xstrata coal

Donkin Export Coking Coal Project
ENVIRONMENTAL IMPACT STATEMENT

July 2012

Stantec

Environmental Impact Statement for the Donkin Export Coking Coal Project

PREPARED FOR:
Xstrata Coal Donkin Management Limited

PREPARED BY:

Stantec Consulting Ltd.

File: 121510478

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Executive Summary

The Donkin Export Coking Coal Project (the Project) involves a proposal to construct and operate an underground coal mine facility at the site of the existing Donkin Mine located on the Donkin Peninsula in Cape Breton Regional Municipality (CBRM), Nova Scotia. The Project proposes a multi-continuous miner underground operation producing approximately 3.6 million tonnes per annum (Mtpa) of Run of Mine (ROM) coal that is subsequently washed to provide approximately 2.75 Mtpa of product coal that is primarily suitable for coking coal markets, but may also supply thermal coal markets. A Coal Handling and Processing Plant (CHPP) capable of processing 3.6 Mtpa of raw coal from the Donkin Mine will be constructed to produce coal ready for presentation to a barge load-out facility. Waste coal and rock will be disposed onsite in surface containment systems engineered to manage runoff.

Product coal will be loaded onto circa 4,000 dwt barges which will be tugged an estimated 8.8 km to a transshipment facility in deeper waters in Mira Bay where it will be loaded onto bulk carriers up to Cape Size vessels for transport to international markets. While the primary method of product coal transportation for the Project is marine transportation, trucking of coal may occur should marine transportation prove impractical at any time.

Pending regulatory approval, construction of the barge load-out facility is planned to start in Q4 2014 and to be completed by Q2 2016. Construction of the CHPP is expected to begin in 2013 and take approximately 17 months to complete including commissioning. The Project is expected to achieve full production by the end of 2017 following an exploration phase which will be completed in 2015.

Project expenditures for capital construction, operation and maintenance are predicted to have a substantial economic impact on Cape Breton Island and Nova Scotia as a whole. Nova Scotia can expect an overall total (direct and spinoff) of 8,497 person-years of employment in the first five years (development phase) and about 724 annually during operations. The Project's contribution to the Gross Domestic Product (GDP) for the province will be $483 million during the development phase and about $63 million annually thereafter. During the first five years of Project development the Project is expected to generate approximately 5,430 person-years of employment (direct and spinoff) sourced within Cape Breton, with an average of 408 person-years of employment annually during operations. Income to Cape Breton is predicted to be in the range of $226 million during the first five years and approximately $23 million annually during operations.

This Environmental Impact Statement (EIS) has been prepared to fulfill the requirements for a comprehensive study level of assessment under the *Canadian Environmental Assessment Act* (CEAA) and environmental registration under the Nova Scotia *Environment Act*. In particular, the EIS has been prepared to comply with EIS Guidelines prepared for the Project by the

Canadian Environmental Assessment Agency with input from federal agencies, the Province of Nova Scotia, the Proponent, the Mi'kmaq of Nova Scotia, and various stakeholders who offered comments during a public review process of the draft EIS Guidelines. A concordance table is provided at the end of this summary to demonstrate compliance with the EIS Guidelines and indicate where requirements have been addressed in the EIS document.

Valued Environmental Components (VECs) specified in the EIS Guidelines for assessment and evaluated in this EIS include:

- Atmospheric Resources;
- Water Resources;
- Birds and Wildlife;
- Wetlands;
- Rare Plants;
- Freshwater Fish and Fish Habitat;
- Marine Environment;
- Commercial and Recreational Fisheries;
- Land Use;
- Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq of Nova Scotia; and
- Archaeological and Heritage Resources.

The public consultation and engagement program as well as the Mi'kmaq engagement activities conducted as part of the environmental assessment process to date has been an important vehicle for the identification, scoping, and resolution or mitigation of potential issues or concerns, and for the exchange of information in respect of the Project.

The assessment methods include an evaluation of the potential environmental effects for each VEC that may arise during each Project phase (construction, operation and maintenance, and decommissioning and reclamation) as well as malfunctions and accidental events. The evaluation of potential cumulative effects with regard to other projects and activities include past, existing, approved and proposed activities that could potentially have spatially or temporally overlapping effects with Project effects. Mitigation is proposed to reduce or eliminate adverse environmental effects. Habitat compensation is proposed to mitigate effects on

wetlands and fish habitat as a result of Project activities. Monitoring and follow-up programs have been proposed in some cases to verify the accuracy of effects predictions or effectiveness of mitigation.

In particular the Project is committed to controlling its greenhouse gas (GHG) emissions from the Project through development and implementation of a GHG Management Plan and use of methane management technologies. It will also control dust at the site as well as treat mine water and acid drainage from coal waste piles. Habitat compensation measures will be employed to provide no-net-loss of the productive capacity of fish habitat and wetland habitat.

With the implementation of the proposed mitigation measures, adverse residual environmental effects of routine Project activities are predicted to be not significant (based on regulatory standards, where applicable and/or using professional judgement) for all VECs. The environmental effects of any potential Project accidents or malfunctions that may occur can be addressed with appropriate environmental management and contingency response planning. Provided that the mitigation outlined in the EIS is implemented and provided that appropriate response plans are in place, no significant adverse environmental effects are likely to occur as a result of Project-related accidents and malfunctions. In the extremely unlikely event of a vessel collision or grounding resulting in the release of a large amount of oil or fuel, effects to birds have the potential to be significant; however an event of this scale is not likely to occur.

Effects of the environment on the Project which could potentially result in an interruption of service or damage to infrastructure or adverse effects to VECs were evaluated in consideration of mitigation and design measures and were found to be not significant.

In summary, the Project is not likely to result in significant adverse residual environmental effects, including cumulative effects, provided that the proposed mitigation, monitoring and follow-up programs are implemented.

There are very few single prospects in Nova Scotia with the potential to provide economic benefits of this scale. The Project is particularly important for Cape Breton, given the need for high quality opportunities to generate employment and income for communities to prosper. The Project's proponent, Xstrata Coal Donkin Management (XCDM), will continue to work with interested stakeholders and the Mi'kmaq of Nova Scotia to develop the Donkin coal resource in a manner that is socially, environmentally and technically feasible, and will provide a reasonable return on investment.

Table E.1 Concordance Table

EIS Guidelines Reference		Applicable EIS Reference
1.0	**INTRODUCTION**	
1.1	Purpose of the Environmental Impact Statement Guidelines	N/A
1.2	Guiding Principles	N/A
	Environmental Assessment as a Planning Tool	EIS submission
	Traditional and Local Knowledge	MEKS (Appendix C)
	Sustainable Development	Section 7 Capacity of Renewable Resources
	Precautionary Approach	EIS meets the intent and objectives of this section
2.0	**THE ENVIRONMENTAL ASSESSMENT PROCESS**	
2.1	Contact for the Federal Environmental Assessment	Section 1.1 The Proponent
2.2	Requirement for Environmental Assessment under the Canadian Environmental Assessment Act	Section 1.3 Regulatory Context
2.3	Federal and Provincial Cooperation in the Environmental Assessment	Section 1.3 Regulatory Context
2.4	Public Consultation by the Agency during the Environmental Assessment Process	N/A
3.0	**SCOPE OF PROJECT, FACTORS TO BE CONSIDERED AND SCOPE OF THE FACTORS**	
3.1	Scope of Project	Section 4.2.1 Scope of the Project
3.2	Factors to be Considered	Section 4.2.2 Factors to be Considered
3.3	Scope of the Factors to be Considered	Section 4.2.3 Scope of the Factors to be Considered
4.0	**PREPARATION OF THE EIS**	
4.1	Executive Summary	Executive Summary
4.2	Project Introduction	Section 1.0 Introduction
4.2.1	The Proponent	Section 1.1 The Proponent, Appendix B
4.2.2	Project Overview	Section 1.2 Project Overview
4.2.3	Regulatory Framework and the Role of Government	Section 1.3 Regulatory Context
4.2.4	Other Participants in the Environmental Assessment	Section 3.2.1 Stakeholder Identification
4.3	Project Description	Section 2.0 Project Description
4.3.1	Purpose of the Project	Section 2.2 Purpose of and Need for the Project
4.3.2	Need for the Project	Section 2.2 Purpose of and Need for the Project
4.3.3	Alternatives to the Project	Section 2.9.1 Alternatives to the Project
4.3.4	Project Location	Section 2.3 Project Location

Table E.1 Concordance Table

EIS Guidelines Reference		Applicable EIS Reference
4.3.5	Project Description	Section 2.0 Project Description
	Facilities and Components	Section 2.4 Project Facilities and Components
	Activities	Section 2.5 Project Activities
	Schedule	Section 2.6 Schedule
4.3.6	Alternative Means of Carrying out the Project	Section 2.9.2 Alternative Means of Carrying Out the Project
4.4	Description of the Existing Environment	Section 5 Environmental Effects Assessment (Existing Conditions for each VEC)
4.5	Effects Assessment	Section 5 Environmental Effects Assessment
4.5.1	Accidents and Malfunctions	Section 6 Accidents and Malfunctions
4.5.2	Capacity of Renewable Resources	Section 7 Capacity of Renewable Resources
4.6	Mitigation Measures	Section 5 Environmental Effects Assessment (Mitigation of Project Environmental Effects for each VEC)
4.7	Cumulative Impact Assessment	Section 4.2.4 Cumulative Effects Assessment Scoping; Section 5 Environmental Effects Assessment (Assessment of Cumulative Effects for each VEC)
4.8	Effects of the Environment on the Project	Section 8 Effects of the Environment on the Project
4.9	Environmental Management	Section 2.12 Environmental Design and Management Planning
	Planning	Section 2.12.2 Environmental Management Planning
	Draft Solid Waste Materials Management Plan	Appendix F Solid Waste Materials Management Plan
	Draft Decommissioning and Reclamation Plan	Appendix D Mine Closure and Reclamation Plan
	Draft Fish and Fish Habitat Compensation Plan	Section 5.7.5 Marine Environment, Appendix G Conceptual Habitat Compensation Plan
	Follow-Up Program	Section 9 Follow-up and Monitoring
4.10	Significance of Residual Adverse Environmental Effects	Section 5 Environmental Effects Assessment (Determination of Significance for each VEC)
4.11	Consultation	Section 3.0 Consultation and Engagement
	Aboriginal Consultation	Section 3.3 Engagement of the Mi'kmaq of Nova Scotia; Section 5.10 Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq
	Public Consultation by the Proponent	Section 3.0 Consultation and Engagement
4.12	Economic and Social Benefits of the Project	Section 2.10 Project Costs and Employment, Section 5.9 Land Use
4.13	Benefits to Canadians	Section 10 Benefits to Canadians
4.14	Assessment Summary and Conclusions	Section 11 Summary and Conclusions

Table E.1 Concordance Table

EIS Guidelines Reference		Applicable EIS Reference
4.15	Plain Language Summary	Plain Language Summary
4.16	Atmospheric Resources	Section 5.1 Atmospheric Resources, Section 5.7.2.3 Oceanography, Section 8.2.1 Climatological Background
4.17	Water Resources	Section 5.2 Water Resources
4.18	Birds and Wildlife	Section 5.3 Birds and Wildlife
4.19	Wetlands	Section 5.4 Wetlands
4.20	Rare Plants	Section 5.5 Rare Plants, Section 5.3.2.3 Survey Results (Habitat - Birds and Wildlife)
4.21	Freshwater Fish and Fish Habitat	Section 5.6 Freshwater Fish and Fish Habitat
4.22	Marine Environment	Section 5.7 Marine Environment
4.23	Archaeological and Heritage Resources	Section 5.11 Archaeological and Heritage Resources
4.24	Current Use of Land and Resource Use for Traditional Purposes by the Mi'kmaq of Nova Scotia	Section 5.10 Current Use of Land and Resource Use for Traditional Purposes by the Mi'kmaq of Nova Scotia, Appendix C MEKS
4.2.5	Commercial and Recreational Fisheries	Section 5.8 Commercial and Recreational Fisheries
4.26	Land Use	Section 5.9 Land Use

LIST OF ACRONYMS

ABA	Acid-Base Accounting
ACCDC	Atlantic Canada Conservation Data Centre
ADCP	Acoustic Doppler Current Profiler
AFS	Aboriginal Fisheries Strategy
AOI	Area of Interest
APA	Atlantic Pilotage Authority
API 2F	Atlantic Petroleum Institute Mooring Chain Specification
ARD	Acid Rock Drainage
ARIA	Archaeological Resource Impact Assessment
BACT	Best Available Control Technology
BATEA	Best Available Technology Economically Achievable
BBS	Breeding Bird Survey
BMP	Best Management Practices
BRD	Bycatch Reduction Device
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CABIN	Canadian Aquatic Biomonitoring Network
CAC	Criteria Air Contaminants
CANMET	Canada Centre for Mineral and Energy Technology
CBDC	Cape Breton Development Corporation (former name)
CBRM	Cape Breton Regional Municipality
CCME	Canadian Council of Ministers of the Environment
CCME FWAL	Canadian Council of Ministers of the Environment Guidelines for the Protection of Freshwater Aquatic Life
CDF	Confined Disposal Facility
CE	Control Efficiency
CEA Agency	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act*
CEPA	*Canadian Environmental Protection Act*
CFA	Snow Crab Fishing Area
CHPP	Coal Handling and Preparation Plant
CHS	Canadian Hydrographic Service
CLC	Community Liaison Committee
CM	Continuous Miner
COLREGS	International Regulations for Preventing Collisions at Sea
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWCS	Canadian Wetlands Classification System
CWS	Canada Wide Standards
DAS	Disposal At Sea
DEVCO	Cape Breton Development Corporation
DFO	Fisheries and Oceans Canada
DJSI	Dow Jones Sustainability Index
DMC	Dense Medium Cyclone
DSP	DEVCO Settling Pond
DTI	Donkin Tenements Inc
DWT	Dead Weight Tonnage

EA	Environmental Assessment
EBSA	Ecologically and Biologically Significant Area
EC	Environment Canada
ECAREG	Eastern Canada Vessel Traffic Services Zone
ECB	Environmental Conservation Branch
ECBC	Enterprise Cape Breton Development Corporation
EEM	Environmental Effects Monitoring Plan
EGSPA	*Environmental Goals and Sustainable Prosperity Act*
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPP	Environmental Protection Plan
Erdene	Erdene Resource Development Corporation
FCR	Federal Coordination Regulations
FEC	Forest Ecosystem Classification
FSC	Food, Social, & Ceremonial Fishing
FWAL	Fresh Water Aquatic Life
GCDWQ	Guidelines for Canadian Drinking Water Quality
GCL	Geosynthetic Clay Liner
GCM	Global Climate Model
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GHGRP	Greenhouse Gas Emissions Reporting Program
GIS	Geographic Information System
GLC	Ground Level Concentration
GOC	Government of Canada
HA	Highly Annoyed
HADD	Harmful Alteration, Disturbance or Destruction
HDPE	High-Density Polyethylene
HSEC	Health, Safety, Environment, & Community
IBA	Important Bird Area
iBoF	Inner Bay of Fundy
ICMM	International Council on Mining and Metals
ISO	International Standards Organization
ISQG	Interim Marine Sediment Quality Guidelines
IUCN	International Union for Conservation of Nature
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
LAA	Local Assessment Area
LBP	Length between perpendiculars refers to length of a vessel along the waterline from the forward surface of the stem, or main bow perpendicular member, to the after surface of the sternpost, or main stern perpendicular member.
LFA	Lobster Fishing Area
LOA	Length overall is the maximum length of a vessel's hull measured parallel to the waterline.
LOM	Life of Mine
LUB	Land Use Bylaws
MARI	Maritime Archaeological Resource Inventory
MARPOL	International Convention for the Prevention of Pollution from Ships
MBBA	Maritime Breeding Bird Atlas

