spring pellet surveys were undertaken in April, 2016

There is no indication from the information collected to indicate that moose prefer one location over another. However, information on moose habitat and the available data on moose related observations is presented in the moose and moose habitat mapbook (Appendix F) and represents areas where moose habitat mitigation may be best implemented – this is further discussed below.

6.4 COMMITMENT TO ADDITIONAL PRE-CONSTRUCTION SURVEYS

Through discussion with NSDNR, the need for additional data on moose habitat and moose-usage of the assessment corridor and adjacent areas was identified. Bear Paw is committed to undertaking additional moose surveys ahead of construction, which will support the development of the MHMP through the identification of key areas for RoW width management, and access control.

Details of these surveys will be determine through ongoing discussion with NSDNR, but will comprise the following survey-types:

- winter track survey
- spring pellet survey

6.5 MOOSE HABITAT MANAGEMENT PLANNING

As discussed in Section 2.1, Bear Paw is approaching environmental management for this Project from the perspective of adaptive management. The sections below detail how this approach is being applied in a practical manner to moose habitat management.

Moose Habitat Management Plan Table of Contents

6.5.1 Communication and Planning

Bear Paw Pipeline is committed to continuing dialogue with regulators and experts. Moose and moose habitat management will be an ongoing concern for the life of the Project; therefore Bear Paw Pipeline plans to work collaboratively with NSE and NSDNR through the steps outlined here for construction and operation activities.

6.5.2 Avoidance of Disturbance

The first principle of protecting environmentally sensitive features is to avoid direct disturbance where possible. This principle has been followed through the initial placement of the assessment corridor next to the existing RoW. The initial routing exercise located the assessment corridor as close as possible to the existing RoW, while considering other environmentally sensitive features such as wetlands, as well as topographic, constructability, and operational safety considerations.

6.5.3 Reduction of Disturbance

The information gathered in support of the EA as described in Section 6.3 above and shown in the moose and moose habitat mapbook (Appendix F), as well as future surveys to be

undertaken, will support efforts to avoid important habitat during detailed design and micro-routing.

6.5.4 Mitigation Planning

There are a number of best management practices that can be used to reduce the potential effects of the Project on moose and moose habitat. These were presented in the EA Report and are summarized in Table 6.1. The application of mitigation requires the combination of an industry-tested and acceptable mitigation toolkit with knowledge of the landscape to meet defined goals and objectives.

It will be critical to have NSDNR's input in to the application of mitigation, which will occur during the development of the Project-specific EPP and associated Moose Habitat Management Plan.

Table 6.1 Summary of Mitigation for Moose and Moose Habitat (adapted from Section 5.6.6.5 of the EA Report)

Effect	Mitigation
Change in Habitat Availability	• Reduce the area of direct habitat disturbance by: o Reducing the operational RoW width to 10 m with natural regeneration, where feasible, only in areas where important wildlife habitat has been identified (i.e., summer foraging, thermoregulation habitat; moose shelter) • Allow full vegetation regeneration (natural and active regeneration methods will be identified in the EPP) within the RoW, leaving a 10 m controlled vegetation regrowth width across the pipeline ditch, where important wildlife habitat has been identified: o Bank restoration and shrub staking at watercourse crossings to restore vegetation, reduce human use of access roads and trails, and reduce line-of-sight. o Provide line-of-sight breaks via vegetation regeneration and management and through use of berms to reduce human use of access roads and trails. o Berms may be considered at access control points along the RoW where coarse woody debris and excavator mounding treatments are not practical. o Permit regeneration across sections of the RoW and plan three year rotational clearing pending consideration of pipeline integrity, safe operation, and regulatory approval. • Reduce indirect loss of habitat / sensory disturbance through access management: o use existing access for construction and operation (i.e., reduce temporary access), where possible; o increase public awareness through signage to reduce human use of access roads and trails; o use gates to reduce human use of access roads with landowner permissions; o deactivate temporary roads to reduce access created by Bear Paw; o use excavator mounding to restore vegetation and reduce human use of access roads with landowner permission; o rollback slash/woody debris. • Reduce indirect loss of habitat / sensory disturbance through traffic management: o adhere to posted speed limits; o use of multi-passenger vehicles for the transport of crews to and from job sites; o install signage where specific wildlife concerns have been identified.

Table 6.1 Summary of Mitigation for Moose and Moose Habitat (adapted from Section 5.6.6.5 of the EA Report)