MBCA	*Migratory Birds Convention Act*
mbgs	Metres Below Ground Surface
MCRP	Mine Closure and Reclamation Plan
MCTS	Marine Communications and Traffic Services
MEKS	Mi'kmaq Ecological Knowledge Study
MGA	*Municipal Government Act*
MGS	Membertou Geomatics Solutions
MOU	Memorandum of Understanding
MPA	Marine Protected Area
MPMO	Major Project Management Office
MPS	Municipal Planning Strategy
Mtpa	Million tonnes per annum
NAAQ	National Ambient Air Quality
NAFO	Northwest Atlantic Fisheries Organization
NAPS	National Air Pollution Surveillance
NBDNR	New Brunswick Department of Natural Resources
NPRI	National Pollutant Release Inventory
NRCan	Natural Resources Canada
NS ESA	*Nova Scotia Endangered Species Act*
NSDA	Nova Scotia Department of Agriculture
NSDNR	Nova Scotia Department of Natural Resources
NSDOE	Nova Scotia Department of Energy
NSE	Nova Scotia Environment
NSGC	Nova Scotia Geomatics Centre
NSOAA	Nova Scotia Office of Aboriginal Affairs
NSPI	Nova Scotia Power Inc.
NSTIR	Nova Scotia Department of Transportation and Infrastructure Renewal
NSUARB	Nova Scotia Utility and Review Board
NWPA	*Navigable Waters Protection Act*
NWPP	Navigable Waters Protection Program
NWWG	National Wetland Working Group
OBBN	Ontario Benthos Biomonitoring Network
OHSAS	Occupational Health and Safety Assessment Series
OPEP	Oil Pollution Emergency Plan
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PDA	Project Development Area
PEL	Probable Effect Levels
PEV	Provincial Energy Ventures
PIANC	Permanent International Association of Navigation Congresses
PID	Property Identification
PM	Particulate Matter
PMWA	Port Morien Wildlife Association
POL	Petroleum, Oils, and Lubricants
PRMM	Pilotage Risk Management Methodology
PTS	Permanent Threshold Shifts (Auditory Injury)
PWGSC	Public Works and Government Services Canada
RA	Responsible Authority
RAA	Regional Assessment Area

RCB	Rural Cape Breton
RDL	Reportable Detection Limit
ROM	Run of Mine
ROV	Remotely Operated Vehicle
RoW	Right-of-Way
RPC	Research and Productivity Council Science & Engineering Laboratory
RV	Research Vessel
SARA	*Species at Risk Act*
SBM	Single Buoy Mooring
SDSM	Statistical Downscaling Model
SHACI	Significant Habitats: Atlantic Coast Initiative
SMP	Salt Management Plan
SOCC	Species of Conservation Concern
SOLAS	Safety of Life at Sea
SSIP	Scotian Shelf Ichthyoplankton Program
STCW	Standard for Training, Certification and Watchkeeping
SWMP	Solid Waste Management Plan
t/d	tonnes per day
t/h	tonnes per hour
TC	Transport Canada
TPH	Total Petroleum Hydrocarbons
TPM	Total Particulate Matter
TSB	Transportation Safety Board of Canada
TSP	Total Suspended Particulate Matter
TSS	Total Suspended Solids
TTS	Temporary Threshold Shifts
UINR	Unama'ki Institute of Natural Resources
UNFCCC	United Nations Framework Convention on Climate Change
US EPA	United States Environmental Protection Agency
US FHWA	United States Federal Highway Administration
VAM	Ventilation Air Methane
VEC	Valued Environmental Component
VOC	Volatile Organic Compounds
VTS	Vessel Traffic Services
WHMIS	Workplace Hazardous Materials Information System
WHO	World Health Organization
ww	Wet Weight
XC	Xstrata Coal
XCDM	Xstrata Coal Donkin Management Limited

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1.0 Introduction

The Donkin Export Coking Coal Project (the Project) involves a proposal to construct and operate an underground coal mine facility at the site of the existing Donkin Mine located on the Donkin Peninsula in Cape Breton Regional Municipality (CBRM), Nova Scotia. The Project would produce approximately 3.6 million tonnes per annum (Mtpa) of raw coal that would be processed and washed to provide approximately 2.75 Mtpa of product coal primarily destined for coking coal markets, but may also supply thermal coal markets.

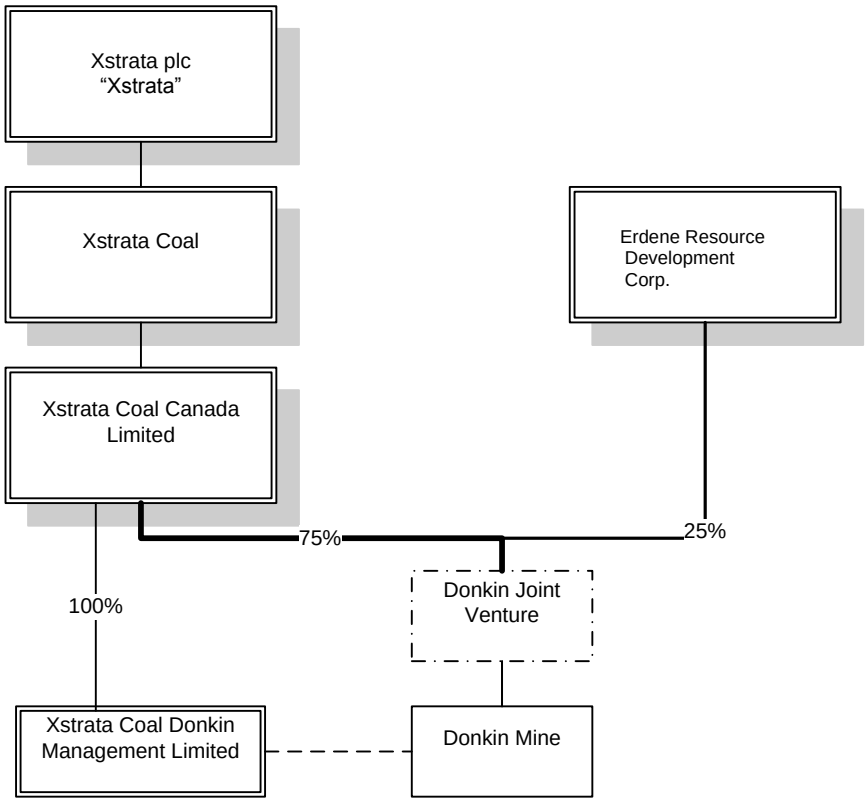
This document is the Environmental Impact Statement (EIS) which has been prepared to fulfill the requirements for a comprehensive study level of assessment under the *Canadian Environmental Assessment Act* (CEAA) and environmental registration under the Nova Scotia *Environment Act*. Specifically, the EIS has been prepared to comply with EIS Guidelines prepared for the Project by the Canadian Environmental Assessment Agency (CEA Agency) (refer to Appendix A). These EIS Guidelines were developed with input from federal agencies, the Province of Nova Scotia, the Proponent, the Mi'kmaq of Nova Scotia (the Mi'kmaq), and various stakeholders who offered comments during a public review process of the draft EIS Guidelines.

This document has been prepared by Stantec Consulting Ltd. (Stantec) on behalf of the Project's proponent, Xstrata Coal Donkin Management (XCDM), based on various technical studies and reports conducted by Stantec and others.

1.1 THE PROPONENT

The ownership of all phases of the Donkin Mine, including the undertaking of this Export Coking Coal Project, is through a joint venture of two subsidiary companies that form the Donkin Joint Venture. These companies are currently Xstrata Coal Canada Limited, with a 75 percent controlling interest, and Erdene Resource Development Corp. with a 25 percent balancing interest. Through a series of subsidiary companies, Xstrata Coal Canada Limited is managed by Xstrata Plc. XCDM is the Project Manager and a subsidiary of Xstrata Coal. Figure 1.1.1 depicts the ownership structure.

Figure 1.1.1 Ownership Structure



Xstrata Plc is a major global diversified mining group, listed on the London and Swiss Stock Exchanges. Headquartered in Zug, Switzerland, Xstrata maintains a meaningful position in seven major international commodity markets: copper, coking coal, thermal coal, ferrochrome, nickel, vanadium and zinc with additional exposure to gold, cobalt, lead and silver. The Xstrata Group also comprises a growing platinum group metals business, iron ore projects, recycling facilities and a suite of global technology products, many of which are industry leaders. The Group's operations and projects span 20 countries.

Xstrata Coal, the coal commodity business unit of Xstrata Plc, is the world's largest exporter of thermal coal and the fifth largest producer of hard coking coal and semi-soft coal. With its headquarters in Sydney, Australia, Xstrata Coal has interests in more than 30 operating coal mines throughout Australia, South Africa and the Americas. The business unit employs more than 11,613 people globally (excluding contractors) and in 2011 managed production of 85.3 million tonnes of coal.

Xstrata Plc and its subsidiaries have an absolute commitment to sustainable development through its Business Principles which recognize that Xstrata's commitment to genuine

partnerships with its stakeholders requires it to work ethically, responsibly, openly and together with others.

To ensure this commitment is met and to provide a clear governance structure Xstrata Plc has developed and implemented its Sustainable Development Framework. As a result, Xstrata Plc has been recognized by the Dow Jones Sustainability Index (DJSI) as the Global Super Sector Leader for Basic Resources (comprises paper, forestry, mining industry participants) in its World and STOXX Indexes for 2010/2011, for the second time. This is also the fourth consecutive year that Xstrata Plc has been named as the top rated mining company in the Dow Jones Sustainability Indexes. More information on Xstrata's Sustainable Development Framework and key elements of an environmental management system for the Project are provided in Section 2.11 and 2.12, respectively.

Erdene Resource Development Corp. is a diversified resource company with multiple projects at various stages of development from exploration to production, all focused on high-growth commodities. It is listed on the Toronto Stock Exchange (ERD), and is headquartered in Dartmouth, Nova Scotia, Canada.

On April 26, 2012 it was announced that XCDM is seeking an operating coal company to assume its interest in the Donkin Mine Project as a result of a change in Xstrata Coal's business strategy focusing on larger volume mining complexes. Xstrata Coal is working closely with its Joint Venture Partner, Erdene, and the Provincial Government to find a suitable company to take over its interest. Until this time, it remains business as usual and XCDM remains committed to continuing its current activities including seeking regulatory approvals for the Project.

Contact information for the Proponent's representative and Stantec's representative is provided below.

Proponent Contact:	Joel May, Environment & Community Coordinator Xstrata Coal Donkin Management Limited
Address:	633 Main Street Glace Bay, NS B1A 6J3
Tel:	(902) 849-9235
Fax:	(902) 849-1641
Email:	jmay@xstratacoal.ca

Environmental Assessment Contact:	Earle Hickey, Project Manager Stantec Consulting Ltd.
Address:	Suite 102 40 Highfield Park Drive Dartmouth, NS B3A 0A3
Tel:	(902) 468-7777
Fax:	(902) 468-9009
Email:	Earle.Hickey@stantec.com

Key personnel, contractors, and/or sub-contractors responsible for preparing the EIS and qualifications of biologists are provided in Appendix B.

1.2 PROJECT OVERVIEW

The Donkin Export Coking Coal Project is to be located at the existing Donkin Mine site on Donkin Peninsula, CBRM, Nova Scotia (Figure 1.3.1). XCDM proposes a multi-continuous miner underground operation producing approximately 3.6 Mtpa (approximately 9,972 tonnes per day (t/d)) of Run of Mine (ROM) coal that is subsequently washed to provide approximately 2.75 Mtpa (approximately 7,620 t/d) of product coal that is primarily suitable for coking coal markets, but may also supply thermal coal markets. A Coal Handling and Preparation Plant (CHPP) capable of processing 3.6 Mtpa of raw coal from the Donkin Mine will be constructed to produce coal ready for presentation to a barge load-out facility. Waste coal and rock will be disposed onsite in coal waste disposal piles engineered to manage acid rock drainage runoff.

Product coal will be loaded onto 4,000 dwt barges which will be tugged 8.8 km to a transshipment facility in deeper waters in Mira Bay which allows the coal to be loaded onto bulk carriers up to Cape Size vessels for transport to international markets. While the primary method of product coal transportation for the Project is marine transportation, there may be trucking of coal to domestic customers and the Port of Sydney should marine transportation prove impractical at any time.

1.3 REGULATORY CONTEXT

The Project will require federal and provincial regulatory approvals to proceed including, but not limited to environmental assessment under the CEAA and Nova Scotia *Environment Act*. Details on federal, provincial, and municipal regulatory processes are provided below.

1.3.1 Federal Environmental Assessment Process

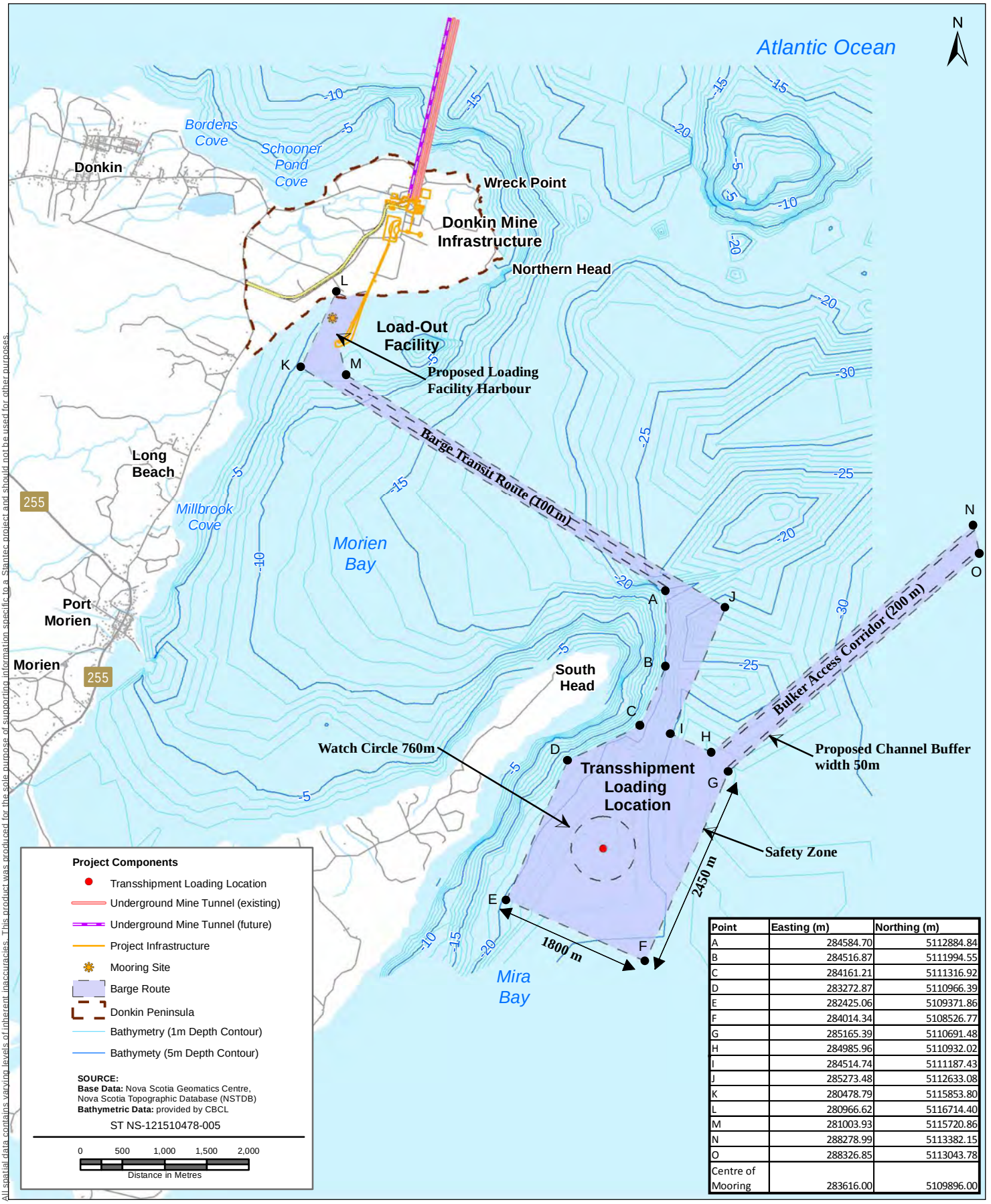
A federal environmental assessment (EA) is required pursuant to Section 5(1) of the CEAA if a federal authority:

a) carries out a project;

b) provides financial assistance to enable a project to be carried out;

c) sells leases or otherwise transfers control or administration of land to enable a project to be undertaken; or

d) permits, approves or takes any other action specified in the Law List Regulations to enable a project to be carried out.



Point	Easting (m)	Northing (m)
A	284584.70	5112884.84
B	284516.87	5111994.55
C	284161.21	5111316.92
D	283272.87	5110966.39
E	282425.06	5109371.86
F	284014.34	5108526.77
G	285165.39	5110691.48
H	284985.96	5110932.02
I	284514.74	5111187.43
J	285273.48	5112633.08
K	280478.79	5115853.80
L	280966.62	5116714.40
M	281003.93	5115720.86
N	288278.99	5113382.15
O	288326.85	5113043.78
Centre of Mooring	283616.00	5109896.00

PREPARED BY: M. Huskins-Shupe
REVIEWED BY: C. Shupe
CLIENT: xstrata coal

Donkin Export Coking Coal Project

Project Location - Concept Only

FIGURE NO.: 1.3.1
DATE: Jul 03, 2012

Stantec

File Path: V:\1215\active\121510xxx\121510478-Donkin Mine Enviro Assessment\geomatics\mapping\mxd\EA_Final\ST_NS_121510478-005_Project_Overview_with_Text.mxd

The first and second triggers ((a) and (b)) above do not apply to the Project as proposed. The third trigger (c) does not apply since federal lands are not required and the water lot lease required for the Project is a provincial Crown Lands lease and does not involve the federal government.

It is assumed that triggers under the Law List Regulations, as shown in Table 1.3.1, will include authorizations that will be required pursuant to the *Fisheries Act* and the *Navigable Waters Protection Act* (NWPA). These triggers would be associated with the proposed marine terminal and transshipment mooring facility.

The CEAA Comprehensive Study List Regulations identify those projects and classes of projects for which a comprehensive study is required. Under these Regulations, Section 3, Part V, Mineral and Mineral Processing, Subsection 16(d), "a coal mine with a coal production capacity of 3,000 t/d or more" will be subject to a comprehensive study.

Table 1.3.1 CEAA Law List Regulations Triggers and Their Relevance to the Project

Triggers	Nature of Authorization	Relevance to Project	Relevant Federal Authority
Fisheries Act			
32	Unauthorized destruction of fish (mortality) by means other than fishing.	Applicable due to marine infilling/ infrastructure associated with construction of barge load-out facility and transshipment mooring.	Fisheries and Oceans Canada
35(2)	Harmful alteration, disruption or destruction (HADD) of fish habitat.	Applicable due to marine infilling/ infrastructure associated with construction of barge load-out facility and transshipment mooring.	Fisheries and Oceans Canada
Navigable Waters Protection Act			
5(2)	If the Minister considers that the work would substantially interfere with navigation.	Applicable due to marine structures at barge load-out facility and transshipment location.	Transport Canada

The Federal Authorities noted in Table 1.3.1 have indicated the applicability of their respective CEAA triggers in the Law List Regulations through the Federal Coordination Regulations (FCR) process. These Federal Authorities are considered Responsible Authorities (RAs) and retain responsibility for issuing their respective permits and authorizations pending approval of the comprehensive study.

During the FCR process, Environment Canada indicated they may also be an RA, pending the requirement for a Disposal at Sea (DAS) Permit under the *Canadian Environmental Protection Act* (Disposal at Sea authorization under subsection 127(1) and subsection 129(3)). XCDM has indicated that they will be seeking approval to dispose of dredged material (if required) on land and will not pursue a DAS Permit. Environment Canada will therefore be a Federal Authority

providing expert advice or specialized knowledge to the EA process. Likewise, Natural Resources Canada (NRCan) indicated they will not be an RA.

Federal Departments also provide expert advice or specialized knowledge through the CEAA process as well as the provincial EA process. Federal Authorities providing expertise or knowledge to the EA process will include Fisheries and Oceans Canada (DFO), Transport Canada, Environment Canada, NRCan and Health Canada.

The federal decision-making and coordinating authority for a comprehensive study is the CEA Agency as per the amendments to CEAA (Bill-9) in July 2010. As an initiative to make federal environmental assessment more efficient and transparent, the Major Project Management Office (MPMO) was established in 2007 to support the Government of Canada's new approach to the regulatory review of major resource projects. In particular, the MPMO's mandate is to provide overarching project coordination, management and accountability for major resource projects within the context of the existing federal regulatory review process. The MPMO is participating in a comprehensive study process to assist with regulatory coordination and ministerial oversight.

1.3.2 Provincial Environmental Assessment Process

Environmental assessment in Nova Scotia is regulated under the province's *Environment Act* and Environmental Assessment Regulations. Projects required to be registered for environmental assessment are divided into two categories, Class I and Class II. A facility that extracts or processes metallic or non-metallic minerals, coal, peat, peat moss, gypsum, limestone, bituminous shale or oil shale, is identified as a Class I undertaking thus requiring registration for EA.

The "One Window" process was developed in 1994 by the Province of Nova Scotia to make the process of review, permitting and approval for mineral development more efficient. The process is designed to facilitate cooperation among government departments (including federal Departments), improve efficiency, and reduce jurisdictional overlap facilitating communication between industry proponents and government (NSDNR 2000). This process also helps to ensure that no significant issues are overlooked.

In addition to Nova Scotia Environment, key provincial departments expected to be involved with the One Window Committee and EA review include Nova Scotia Department of Natural Resources (NSDNR) (mineral resources and habitat branches), and Nova Scotia Department of Labour and Advanced Education.

1.3.3 Federal-Provincial Environmental Assessment Agreement

With respect to the Donkin Export Coking Coal Project, the Government of Canada and the Province of Nova Scotia have signed a Federal-Provincial Environmental Assessment

Agreement to coordinate their respective EA processes to reduce duplication. This EIS shall be used to satisfy both processes and there will be a joint federal and provincial comment period.

1.3.4 Other Applicable Legislation

1.3.4.1 Federal

This section provides additional detail on federal authorizations described in CEAA triggers in Section 1.3.1 as well as other federal legislation potentially relevant to this Project.

Fisheries Act

Fish habitat is protected under the *Fisheries Act* and by DFO's *Policy for the Management of Fish Habitat* (DFO 1986). The *Policy for the Management of Fish Habitat* is regulated by Sections 20, 21, 22, 30, 32, 35, 37, 40 and 43 of the *Fisheries Act* which is administered by DFO. This policy applies to all projects and activities in or near water which could result in the harmful alteration, disruption, or destruction (HADD) of fish habitat by chemical, physical, or biological means. The guiding principle of this policy is to achieve no net loss of the productive capacity of fish habitats.

Pollution prevention and control provisions of the Fisheries Act are administered and enforced by Environment Canada. Subsection 36(3) of the Fisheries Act prohibits anyone from depositing or permitting "the deposit of a deleterious substance of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter such water". Activities must be managed so as to prevent the release of substances deleterious to fish. In general, compliance is determined at the last point of control of the substance before it enters waters frequented by fish, or, in any place under any conditions where a substance may enter such waters.

Navigable Waters Protection Act

The Navigable Waters Protection Program (NWPP) ensures the public's right to navigate Canada's waters without obstruction. This is accomplished through the administration of the *Navigable Waters Protection Act* (NWPA). The NWPA is a federal law designed to protect the public right of navigation. In order to minimize the impact to navigation, the NWPP ensures that works constructed in navigable waterways are reviewed and regulated. Only those projects that have the potential to substantially interfere with navigation require an approval under Section 5(2) of NWPA (a CEAA trigger).

Canadian Environmental Protection Act

The *Canadian Environmental Protection Act*, 1999 (CEPA 1999) is federal legislation aimed at preventing pollution and protecting the environment and human health. Among other things, CEPA 1999 provides for the assessment and/or management of environmental and human health impacts of toxic substances and other pollution and wastes. CEPA 1999 manages

disposal of material at sea (*e.g.*, dredged material) and encourages pollution prevention, including but not limited to, marine pollution prevention from land-based sources.

Explosives Act

The *Explosives Act* requires anyone working with explosives to have a licence, certificate or permit issued by the Minister of Natural Resources, with the exception of explosives and storage activities which are regulated provincially and/or use of some commercial blasting explosives licensing. This may include the manufacturing, sale, storage and possession of explosives. The Project may require storage and use of explosives on site and has been in discussion with NRCan requiring licencing under the Act. Use of blasting explosives is not regulated by NRCan as it falls under provincial jurisdiction.

Migratory Birds Convention Act, 1994

Migratory birds are protected federally under the *Migratory Birds Convention Act, 1994* which states that “no person shall disturb, destroy or take a nest, egg, nest shelter, either duck shelter or duck box of a migratory bird” without a permit. The Act includes prohibition of “incidental take” of migratory birds or their nests as a result of activities such as those required for the proposed Project.

Under the current *Migratory Birds Regulations*, no permits can be issued for the incidental take of migratory birds or nests caused by development projects or other economic activities. Furthermore, Section 5.1 of the *Migratory Birds Convention Act* describes prohibitions related to deposit of substances harmful to migratory birds: “No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area” and “no person or vessel shall deposit a substance or permit a substance to be deposited in any place if the substance, in combination with one or more substances, results in a substance — in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area — that is harmful to migratory birds.” Other bird species (and other wildlife) not protected under the federal act, such as raptors and cormorants, are protected under the provincial *Wildlife Act*.

Species at Risk Act

Species at Risk Act (SARA*)*, implemented in 2002, is a federal government commitment to prevent Canadian indigenous species from becoming extirpated or extinct by providing legal protection of wildlife species, the conservation of their biological diversity and encouraging the management of other species to prevent them from becoming at risk.

Wildlife species that are protected federally under SARA are listed in Schedule 1 of the Act. As defined in SARA, "wildlife species" means a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or

virus, that is wild by nature and (a) is native to Canada; or (b) has extended its range into Canada without human intervention and has been present in Canada for at least 50 years. The purpose of this Act is to protect wildlife Species at Risk and their critical habitat. Those species listed as “Endangered” or “Threatened” in Schedule 2 or 3 of SARA may also be considered as Species at Risk, pending regulatory consultation. Several species listed under SARA have been recorded in or around the local assessment area for the Project (refer to Section 5.3).

1.3.4.2 Provincial

This section provides information on provincial approvals and other provincial legislation potentially relevant to this Project.

***Environment Act* and Regulations**

In addition to environmental assessment approval under the *Environment Act*, the Project will also require other approvals under the Activities Designation Regulations of the Act, including an updated Industrial Approval and Water Approvals to authorize alterations to wetlands and watercourses on site. Approvals under the Activities Designation Regulations are granted by Nova Scotia Environment (NSE).

Air Quality Regulations under the Act specify ambient air quality maximum permissible ground level concentrations. These criteria are considered in the evaluation of effects of the Project on air quality (refer to Section 5.1) and will be referenced in the Industrial Approval for the Project.

Other relevant regulations which may require specific approvals and/or conditions associated with the Industrial Approval include the Dangerous Goods Management Regulations, On-site Sewage Disposal Systems Regulations, and Petroleum Management Regulations.

Mineral Resources Act and Regulations

The *Mineral Resources Act* supports and promotes responsible mineral resource management consistent with sustainable development while providing a framework for efficient and effective mineral rights administration; encouraging, promoting and facilitating mineral exploration, development and production; providing a fair royalty regime; and improving the knowledge of mineral resources in the Province. Exploration, development and mining activities associated with the Donkin Export Coking Coal Project are governed by the *Mineral Resources Act* and Regulations.

Endangered Species Act

The *Endangered Species Ac*t provides for the protection, designation, recovery and other relevant aspects of conservation of species at risk in the Province, including habitat protection. The Act prohibits killing or disturbing endangered or threatened species, destroying or disturbing its residence (habitat) and destroying or disturbing core habitat. Species assessed by the NS

Species at Risk Working Group as endangered threatened, or vulnerable are listed under the NS *Endangered Species Act* (NS ESA) are legally protected. Several species listed under the NS ESA have been recorded in or around the local assessment area for the Project (refer to Sections 5.3 and 5.5).

Crown Lands Act* and *Beaches Act

A permit under the Nova Scotia *Beaches Act* and Provincial Crown Land lease under the *Crown Lands Act* (section 16(1)(a)) will be required from NSDNR to obtain a water lot lease for the barge load-out facility and possibly for the transshipment mooring.

Environmental Goals and Sustainable Prosperity Act

The *Environmental Goals and Sustainable Prosperity Act* (EGSPA) proclaimed in 2007 establishes specific goals associated with air quality, water quality, renewable energy, ecosystem protection, contaminated sites, solid waste reduction, sustainable purchasing, and energy efficiency building. In particular, goals associated with climate change and air quality improvements (*e.g.*, reduction of greenhouse gas emissions to at least 10 percent below 1990 levels) and ecosystem protection (*e.g.*, prevention of net loss of wetlands) have specific implications for Project design and mitigation.

1.3.4.3 Municipal

The CBRM adopted a Municipal Planning Strategy (MPS) and Land Use Bylaws (LUB) in 2004 which were amended in 2011. The MPS and LUBs are used to guide the development and management of the Municipality, giving policy direction to regulate the use of land within the borders of a municipality so as to minimize conflicts in land use (CBRM 2011). The Project area on the Donkin Peninsula falls within the Rural Cape Breton (RCB) Zone identified within CBRM's LUB.

CBRM provides a variety of municipal services to several communities located in close proximity to the Project area. At the Project site, the Proponent will be responsible for the installation and maintenance of all the site services required to support the Project.

CBRM is also responsible for municipal planning and the issuance of development permits pursuant to the *Municipal Government Act.* Municipalities do not regulate the primary industry of natural resource extraction (including mining and refining) and therefore CBRM does not issue development permits for mining operations (M. Gillis, CBRM, pers. comm. 2012). No development permit will be required from CBRM to execute the Project.

1.3.5 Federal and Provincial Policies, Guidelines and Standards

In addition to the legislative requirements discussed above, several government policies, guidelines and standards have influenced the Project design and environmental assessment in

terms of assessment methods, mitigation and/or evaluation of predicted environmental effects. Key documents are listed in Table 1.3.2. Additional policies, guidelines and standards may be referenced throughout the EIS where relevant.

Table 1.3.2 Key Relevant Federal and Provincial Policies, Guidelines and Standards

Issue	Federal Policies Guidelines and Standards	Provincial Guidelines and Standards
Environmental Assessment Methods	• Guidelines for the Preparation of an Environmental Impact Statement for the Comprehensive Study Process Pursuant to the *Canadian Environmental Assessment Act* (CEA Agency 2011a) • Canadian Environmental Assessment Agency - Policy & Guidance - Cumulative Effects Assessment Practitioners' Guide (CEA Agency 1999) • Addressing "Need for", "Purpose of", "Alternatives to" and "Alternative Means" under the *Canadian Environmental Assessment Act* (CEA Agency 2007a) • Operational Policy Statement: Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act* (CEA Agency 2007b) Cumulative Effects Assessment Practitioners Guide.	• Guide to Preparing an EA Registration for Mining Developments in Nova Scotia (NSE 2002, revised 2009)
Climate Change	• Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (CEA Agency 2003)	• Guide to Considering Climate Change in Environmental Assessments in Nova (NSE 2010a) • Guide to Considering Climate Change in Project Development in Nova Scotia (NSE 2010b).
Wildlife and Species at Risk	• Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada (Environment Canada 2004) • The *Species at Risk Act* Environmental Assessment Checklists for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada – (Environment Canada –Parks Canada 2010)	• Guide for Addressing Wildlife Species and Habitat in an EA Registration Document (NSE 2005, updated 2009)
Wetlands	• The Federal Policy on Wetland Conservation (Environment Canada 1991)	• Nova Scotia Wetland Conservation Policy (Government of Nova Scotia 2011)
Fish Habitat	• Policy of the Management of Fish Habitat (DFO 1986)	

1.3.6 Mi'kmaq Policies and Guidelines

There are two key Mi'kmaq guidelines which have influenced the EA process for this Project: Proponent's Guide: *The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia* (NSOAA 2011); and the Mi'kmaq Ecological Knowledge Study Protocol (Assembly of Nova Scotia Mi'kmaq Chiefs 2007). The Proponent's Guide was used to inform engagement activities with the Mi'kmaq of Nova Scotia (refer to Section 3 for additional information on

Mi'kmaq engagement activities) and the Mi'kmaq Ecological Knowledge Study (MEKS) Protocol was adhered to in the preparation of an MEKS for the Project by Membertou Geomatics Solutions (refer to Appendix C). Another relevant guideline with respect to Mi'kmaq engagement is the *Aboriginal Consultation and Accommodation - Updated Guidelines for Federal Officials to Fulfill the Duty to Consult* (Department of Indian Affairs and Northern Development 2011).