Effect	Mitigation
	• Facilitate habitat restoration by reducing surface disturbance and soil stripping in sensitive areas during construction: o work in frozen-ground conditions where feasible; and o use matting to protect soil and vegetation from compaction by heavy equipment. • Reduce sensory disturbance in areas of potentially important moose habitat: o maintain vegetation buffer in areas adjacent to potentially important moose habitat; and o reduce, if possible, construction and maintenance activities during periods when moose are observed proximate to construction. • Provide Human-Wildlife Conflict training to personnel, including information on effectively managing human-moose interactions.
Change in Habitat Connectivity	• Reduce the area of direct habitat disturbance by: o Reducing the operational RoW width to 10 m with natural regeneration where feasible, only in areas where important wildlife habitat has been identified (i.e., summer foraging, thermoregulation habitat; moose shelter) • Allow full vegetation regeneration (natural and active regeneration methods will be identified in the Moose Management Plan) within the RoW, leaving a 10 m controlled vegetation regrowth width across the pipeline ditch, where important wildlife habitat has been identified: o Bank restoration and shrub staking at watercourse crossings to restore vegetation, reduce human use of access roads and trails, and reduce line-of-sight. o Provide line-of-sight breaks via vegetation regeneration and management and through use of berms to reduce human use of access roads and trails. o Berms may be considered at access control points along the RoW where coarse woody debris and excavator mounding treatments are not practical. o Permit natural vegetation regeneration across sections of the RoW and plan a three year rotational clearing pending consideration of pipeline integrity, safe operation, and regulatory approval. • Provide line-of-sight breaks via vegetation regeneration and management and through use of berms to reduce human use of access roads and trails. Berms may be considered at access control points along the RoW where coarse woody debris and excavator mounding treatments are not practical.
Change in Mortality Risk	• Monitor the open cut for trapped wildlife before the daily start of construction, or prior to resuming work after a shutdown, and remove wildlife before startup. • Reduce potential for interactions with wildlife through traffic management (refer to mitigation items identified under Change in Habitat Availability). • Reduce potential for interactions with wildlife by limiting site access (refer to mitigation items identified under Change in Habitat Availability). • Avoid planting species preferred by white-tailed deer to avoid interspecific food competition and increased parasite transmission between moose and deer. • Avoid attracting black bears to the RoW by avoiding planting preferred forage species. This could be most effective during the calving season when predation of calves can restrict populations of moose in areas of low population density. • Provide human-wildlife conflict training to personnel.

Bear Paw will build on the mitigation commitments discussed in the EA Report through discussion with NSE and NSDNR, and the development of the MHMP. Field based observational data will play an important role in determining the appropriate areas for directed moose habitat mitigation.

6.5.5 Mitigation Implementation

Moose habitat management mitigation will be implemented through detailed routing of the pipeline; construction management and monitoring; operational maintenance; and monitoring and follow-up. These commitments will be solidified through the development of the Project-specific EPP, and the MHMP. Site-specific Environmental Protection Plans and alignment sheets will show the details of moose habitat management, such as the example provided in the EA Report, which is attached (Appendix F).

6.5.6 Monitoring and Follow Up

A monitoring and follow up program will be developed for moose and moose habitat. The details of this plan will depend on the results of the pre-construction surveys, as well as the final location and type of mitigation that is implemented. The monitoring and follow-up commitments will be developed in consultation with NSDNR through the development of the MHMP.

6.5.7 Adaptive Management

Moose habitat management will be ongoing for the life of the Project. As mitigation is implemented, and the results of monitoring and follow-up are reported, there will be ongoing opportunities to refine and improve on the mitigation tools. The ability to adjust mitigation based on results is an important components of environmental management, and will be part of the planning process reflected in the MHMP.

7.0 BROOK FLOATER

During discussion with NSDNR, the potential for *Alismidonta varicose* (brook floater) to be present in the Salmon River was noted. This potential was known during the field surveys undertaken in 2015.

A field assessment of the Salmon River water crossing was conducted on September 24, 2015 by an experienced aquatic field biologist (B.Sc.) and environmental technician. Weather station data and onsite observations indicated that weather conditions were within ideal parameters for conducting a visual survey of fish and fish habitat (including mussels) along the approximately 650 m length of river identified for assessment. Water levels contributed to an often smooth water surface, and were safely and easily traversed with a mean channel depth of 0.29 m and a maximum depth of 0.62 m. Mean velocity was calculated to be 0.32 m/sec. Field surveys were undertaken according to Stantec field protocols for freshwater fish and fish habitat assessment, which are developed based on federal and provincial requirements.

Although no brook floaters were observed at the time of the surveys, given the observed habitat the potential remains for this species to be present during construction activities.

In general, standard mitigation (Appendix B), and mitigation specific to working in watercourses is considered sufficient for the protection of this species. However, should a trenched watercourse crossing be required at the Salmon River, the following additional mitigation will be applied:

- Fish rescues carried out ahead of in-water work will include the brook floater, which if observed, will be relocated to nearby suitable habitat, in consultation with NSDNR.

8.0 CONCLUSION

The report summarizes mitigation proposed in the EA Report. New mitigation and follow-up and monitoring measures have been proposed for wood turtles, wetlands of special significance, and lichen.

The discussion of moose and moose habitat management planning includes specific commitments for ongoing consultation with NSDNR in the development of mitigation, and the MHMP, as well as commitments to undertake pre-construction field surveys.

In consideration of the mitigation commitments detailed in the EA Report, and the additional mitigation, monitoring and follow-up commitments made herein, results of the assessment of residual environmental effects presented in the EA are unchanged.

9.0 CLOSURE

This document entitled Bear Paw Pipeline Project – Additional Information Request Report was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Bear Paw Pipeline Inc. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

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10.2 PERSONAL COMMUNICATION

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