2.0 Project Description

2.1 PROJECT BACKGROUND

In December 2005, an Xstrata Coal-led consortium, through Donkin Tenements Inc. (DTI), was awarded a Special License by the Nova Scotia Provincial Government for a period of three years to conduct exploration activities to determine the viability of developing the Donkin coal resource block. XCDM was formed in connection with a joint venture partnership with Erdene Gold Inc., now Erdene Resource Development Corp. (Erdene), which proceeded to investigate the Donkin Mine. The Special License was subsequently converted into a 33-year Special Lease on May 1, 2009 by NSDNR. The Special Lease is renewable for an additional 20 years and grants DTI exclusive rights to mine coal within the Lease boundary.

On January 31, 2007, DTI entered into a five-year Coal Gas Exploration Agreement (No. 07-31-01-01) which authorized DTI to explore for coal gas in the Donkin Resource Block. On May 5, 2011, DTI requested a five-year extension to the agreement. The extension was granted by the Minister of Energy to January 31, 2017.

On October 29, 2008, Xstrata Coal registered the Donkin Underground Exploration Project for environmental assessment with Nova Scotia Environment, in accordance with Part IV of the provincial *Environment Act*. The EA Registration document was based on field studies and literature searches completed by CBCL Limited from 2006 to 2008. The objective of the exploration project was to provide the Proponent with sufficient information and confidence in data with respect to the subsea geology, coal quality, hydrology, and methane gas regime to determine the commercial viability of developing a longwall mine at Donkin. The works associated with this registration were intended to be executed in two phases: the first phase involved preparatory works both on the surface and underground; the second phase was intended to involve the use of a continuous miner system for a period of up to two years to remove an average of 2,000 tonnes of coal per day (approximately 0.5 million tonnes per annum). On December 18, 2008 the Minister of Environment announced a decision to approve the undertaking subject to a number of conditions.

Subsequent to the EA approval, the Donkin Mine has been progressing through further stages of study and assessment including a Provincial Industrial Approval to Construct and Operate - Underground Mine (Approval # 2009-066677) and a Provincial Water Approval for the storage of water in excess of 25,000 m^3 via a dam (Approval #2008-060929, which refers to the Cape Breton Development Corporation (DEVCO) settling pond.

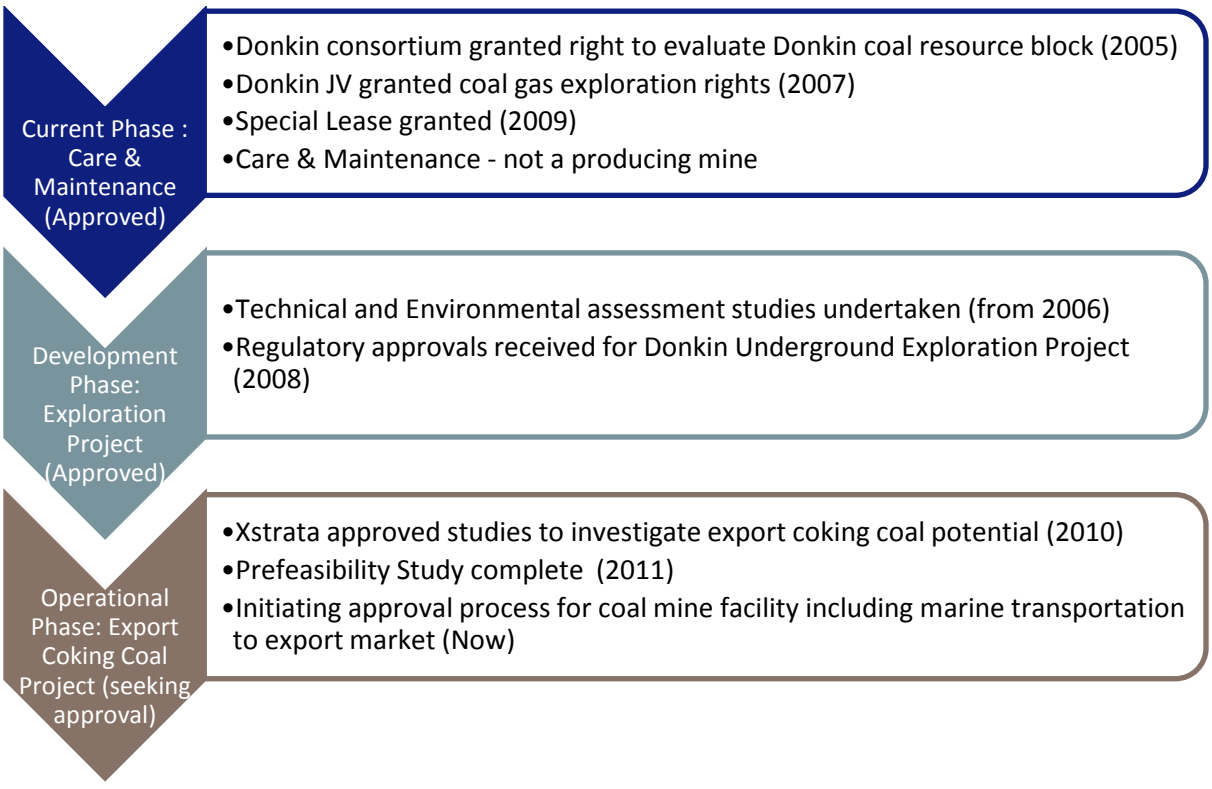
In June 2009 a Feasibility Study of the Exploration Phase of Donkin Mine utilizing a single continuous miner was approved conditional upon XCDM exercising a sales contract with the sole power utility, Nova Scotia Power Inc. (NSPI), for the raw coal that would be produced. Unfortunately the parties were unable to reach agreement on the terms of the sale contract. As

a result, operation of the Donkin Underground Exploration Project has not occurred; activities at Donkin Mine have been restricted to care and maintenance (*i.e.,* no coal mining).

In early 2010 Donkin Mine underwent another thorough review of all available options. XCDM decided to conduct a prefeasibility study of an option whereby multi-continuous miners (CM) would be utilized to produce Run of Mine (ROM) coal from the Harbour and Hub seams that would subsequently be washed to produce a coal product that is primarily suitable for sales into coking coal markets, but may also supply thermal coal markets.

Figure 2.1.1 illustrates the three general phases of Donkin Mine – the current phase of care and maintenance of the mine site; the development phase previously approved by the Nova Scotia Provincial Government; and the operations phase described in this document, the Donkin Export Coking Coal Project.

Figure 2.1.1 Current and Proposed Phases of Donkin Mine



2.2 PURPOSE OF AND NEED FOR THE PROJECT

The purpose of the Donkin Export Coking Coal Project is for the development and operation of a commercial underground coal mine to produce a coal product that is primarily suitable for export sales into the international coking coal markets, but, dependent upon prevailing market conditions, may also produce thermal coal. The Project is proposed to be developed on Donkin Peninsula, Cape Breton, Nova Scotia, in a manner that is socially, environmentally and technically feasible, and will provide a reasonable return on investment to Company shareholders.

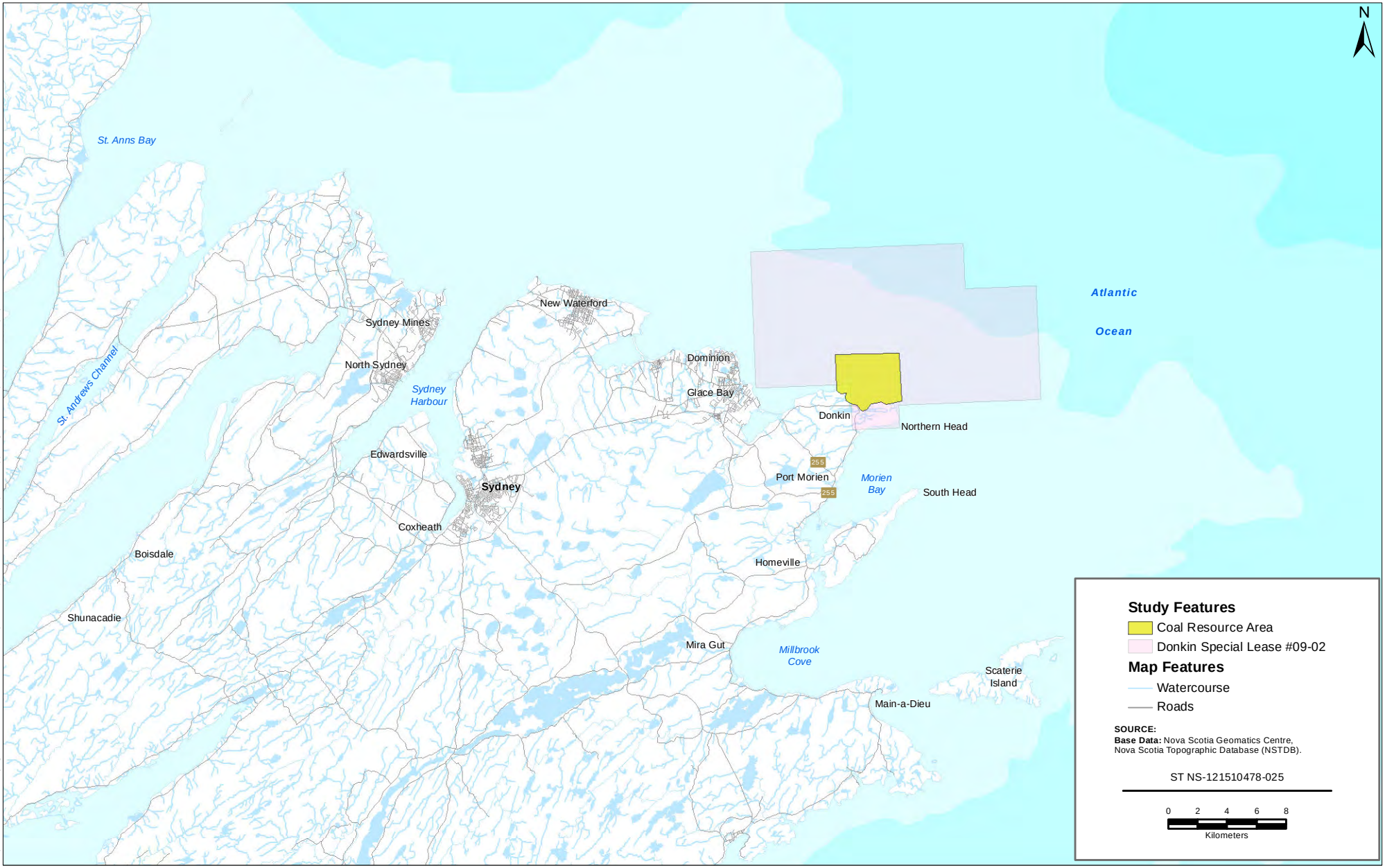
2.3 PROJECT LOCATION

The Project is located at the site of the existing Donkin Mine on the Donkin Peninsula (59° 49' 38" W, 46° 10' 33" N) within CBRM. The Donkin Peninsula is situated in Nova Scotia on the Atlantic coast of Canada. Nova Scotia is part of the Canadian Maritimes region and forms the southeastern limits of the Gulf of St Lawrence. Cape Breton Island is northeast of mainland Nova Scotia. Nearby communities include the rural villages of Donkin, Port Caledonia and Port Morien. Historically, these communities have been built on coal mining and fishing industries.

Key social infrastructure in the Donkin-Port Caledonia region includes the Donkin Elementary Junior High School, Donkin Volunteer Fire Department Fire Hall, Dearn's Corner Gas Station, Royal Canadian Legion Branch and the Senior Citizen's Complex.

Port Morien, approximately 10 km from Donkin, is one of the oldest villages in Canada and is home to the first commercial coal mine in the country. It has approximately 700 residents and social infrastructure includes an elementary school (Gowrie School), Royal Canadian Legion Branch (which also serves as a Community Access Program venue), bed and breakfast, and seasonal tea room. Of particular importance is the presence of the small port which supports the local lobster fisheries for the region. The key commercial centre for the region is Glace Bay.

The Sydney coal basin is located along the northeastern coastline of Cape Breton Island, mostly offshore, under the Atlantic Ocean. The basin structure was determined by geophysical methods in 1976 and is described as a relatively simple basin, with the beds dipping towards the deeper and central parts of the basin (20 km north of Donkin Mine), steeper along the coastline and becoming flatter offshore. Along the southern boundary of the basin (Cape Breton coastline), a marginal fold belt exists, with north-easterly trending folds and minor faulting affecting the Sydney coalfield mines. The Donkin Special Lease is presented in Figure 2.3.1.



PREPARED BY: K Keizer	Donkin Export Coking Coal Project	FIGURE NO.: 2.3.1
REVIEWED BY: H Giddens	**Donkin Coal Special Lease Area**	DATE: Apr 26, 2012
CLIENT: xstrata coal		Stantec

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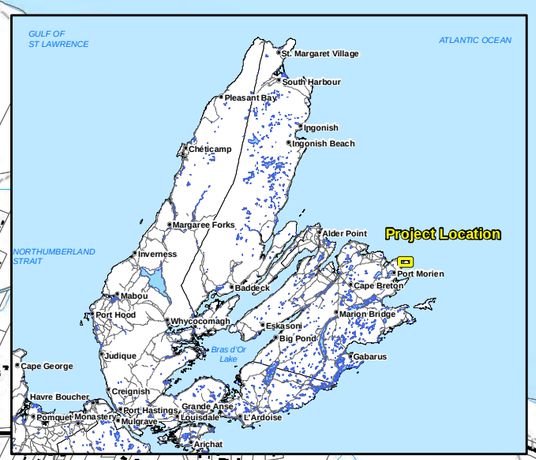
Xstrata Coal currently owns approximately 99 percent of the land on Donkin Peninsula. Figure 2.3.2 illustrates Xstrata Coal owned properties and Property Identification (PID) numbers. The non-Xstrata Coal portions of land include the government-owned Fisherman's Reserve at Schooner Pond Cove and five small resident lots which are not required for the Project. Current land uses entail either mining areas under XCDM control and/or recreational and buffer zone areas.

Although once settled and some of the lands grazed, the use of Donkin Peninsula has been sparse since DEVCO closed the mine tunnels in 1992. Much of the area has been left to revegetate and regular use has been limited to community access to the headland and the well-used trails for walking. The Donkin Peninsula (Cape Perce), Schooner Pond and Schooner Pond Cove serve as popular local recreational respites for the communities of Port Caledonia, Donkin and Port Morien. Birdwatchers, hikers and the local Port Morien Wildlife Association frequent the area.

The local community has identified continued access to the Schooner Pond Beach and headlands as a concern during previous stakeholder consultations for the Donkin Underground Exploration Project. The Project is committed to maintaining access to the community.

The Donkin Peninsula is recognized to be part of an Important Bird Area (IBA) by the Canadian co-partners of BirdLife International (Bird Studies Canada and Nature Canada). The Northern Head and South Head IBA (NS053), in which the peninsula is located, is considered to be "Globally Significant" as a result of supporting relatively large congregations of nesting seabirds and is also recognized for providing habitat for other species of conservation concern (IBA Canada n.d.). Northern Head supports a seabird colony that is used by Black-legged Kittiwakes, Great Cormorants, Double-crested Cormorants, Razorbills, and Black Guillemots.

The barge load-out facility, which will be constructed of a breakwater and nestled wharf, and features a mooring point, will be located on the south side of the Donkin Peninsula. The transshipment mooring site is located approximately 8.8 km from the Donkin Peninsula barge load-out facility and approximately 1.6 km southeast from South Head (the southernmost peninsula in Morien Bay) within Mira Bay, Cape Breton. Nearby coastal communities include Main-a-Dieu, Bateston, Mira Gut, Wadden's Cove and Port Morien. The shoreline adjacent to the transshipment location is predominantly sheer, rock face cliffs, with no beaches.



PREPARED BY: R. Sutcliffe REVIEWED BY: M. Huskins-Shupe CLIENT: xstrata coal	Donkin Export Coking Coal Project **Property Ownership on the Donkin Peninsula**	FIGURE NO.: 2.3.2 DATE: Apr 26, 2012 Stantec

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Mira Bay is the southernmost bay in Sydney Bight and has an abundance of marine life including a herring spawning area, habitat for lobster and scallop, rock crab, oysters and the largest seal breeding colony on the Atlantic coast of Nova Scotia (Schaefer *et al.* 2004). Mira Bay has been identified as a proposed inshore Ecologically and Biologically Significant Area (EBSA) by scientific experts primarily due to the abundance of marine life and high species aggregations, including breeding colonies of Black-legged Kittiwakes, and Double-crested and Great Cormorants (Doherty and Horsman 2007).

The transshipment mooring is located 10.5 km from Scatarie Island and 10.2 km from St Anns Bank. Scatarie Island is a Protected Area of Nova Scotia and is designated an Important Bird Area (IBA) due to the presence of a threatened species (Bicknell's Thrush) and congregatory species. Scatarie Island is thought to have an estimated 10 to 25 territorial male Bicknell's Thrush of a total global population 5,000-15,000 (IBA Canada n.d.). Also it is estimated that several thousand pairs of Leachs Storm-Petrels breed on Scatarie Island. From mid-July to September there is a large number of southward migrating Whimbrels feeding on the island and Buff-breasted Sandpipers are occasionally seen on the island (IBA Canada n.d.). St. Anns Bank is a candidate area of interest (AOI) as a Marine Protected Area under *Canada's Oceans Act*. More information on characterization of the locations of the marine Project components is provided in Section 5.7.

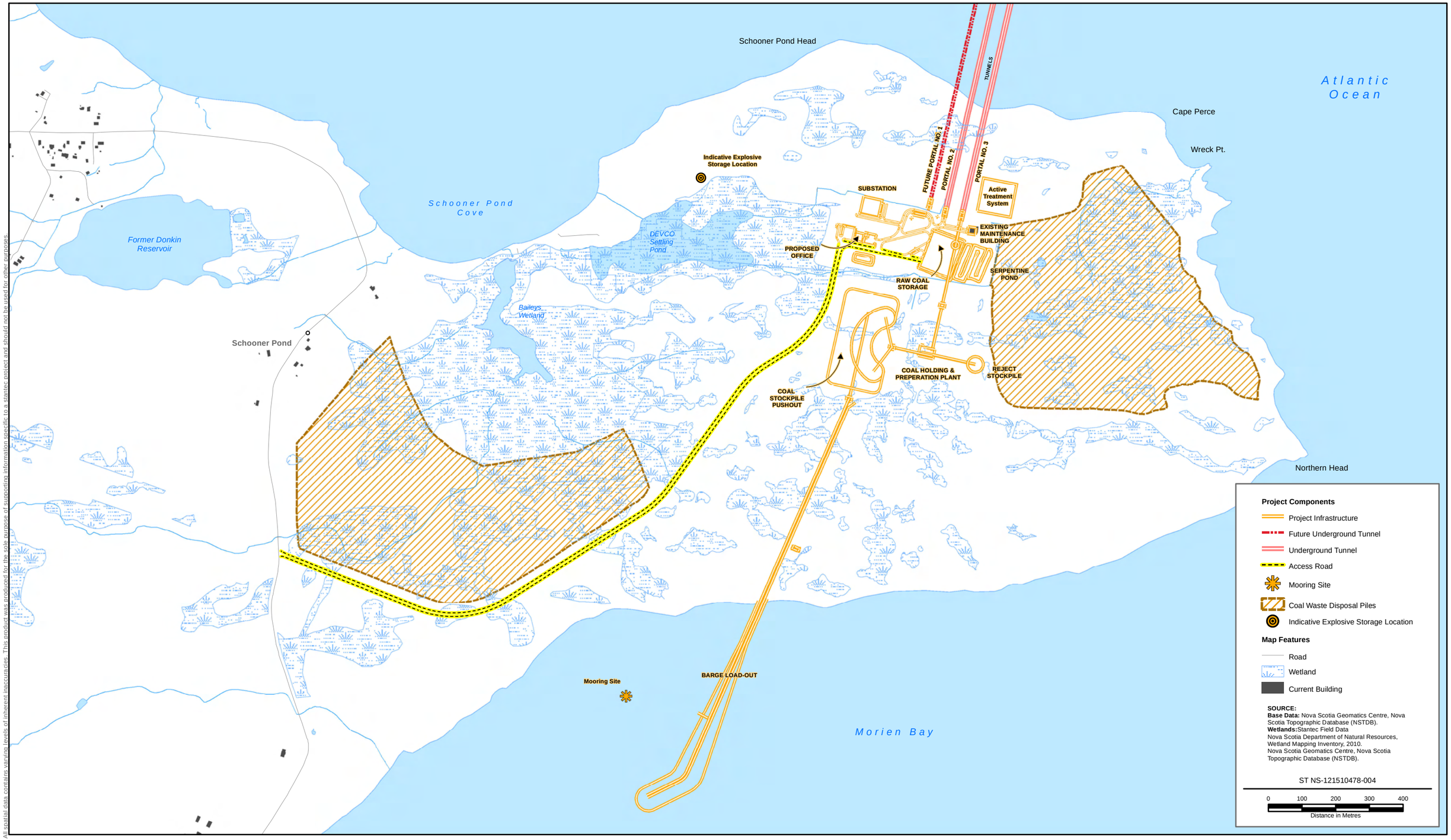
2.4 PROJECT FACILITIES AND COMPONENTS

The Project will consist of land-based and marine-based components. Key Project components are discussed below and are shown on Figure 2.4.1. Details on Project activities associated with these components are addressed in Section 2.5.

The Project Development Area (PDA) (*i.e.*, footprint of Project components/activities) comprises:

- existing and planned underground and surface infrastructure at the site on the Donkin Peninsula (including the Coal Handling and Preparation Plant, and product stockpiles and coal waste disposal piles);
- a marine barge load-out facility (Morien Bay) and transshipment site (Mira Bay) and vessel route between the two locations;
- an approximately 25 km long 138 kV transmission line within existing rights-of-way (RoWs) from Victoria Junction to Donkin Mine; and
- the trucking haul route (to be for domestic customers and used when marine transportation is considered impractical; refer to Section 2.5.2.3 and Figure 2.5.3 for information on the haul route to be used).

Additional details on Project components and activities are provided below and in Section 2.5.



PREPARED BY: M Huskins-Shupe REVIEWED BY: K Keizer CLIENT: xstrata coal	Donkin Export Coking Coal Project **Conceptual Project Development Area**	FIGURE NO.: 2.4.1 DATE: May 09, 2012 Stantec

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2.4.1 Mine Site

2.4.1.1 Underground Mine

The proposed mining activity at Donkin Mine will target the Harbour Seam which is part of the larger Sydney Coalfield. The Sydney Coalfield is a coal-bearing sequence of Carboniferous age, Westphalian series Morien Group. The overburden consists of interbedded shales, claystones, siltstones, sandstones, and coal. Post-depositional faulting and folding are common within the Sydney Coalfield. It is also anticipated that un-mapped faults exist within the resource and will be encountered during the proposed mining.

The Harbor Seam, the initially exploitable seam, and the Hub Seam, are located approximately 3.5 km offshore with the seam sub outcropping in the ocean floor. The Harbour Seam dips approximately 10° in a northerly direction and ranges between 1.7 m and 3.7 m in thickness. The minimum mining thickness is 2.0 m and the average seam thickness is 2.8 m. Localized bands of high ash and sulphur coal have been identified near the margins of the Harbour Seam. The ash content varies between 10 and 21 percent and the sulphur content ranges between 3.5 and 8.5 percent.

The Harbor Seam sub outcrops approximately 2,060 m offshore along the centre line of the existing tunnels. Because the seam dips at approximately 10º in a northerly direction, it obtains a depth of approximately 205 m below sea level where the seam is intersected by the two access tunnels. At this point, the ocean is approximately 24 m in depth, and the unconsolidated ocean floor sediments are estimated to be approximately 5 m in thickness. This leaves approximately 175 m of rock or overburden protecting the coal seam. The seam continues to dip in a northerly direction and at approximately 3,900 m from the intersection with the access tunnels reaches a depth of approximately 550 m below sea level. At this point, the rock overburden is approximately 495 m in thickness.

The Hub Seam thickness ranges from 1.5 m to 3.6 m, with an average of 2.5 m. Coal thickness increases from west to east across the resource area in both seams. The selected minimum mining thickness is 2.0 m. Maximum mining thickness is approximately 3.65 m. The intent is to mine full seam height within the mineable thickness range. Mineable thickness is a critical factor in the specification of properly sized equipment and also influences the design of the coal pillars.

There are currently two surface portals to the existing two subsea tunnels which extend approximately 3.6 km from the Donkin Peninsula to intersect with the Harbour Seam. The previous owners of the mine (DEVCO) sealed the tunnels in 1992 and the tunnels were allowed to fill with water (from groundwater intrusion). Since taking ownership, XCDM has removed more than 1460 million litres of water from the tunnels (as of March 2012). As part of the ongoing care and maintenance activities of the mine, dewatering continues on an ongoing basis.

A third mine access tunnel will be excavated prior to when the third and fourth CMs are introduced (estimated to be in Year 4 of the development), in order to provide adequate mine ventilation. The tunnel will be approximately 7.6 m in diameter and 3.6 km long.

In the event mining encounters stone intrusions or similar hard material requiring explosives use underground, it is proposed to have a small amount of explosives stored onsite. Regulatory requirements regarding storage and use will be adhered to. An indicative explosives storage location is shown in Figure 2.4.1. This figure indicates that the proposed explosives storage location satisfies NRCan's booklet on *Blasting Explosives Initiation Systems - Storage, Possession, Transportation, Destruction and Sale* (March 2008) in that it is:

- 503 m away from the nearest inhabitated building labelled “Proposed Office” (the booklet states a minimum distance of 400 m); and

- 191 m away from the nearest waterway, the mouth of natural watercourse feeding into the DEVCO settling pond, and 77.5 m away from the nearest non-natural waterbody, the DEVCO settling pond, used in the mine’s water management system (the booklet states that if a magazine is situated within 30 m of a body of water, an environmental assessment is required).

Two explosives storage magazines are proposed at this location: one magazine is to store up to 500 kilograms (kg) capacity of explosives; the other to store initiation systems (*e.g.*, detonators) of up to 250 kg in capacity. It is likely that footprint dimensions of the magazine to store the explosives will be approximately 1.2 m wide X 1.2 m long. It is expected that the magazine for the initiation system will be similarly sized and located a sufficient distance away from the explosives themselves (*i.e.*, 50 m or less if the Explosives Inspector determines that the detonator quantity of no more than 250 kg capacity is small). As per Section 1.3.1, XCDM has provided further information to NRCan regarding explosives. Further information will be provided to both the federal (*i.e.*, NRCan) and the provincial (*i.e.*, Nova Scotia Department of Labour and Advanced Education) explosives regulators during the permitting process subsequent to the environmental assessment.

Details on mining operations including the use of mining equipment are provided in Section 2.5.2.

2.4.1.2 Coal Handling and Preparation Plant

The Coal Handling and Preparation Plant (CHPP) is designed to wash mined coal to a given coal specification and involves the following components:

- A raw coal stockpile, reclaim and sizing system to prepare a minus 50 mm raw coal feed to the CHPP;

- A 650 tonnes per hour (t/h) processing plant featuring a single stage large diameter dense medium cyclone (DMC) to process coal, spirals to process the mid-size material, and flotation to beneficiate the fine coal;

- A product stockpile, sampling (*e.g.*, includes coal weighing and sampling facilities) and reclaim system to prepare product coal ready for loading onto a barge or truck load out facility;

- A dry disposal reject handling system; and

- Offices, workshop, laboratory, crib rooms and ablutions required directly for operation and control of the CHPP.

The CHPP will be inside a free standing insulated and heated building. The type of cladding is expected to consist of twin sheets of metal sandwiching a thick insulation layer. At this stage of Project development, it has been assumed that the roof and all walls of the CHPP and filter buildings will be fully clad to ground level, with some allowance made for door and maintenance access and consideration for visual impacts both during operations and post decommissioning.

To cater for personnel comfort and to provide a stable operating environment for equipment and machinery, it is proposed to centrally heat the interior environment of all buildings. An externally located package boiler system (*e.g.*, gas, oil or coal fired) would supply heated water to these buildings in a closed loop system.

Based on the requirement for 3.6 Mtpa ROM coking coal, the CHPP will have a design feed rate of 650 t/h (as mined). CHPP engineering design considerations have allowed for the CHPP a 20 year minimum life, based on operating 24 hours per day, 7 days a week and up to 6,000 hours per year. For more information on coal processing, refer to Section 2.5.2.2.

The CHPP will generate a sizeable volume of coal waste over the lifetime of the Project. Onsite surface disposal of coal waste has been selected as the preferred disposal option. This approach will result in the creation of two large coal waste disposal piles which will be constructed and remediated in a phased approach and will substantially affect the local landscape. Refer to Section 2.7.1 for more information on the coal waste disposal piles.

2.4.2 Barge Load-out Facility

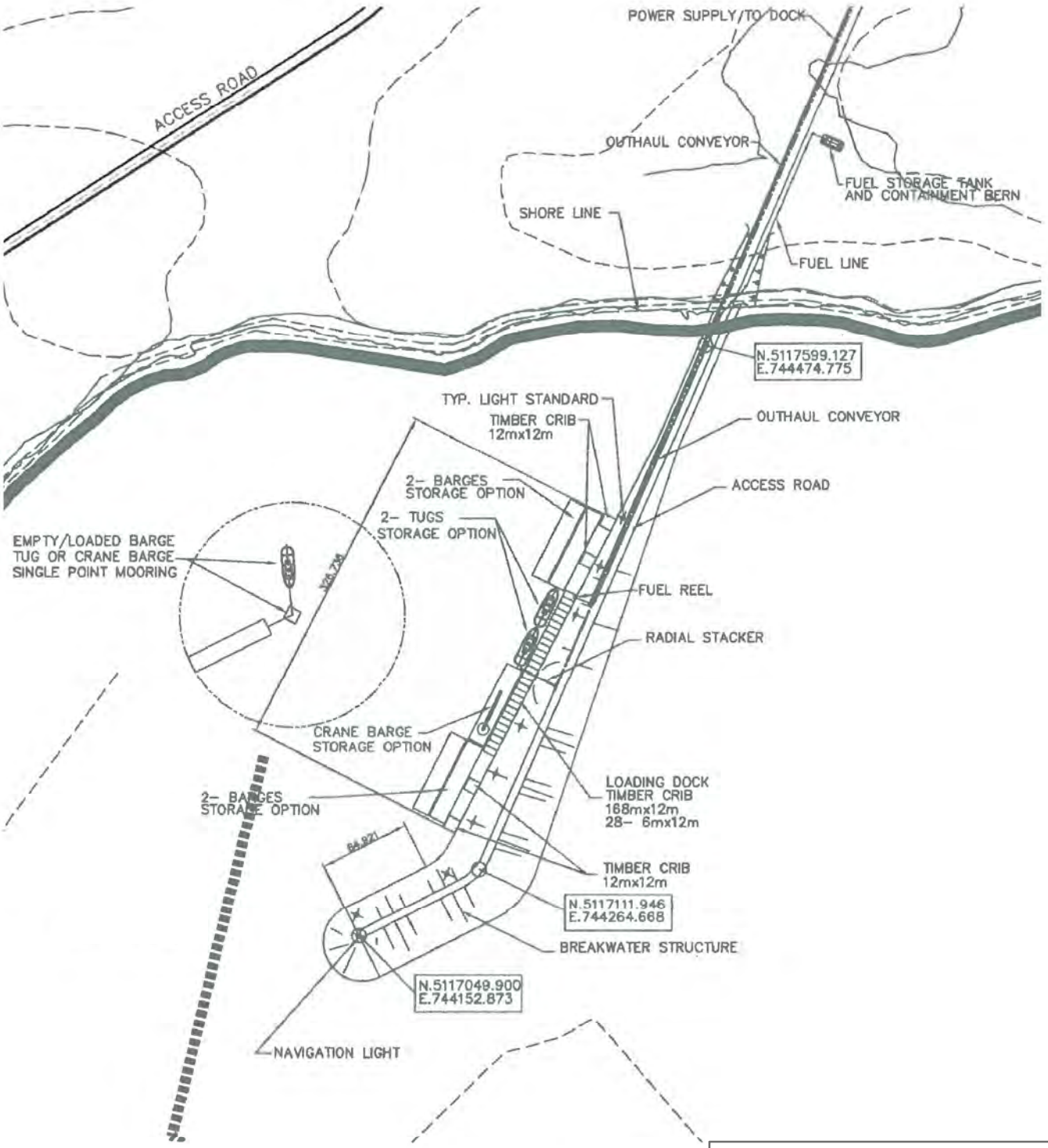
The barge load-out facility will consist of a breakwater, wharf and mooring point. The product coal will be reclaimed to an overland conveyor that traverses the onshore section from the product stockpile to a nearshore loading berth to accommodate the direct loading of four 4,000 tonne coastal barges (CBCL 2012). The barge load-out facility, located in water depths of approximately 6 m, consists of a breakwater and nestled dock to protect the floating equipment and loading dock during high wind and wave events.

The primary function of the dock is to load coal from a conveyor/radial stacker system to a barge. The main dock will be a continuous structure with adjacent mooring blocks to facilitate berthing of the various vessels. The dock is to be a timber crib gravity structure and is approximately 660 m long with the elevation of the dock surface to be 2.5 m above Chart Datum. This is based on a maximum tide of 1.4 m and a storm surge of 0.7 m plus 0.4 m for wave chop conditions. A loaded barge has a draft of 3.0 m and the required under keel clearance is 1.0 m; consequently the bottom of the dock structure is to be located at a minimum of 4 m below chart datum. The dock is protected from wave action by the breakwater structure. Nonetheless its elevation could be raised during detailed design without any impact on the overall footprint of the facility.

The breakwater structure for this location is a conventional rubble mound structure consisting of a primary armour stone outer face underlined with a filter stone layer, which is underlined by a geotextile filter fabric over a crushed stone core. The elevation of the breakwater structure is to be 5.0 m above Chart Datum. The design of both the dock and the breakwater takes into account the extreme water levels from high tide, storm surge, projected sea level rise and wave run-up as described in Sections 5.7.2.3 and 8.5. Figure 2.4.2 shows the conceptual design of the barge load-out facility and Figure 2.4.3 shows a typical road/breakwater section and wharf/ breakwater section. The barge load-out facility will include material handling outhaul conveyor, and a radial, luffing telescopic stacker.

An onland fuel storage tank with a minimum capacity of 200,000 L will be used for refueling of marine equipment. A containment berm with a capacity of 110 percent of full tank capacity will surround the tank. The fuel lines from the tank to the dock area will be above grade to allow for continuous inspection, but will have protective barriers to prevent any damage from vehicle's operating on the wharf. The tank will be filled from tanker trucks accessing the tank via the road corridor.

In addition, the barge load-out facility will include the following ancillary items: fuel lines and valving for fueling of vessels; and light, power, and potable water supply.



SOURCE:
Document: Marine Transport Options, CBCL Limited, January 2012

Coordinate System: NAD 83 UTM Zone 20N

ST NS-121510478-47

NOT TO SCALE

PREPARED BY: M. Huskins-Shupe	Donkin Export Coking Coal Project	FIGURE NO.: 2.4.2
REVIEWED BY: C. Shupe	**Barge Load-out Conceptual Design**	DATE: Apr 26, 2012
CLIENT: xstrata coal		Stantec

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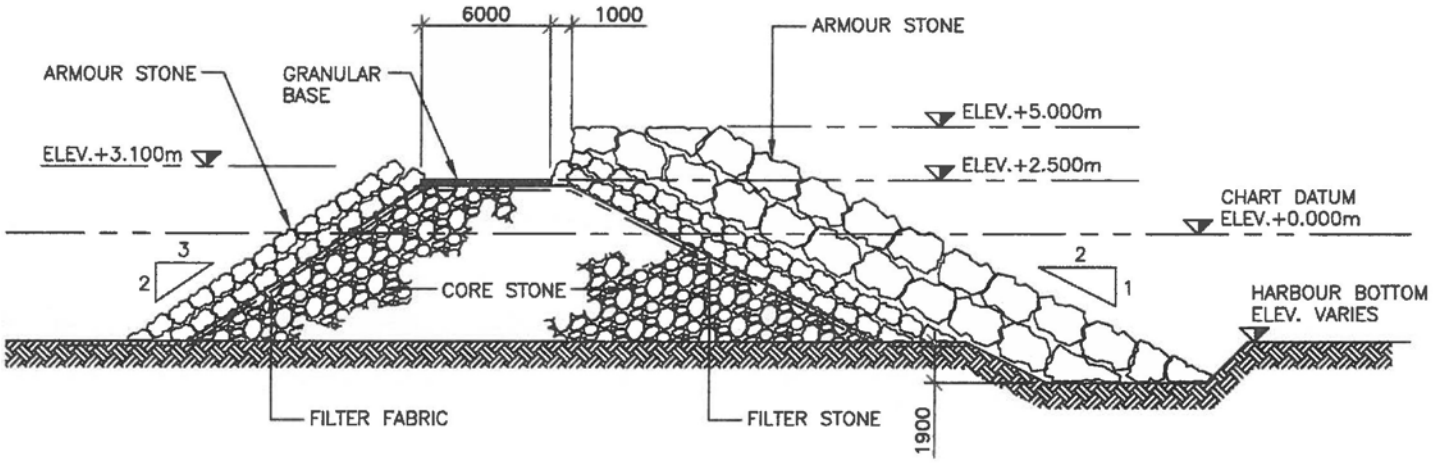
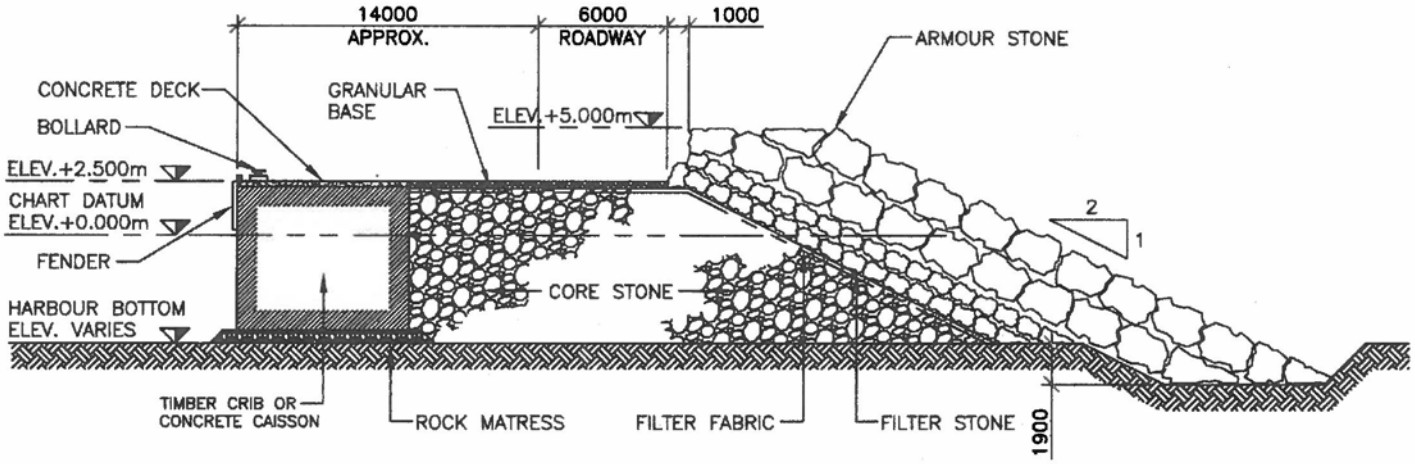


Typical Road/Breakwater Section



Typical Wharf/Breakwater Section

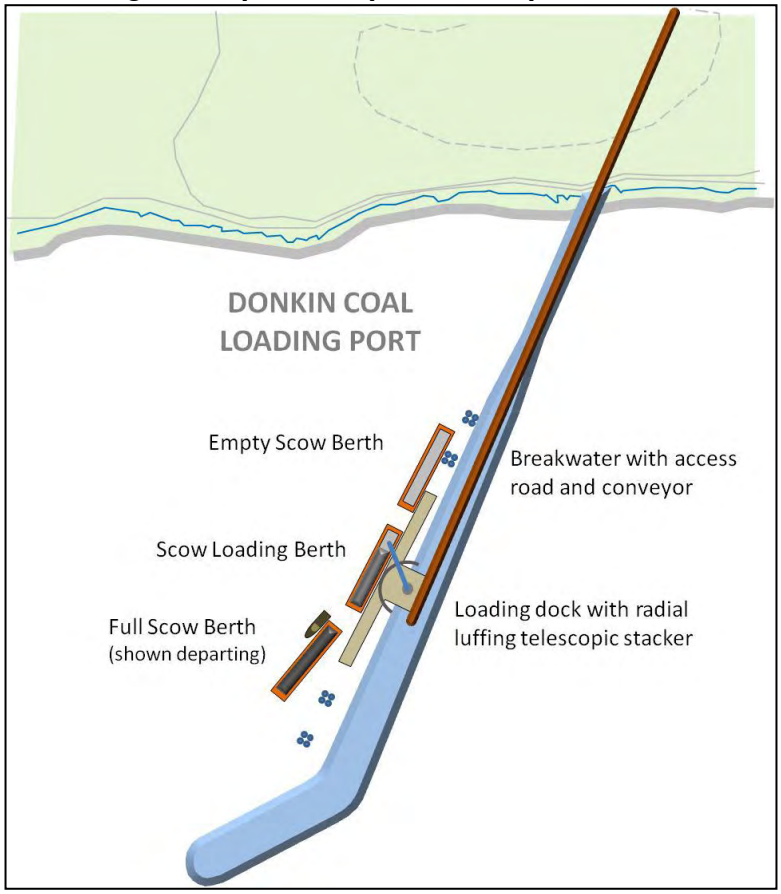
SOURCE:
Document: Marine Transport Options, CBCL Limited, January 2012
ST NS-121510478-48

NOT TO SCALE

PREPARED BY: M. Huskins-Shupe	Donkin Export Coking Coal Project	FIGURE NO.: 2.4.3
REVIEWED BY: C. Shupe		DATE: Mar 28, 2012
CLIENT: xstrata coal	**Breakwater Sections**	Stantec

As illustrated in Figure 2.4.4, the loading berth will be designed with three berthing positions: a holding berth for an empty barge (otherwise known as a scow), a coal loading berth and a holding berth for a full scow. A cable-drum barge mover will be used to move the scows along the three berthing positions. There will also be adequate mooring space within the protected basin to moor the crane barge, the tugs and all of the coal scows (see Figure 2.4.4 below).

Figure 2.4.4 Coal Loading Port Operation (CBCL 2012)



2.4.3 Transshipment Site

The transshipment mooring site is located approximately 1.7 nautical miles (3.2 km) southwest of Cape Morien (59° 48’ 00” W, 46° 06’ 30” N), and approximately 4.75 nautical miles (8.8 km) from the barge load-out facility, at a depth of approximately 24 m; a depth suitable for the passage of ocean going vessels of Panamax to Cape Size. It will consist of a single buoy moored to the seafloor by several chain legs secured to a drag anchor or driven anchor at relative intervals in a radial arrangement. The steel hulled buoy, equipped with an access ladder, handrails and navigation beacon light will contain a swiveling capability to rotate about the splayed anchor legs.

The buoy will be classified as a private aid to navigation according to the Canadian Coast Guard. Mooring buoys will be white and orange with the orange covering a horizontal band of the upper one third of the exposed buoy. It will likely be marked with a quick flashing yellow beacon with a 0.5 second interval and 15 flashes per minute. Navigation markings are subject to review and approval by the Canadian Coast Guard.

Anchors will be a high capacity type anchor with an ultimate holding capacity greater than 200 tonnes. Additional geotechnical characterization at each anchor position is needed to confirm anchor size and holding capacity. All chain and hardware will conform to API 2F (Atlantic Petroleum Institute Mooring Chain Specification).

The transshipment facility would accommodate bulk vessels (*e.g.*, Cape size and/or post-Panamax ships) during transshipment operations for approximately four to ten days depending on bulk vessel type. Figure 2.4.5 presents the anchor coordinates, buoy location, footprint of the anchor and ground chain area and swing radius of the mooring.

2.4.4 Ancillary Components

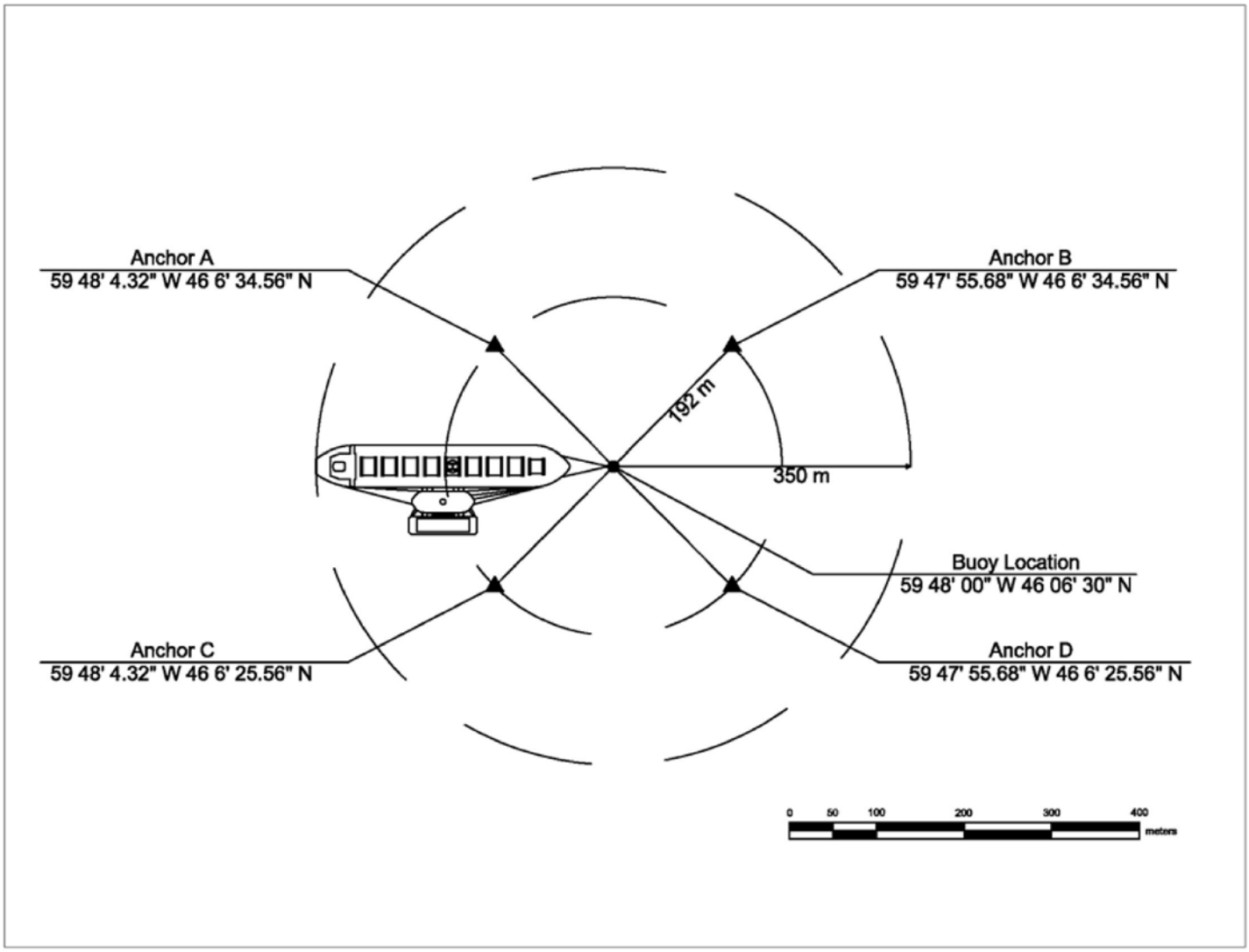
Ancillary services to support the Project include administration/office buildings (including workshop), security fencing, roadways, water infrastructure (including dust suppression systems), materials handling, mobile equipment (including truck loading) and a 138 kV transmission line from Victoria Junction to the Project site.

Site Facilities and Buildings

The administration and bathhouse facilities will be housed in a new modular style building which will also include a control room and lamp room. This structure will be constructed such that it could be easily expanded. The building has enclosed breezeways between modular units. It also includes an enclosed muster area with a roller door for use during the cold months.

There will be an equipment staging area adjacent to the administration building. This lay down area will be used to store non-weather sensitive materials. This area will also be used to park mine vehicles. This area will also house a storage silo for dry materials, including limestone dust used in the mining process. A self-contained 10,000 litre diesel storage tank with a dispensing station for fuelling the diesel mine equipment will be located near Tunnel #2. There will also be a 200,000 litre diesel tank and containment berm located adjacent to the coal product conveyor with fuel lines running to the barge load-out facility to fuel marine vessels.

It is proposed to situate the workshop, warehouse and other maintenance facilities within the existing Quonset Hut. This building is approximately 20 x 25 m and is fully insulated. This building will be serviced with the same potable water and sewage system designed for the building compound.



SOURCE:
Document: Marine Transport Options, CBCL Limited, January 2012

Coordinate System: WGS 1984

ST NS-121510478-46

NOT TO SCALE

PREPARED BY: M. Huskins-Shupe	Donkin Export Coking Coal Project	FIGURE NO.: 2.4.5
REVIEWED BY: C. Shupe	**Single Buoy Mooring Concept for Transshipment Facility**	DATE: Apr 25, 2012
CLIENT: xstrata coal		Stantec

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There are two electrical sub-station buildings that need to be constructed to house the various electrical components. These buildings are to be located adjacent to the administration/ bathhouse and the mine ventilation fans. These electrical substation buildings will be constructed as light duty, insulated, metal clad buildings on an engineered concrete slab complete with housekeeping pads for the electrical equipment, ventilation, electric heat, a pedestrian door and a double door to facilitate installation of electrical equipment.

Security Fencing

Security fencing has been placed around the perimeter of the existing surface mine infrastructure. The fencing has been located to provide the maximum area accessible to naturalists while minimizing the length of fence required.

Roadways

Roadways and vehicle parking areas, including the site mine vehicle roads, will be delineated via a combination of graded berms, concrete abutments and guide posts with reflective indicators.

An access road from Long Beach Road to the mine site was constructed during the summer of 2010 under the existing approvals for the Donkin Mine gained as part of the Donkin Underground Exploration Project. This road is raised and ditches on each side serve as the principal drainage infrastructure. The access road was designed as a 9 m wide roadway connecting Long Beach Road to the proposed site entrance, following the path of an existing transmission line. The road structure consists of 800 mm of sub-base gravel and 400 mm of Type 1 and 2 gravels. It is intended to asphalt seal the access road after mine site construction has been completed.

A network of internal access roads will be required generally for the access of light service/ delivery trucks and passenger vehicles. With respect to onsite road construction, the current design for site preparation considers that the existing site is a competent fill which was previously gravelled and prepared. Additional gravels have also been added throughout the existing lay down area during the last two years and recent works demonstrate that the area is competent enough to accommodate heavy equipment traffic.

The parking lot has been designed for 120 vehicles based on a maximum shift size of full time staff, miners and contractor vehicles and will be provided with security lighting. This number of spaces allows for parking by both shifts with some allowance for carpooling.

Water Infrastructure

There will be three main requirements for water supply to the site:

- Shower/toilet water supply;
- Potable water supply; and

- Process water supply.

Currently the site utilizes a small dosing plant to soften bore water from the site for showering and sanitary use. Projected staffing will require an upgraded system. A new holding tank of approximately 30,000 litre capacity is planned to be included and located near the administration/bathhouse complex.

A potable water treatment plant treating onsite groundwater or piping from the former municipal water supply of the old Donkin reservoir are alternatives that are being considered for potable water.

It is expected that the mine and coal handling process demand will require supply from a municipal water supply such as the Donkin reservoir. However, if it is feasible to do so, reuse of the water accumulated in the underground workings, mine process water and/or the water used in dust suppression and cleaning systems may be utilized to supplement water demand through, for example, collection in the DEVCO settlement pond and directed through a water treatment system.

It is anticipated that dust and fire suppression water will be sourced from onsite water sources. A combined fire and hose down water reticulation system will be provided for the CHPP and will be fed from the clarified water tank located adjacent to the tailings thickener. Fire hydrants will be provided adjacent to the CHPP, and transfer stations. Pressure requirements for washdown hoses shall be the same as that for fire hoses and hydrants.

A dust suppression system will be provided which will connect to the above fire and hose down water reticulation system. Dust suppression sprays will be provided at the loading points to all conveyors on the raw coal system and will be controlled by the conveyor belt weighers. The dust suppression system will be limited (*e.g.*, to water truck operations only) during the winter months due to climate conditions.

The vessels will require potable water. Water will be delivered from the mine site potable water system via a buried water line along the access corridor. The pipeline on the dock will be heat traced and insulated for year round operation.

Materials Handling

All conveyors will be in enclosed gantries which will be heated via hot water pipes. The product stacker, however, will be an open structure. Reclaim tunnels will be heated in a similar manner to the conveyors. Stockpile activators and vibrating feeders on both the raw coal and product stockpiles will be provided to assist in the flow of potentially frozen material from the stockpiles. Transfer stations and the sizing station will be cladded and heated similar to the CHPP building.

The coal will be transported from the mine site to the barge load-out facility via an overland conveyor. The overland conveyor will have dust hoods over the conveyor to prevent dust migration. Similarly, the radial telescopic stacker used to load the barges will have dust hoods.

The discharge section of the stacker will have a dust hood and a banana peel flexible chute. The stacker chute through the luffing of the stacker will sit on the coal surface in the barge, so there is no free fall of the coal through the air column. The transfer point from overland conveyor to the stacker will be totally enclosed with a dust collection system. The head pulleys on each belt will be outfitted with a double belt cleaner system to control coal carry back on the return idlers.

Power

A new 138 kV transmission line will be required to be constructed from Victoria Junction to meet power requirements for the continuous miners, fans, CHPP and associated infrastructure. This transmission line will be constructed within existing rights-of-way (RoWs) with approximately 11.4 km of the route within an abandoned transmission line RoW and 13.8 km within an active transmission line RoW.

Radial distribution circuits, comprised of cables installed in underground duct banks will be utilized to deliver power to the various facilities onsite. A new fan house building will be designed and constructed to house the electrics for the main conveyor electrics and ventilation fans.

Outdoor general lighting will be provided to cater for night time operations. Stockpile lighting will be constructed to minimize potential for impact on surrounding environs.

A transmission line will be installed from the CHPP to supply power and lighting to the dock. At this time, shore power for the vessels is not envisioned as, similar to all mobile equipment, they will operate off their generators while at dock.

2.5 PROJECT ACTIVITIES

2.5.1 Construction

2.5.1.1 Site Preparation

With the exception of site preparation for coal waste stockpiles, which will occur progressively during operations (refer to Section 2.7.1.4), overall site excavation and grading is expected to be minimal. Much of the Project Development Area exists on previously disturbed lands. The only area requiring substantial site surface preparation will be the site of the CHPP and associated stockpile areas. This work will include the installation of all necessary sedimentation and erosion control measures, including the drainage infrastructure; this work will be done in accordance with Nova Scotia Environment's Erosion and Sedimentation Control Handbook for

Construction Sites. Ongoing monitoring will occur under the Project's existing sustainable development framework.

Site preparation will be an ongoing activity throughout the life of the mine operation as it will be necessary to prepare coal waste disposal piles on a progressive basis (refer to Section 2.7.1 for more information on site preparation of coal waste disposal piles).

No above-ground blasting will be conducted on site. All excavation, including cuts in the cliff to accommodate the marine loading conveyor, will be conducted by earth-moving equipment (*e.g.*, dozer ripping and/or hydraulic rock breaker).

2.5.1.2 Construction of Mine Site Infrastructure and Underground Preparation

Infrastructure and facility development planned for the Project includes: roadways; site buildings; security fencing; water supply; coal transfer (*i.e.*, conveyors, raw and product coal stockpiles); CHPP construction; and development of a third access tunnel.

In terms of site underground preparation, tunnel rehabilitation work is required within the two existing tunnels to ensure that they are secure and safe. The necessary underground installation work, including the installation of the conveyors and other equipment, will not be started until the rehabilitation of the tunnels has been completed.

To ensure adequate mine ventilation a third mine access tunnel will be required as the mine is being developed (planned for Year 4 when the third and fourth CMs are introduced). The tunnel will be approximately 7.6 m in diameter and 3.6 km long resulting in approximately 200,000 m^3 of *in situ* rock (likely composed principally of mudstone and sandstone) being excavated. It is likely that construction would be carried out using a tunnel boring technique similar to that used for the majority of developing the existing tunnels and so the waste would likely be a uniformly graded minus 75 mm minus crushed rock similar to that observed of the existing waste piles storing material from tunnel boring.

2.5.1.3 Construction of 138 kV Transmission Line

A system impact study done by Nova Scotia Power Inc. (NSPI) in May 2007 concluded that a new 138 kV transmission line will be required to be constructed from Victoria Junction to the Project to supply the load requirements for the Project. While a detailed System Impact Study will be required to confirm this requirement as well as the point at which the new transmission line should be interconnected with the NSPI transmission system, NSPI have indicated that this route remains the most likely route for the line (NSPI representative, pers. comm. 2012). This new 138 kV transmission line to the mine site is planned to originate at the Victoria Junction Substation, approximately 25 km from Donkin Mine (refer to Figure 2.5.1 for transmission line route). The line will be installed along existing RoWs including power transmission corridors currently used by NSPI for several existing transmission and distribution lines, between Victoria

Junction and Glace Bay. Detailed routing and design of the transmission line will be undertaken by NSPI who, it is anticipated, will construct and operate the system.

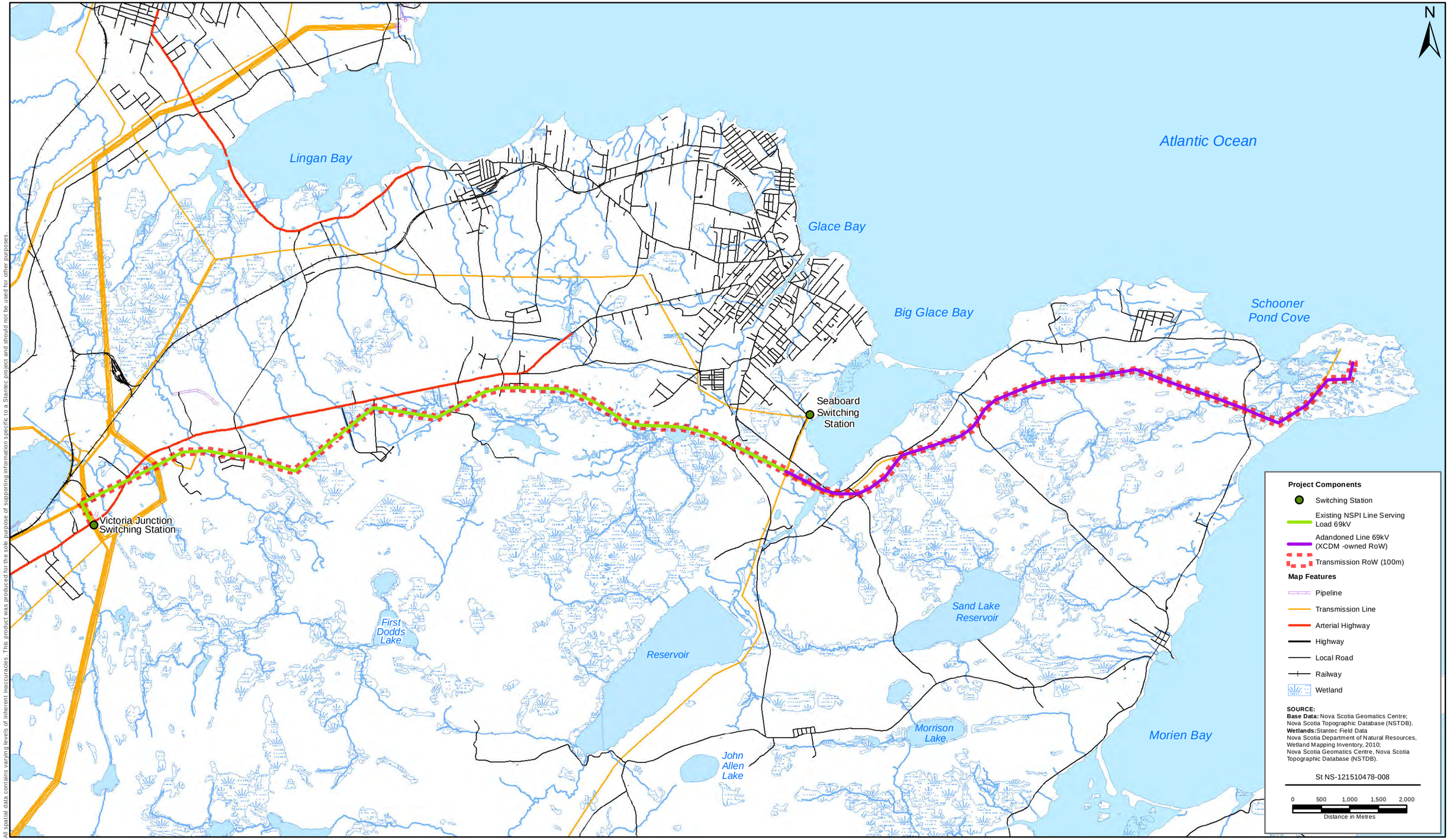
A new 138 kV line would be constructed from Victoria Junction (VJ) to Seaboard and then also from Seaboard to Donkin. The VJ to Seaboard line would be constructed within the existing NSPI RoW either with a newly constructed single circuit line (using H frame construction) or upgrading an existing single circuit line to accommodate the new 138 kV Line from VJ to Seaboard. NSPI's preference is to confirm there is enough space on the existing RoW to build a new Single Circuit H frame line from VJ to Seaboard. It is expected that confirming these details will be part of the detailed System Impact Study to be conducted by NSPI.

The existing 69 kV transmission line (L-5556) from Seaboard to Donkin is out of service and the RoW has become somewhat overgrown as it was not maintained as an active transmission line. Some clearing will therefore be required. The RoW is currently owned by XCDM, who will register easements for NSPI over these properties to construct the new line. A new line will need to be constructed as the old existing one was not built to 138 kV Line specifications (pole heights, clearances and span lengths). The new 138 kV line will be constructed using H frame structures with taller poles and allowing for longer span lengths than what is presently existing. The conductor would be either 336 or 556 ACSR depending on the size of the load.

2.5.1.4 Construction of Barge Load-out Facility

The construction of barge load-out facility (including conveyor, access road and breakwater infrastructure) on the Donkin Peninsula is required to facilitate direct loading of barges that are then moved to deeper water off Cape Morien to allow transshipment by floating crane into ocean going vessels up to Cape Size. Construction of the barge load-out facility is planned for start of Q4 2014 for completion by Q2 2016. A notice to Mariners will be issued to inform local vessel operators of construction activity in the area.

The dock will be a gravity-based, timber crib structure, requiring a sound bearing on rock or a competent fill to prevent settlement and tipping. Because it is assumed that bedrock is very close to the seabed surface, it is anticipated that minimal dredging will be required for the wharf structure. Marine engineering studies have determined that the only requirements for dredging are expected to be during the construction period for the wharf structures – *i.e.*, no maintenance dredging required due to Project activities (*e.g.*, coal deposition) is anticipated. In the unexpected event subsequent dredging is required, a separate approval process will be initiated. It is assumed approximately 11,250 m^3 of organic silt will be dredged. Dredge spoils will be disposed of on land comingled with coal waste and disposed in the coal waste disposal piles (refer to Figure 2.4.1 for proposed disposal locations).



PREPARED BY: M. Huskins-Shupe	Donkin Export Coking Coal Project
REVIEWED BY: C. Shupe	**Proposed 138 kV Transmission Line Route**
CLIENT: xstrata coal	FIGURE NO.: 2.5.1
	DATE: Apr 26, 2012
	Stantec

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Dredging will be completed using a dredge barge outfitted with either a crane or long stick excavator equipped with an environmental dredging cam or bucket. During dredging, the operation will be surrounded by a silt boom. Once the material is dredged and placed in the scow, it will be towed to the temporary landing dock where it will be transferred from the scow to trucks. To accommodate this operation, a landing area and portion of the breakwater must be constructed to obtain sufficient draught for docking of the scow. Timber cribs will be placed at the end of the partial breakwater structure; these cribs will eventually be used in the dock construction. During dredging, the cribs will provide a dock face for the scow and deck to support the excavator and truck. Truck boxes will be sealed and filled to 2/3 capacity to prevent any leakage of dredge spoils. Disposal activities will be contained within the Donkin property boundaries, negating the need for truck transport of dredge spoils over public roads.

The wharf will be composed of treated timber and galvanized hardware. The timber cribs will be built in large sections, then floated to the desired location and sunk in place on a prepared rock mattress. The timber cribs will be filled with ballast; a concrete deck is used for a working surface. Vertical timber fenders are typical. The timber crib can be built with local labour and materials and is expected to have a design life of greater than 40 years with maintenance.

Construction of the barge load-out facility will result in the loss of fish habitat which will require authorization and a fish habitat compensation plan under the *Fisheries Act*. Additional detail on proposed fish habitat compensation is provided in Section 5.7 and Appendix G.

2.5.1.5 Construction of the Transshipment Facility

The transshipment facility will consist of a single buoy mooring (SBM). Detailed design of the mooring will be based on geotechnical testing results, although it is anticipated that a minimum of four anchors, each with a minimum holding capacity of 200 tonnes, will be used to secure the SBM buoy. The benthic disturbance associated with the footprint from the anchors on the seafloor is anticipated to be contained within a 500 m radius. During construction and the deployment of the mooring tackle at the transshipment location, localized disturbance of the seabed and noise will be generated on the deck of vessels and which may be transmitted into the marine environment. This noise, however, will be of very short duration and over a few days only. Additional detail on noise emissions is provided in Section 5.1 (Atmospheric Resources).

An authorization for the harmful alteration, disruption and destruction (HADD) of fish habitat is not anticipated since the hard surfaces of the buoy, mooring chains and hardware, and the exposed parts of anchors on a soft substrate will enhance fish habitat whereby these surfaces will be colonized by marine organisms such as seaweed, mussels, and barnacles.

2.5.2 Operations

Operation activities will begin during a planned exploration phase (anticipated start 2014) and continue through the production phase (anticipated start 2016). With the exception of the

operation of the marine facilities, most of the Project operation activities are the same during exploration and production.

2.5.2.1 Underground Mining

The Donkin Harbour and Hub seam resources are located off the coast of Cape Breton beneath the Atlantic Ocean. There have been several submarine mines that have operated off the coast of Cape Breton in the vicinity of the Donkin License area, but none are currently active (Marston 2011). Mining will occur below the ocean floor at rock depths of greater than 200 m below sea level where existing access has already been established to the Harbour seam.

Initial mine development and production will only have two existing tunnels for access, ventilation and transport of coal out of the mine. The initial phase of mining is referred to as the exploration phase. This exploration phase will allow collection of multiple Harbour Seam bulk samples for testing, and various geotechnical investigations on mine and coal conditions (Marston 2011). This will involve the continuous miner mining a five roadway panel towards the eastern side of the lease to validate one suspected geological fault location. The miner will then relocate and mine in a northerly direction to validate another suspected fault location.

Mine design and mining operation are based on the use of standard continuous miner (CM) sections. A section consists of one CM, one roof bolter, and three shuttle cars. Depending on the roof conditions, the CM advances the entry or crosscut face on average 6 m and then moves to the next place to be cut. If the roof conditions allow, extended cuts up to 12 m could be taken. The roof bolter then moves into the recently mined place and installs the roof bolts and other secondary supports that make up the immediate roof support.

In the production phase, the underground coal mine is planned to utilize four continuous miners mining the production panels and producing approximately 3.6 Mtpa (approximately 9,970 t/d) ROM coal which is then processed onsite to produce an estimated 2.75 Mtpa (approximately 7,620 t/d) of marketable product coal. The panels of the mine plan have been oriented in a northerly direction down-dip and are generally 150 m to 230 m wide with a conveyor belt running down the centre entry of the panel.

Given the depth of the reserves at Donkin, large pillars will be left during advance under the deeper cover of a significant portion of the reserve. Retreat mining and partial extraction of the pillars will utilize the mining method that is practiced in Xstrata's South African operations known as "Xmas tree" pattern or Nevid pillar extraction. Once pillar extraction starts, higher production rates are expected. A geotechnical review of the Project will be done during detailed design and exploration phase to further predict the fracturing and subsidence effect.

The Donkin Mine is expected to produce relatively significant quantities of methane gas. As mining advances from the mains at the beginning of the panel toward the bleeder connection at the end of the panel, methane will be allowed to bleed off from the pillar areas into the main

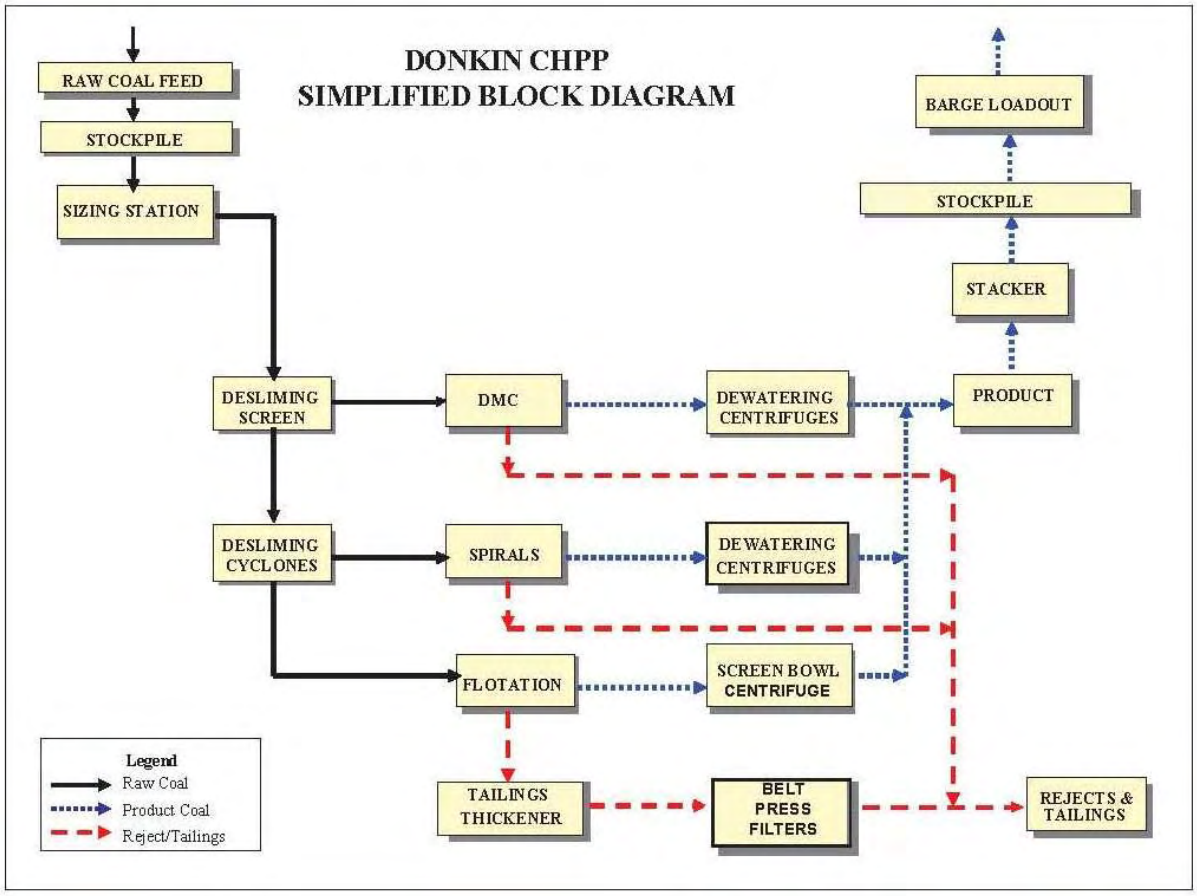
returns (Marston 2011).Although there is no history of outburst in shallow (<700m) workings, XCDM considers the management of outbursts to be fundamentally important and mining depth of 550 m will not be exceeded as a precaution. It is believed that the seam has a low to medium propensity for spontaneous combustion but this risk will be regularly monitored and controlled.

Good ventilation is the primary means for managing methane. As discussed above in Section 2.5.1.2, preliminary engineering studies have indicated that the two existing tunnels will provide enough air to safely ventilate the mine for the operation of two CM sections. A third tunnel will be constructed and in operation prior to the addition of the third CM section. A ventilation and gas management plan is being developed to determine design requirements (refer to Section 2.7.8 and Section 5.1 (Atmospheric Resources) for more information on methane management).

2.5.2.2 Coal Handling and Preparation

The ROM (raw) coal handling system will receive the raw coal directly from underground via the underground tunnel drift conveyor where it will be deposited onto a stockpile. The stockpile is necessary to disconnect the mine from the plant to allow for the higher mining rate and fluctuations in underground production. This “as mined” coal with an assumed top size of 250 mm is then reclaimed via the reclaim tunnel and three reclaim feeders. Discharge from the reclaim conveyor will be directed to a two stage crushing system comprising a sizing station to produce a minus 50 mm plant feed material. The crushed raw coal will discharge onto the plant feed conveyor a rate of approximately 650 t/h which in turn will discharge directly into the desliming screen feed box on the top of the CHPP building. A simplified process diagram is presented in Figure 2.5.2, with further description in the following text.

Figure 2.5.2 A Schematic Block Flow Diagram of the CHPP



Desliming and Coarse Coal Circuit

Plant feed coal will be slurried in the desliming screen feed box and fed onto a multislope desliming screen. The -1.4 mm wet weight (ww) material and water will be collected in an underpan and piped to a desliming cyclone feed sump. The minus 50+1.4 mm (ww) material will discharge from the desliming screen and be flushed by correct medium into a dense medium cyclone (DMC) feed sump.

The dense medium cyclone feed sump will be of a wing tank type design with constant sump level maintained through overflow of excess medium to the correct medium sump. Mixed dense medium and coarse coal from the DMC feed sump will be pumped to the dense medium cyclone.

Product coal and medium will overflow from the cyclone and discharge directly to a tile lined screen feed box which will feed onto a multislope product drain and rinse screen. Oversize coal

will be directed to coarse coal centrifuges for dewatering prior to being discharged onto a product conveyor.

Reject and medium coal will underflow from the dense medium cyclone into a tile lined screen feed box which will feed onto a multislope reject drain and rinse screen. The reject screen discharge chute will direct the reject material onto a reject conveyor.

Medium drained on the first section of the product and reject screens will be returned directly to the correct medium sump to be recirculated. Adhering medium will be rinsed from the coal by clarified water sprays on the rinse section of each of these screens.

The dilute medium from the rinse sections of the product and reject drain and rinse screens will be collected in a dilute medium sump. The dilute medium will be pumped to magnetic separators for efficient recovery of a high density concentrate. Concentrate from the separators will gravitate back to the correct medium sump.

Mid-Size Circuit

The desliming screen undersize (1.4 mm (ww)) material will be pumped to a cluster of desliming cyclones. The cyclones will classify the feed at approximately 0.250 mm, with the underflow (+0.250 mm) gravitating to spirals and overflow (-0.250 mm) reporting to the flotation feed sump.

Deslimed mid-size material will be pumped to two banks of triple-start spirals. Spirals product will gravitate to the spirals product sump prior to being pumped to a cluster of spiral product thickening cyclones. The thickened underflow will be dewatered by two fine coal centrifuges before discharging onto the product conveyor.

Spirals reject will gravitate to a high frequency dewatering screen. Dewatered reject will discharge onto the reject conveyor, and screen underflow will report to the thickener.

Flotation

Desliming cyclone overflow and spiral product thickening cyclone overflow will be combined in the flotation feed sump and pumped to a single Jameson Cell.

The concentrate from this cell will gravitate to a screen bowl centrifuge to dewater the flotation concentrate. The tailings from the flotation cells will report to the de-aeration tank where a portion of the flotation tailings will be recycled as sump level control and as a scavenging process. The remainder of the tailings will gravitate from the de-aeration tank to the tailings thickener.

Product and Waste Handling

The plant will primarily produce product suitable for coking coal markets but may also supply thermal coal markets. A product collection conveyor will receive the dewatered products from the coarse and fine centrifuges and the cake discharge from the screen bowl centrifuge. A ± 1.0 percent accuracy weighscale located on this conveyor will record instantaneous product rate and cumulative tonnes.

The product collection conveyor will transfer product to a radial stacker and on to a 'kidney' shaped product stockpile. The direct stack capacity of the stockpile will be 100,000 t with dozer assisted pushout to 300,000 t.

Disposal of waste from the CHPP is discussed in Section 2.7.1.1. There is no water effluent discharged from the CHPP as the water is continuously recycled through the process. Raw make up water (53 m^3/h) is required as water is gradually spent and disposed as moisture on product and reject matter.

Spontaneous Combustion Management

Spontaneous combustion (abbreviated in the industry as "sponcom") is a process whereby certain materials such as coal can ignite as a result of internal heat which arises spontaneously due to reactions liberating heat faster than it can be lost to the environment (Mackenzie-Wood and Bird 1999). Sponcom of coal is typically detected by heat, smell, sweating, smoke and unusual colouring. Coal that is more susceptible to sponcom typically has a higher inherent moisture (>3 percent), high sulphur content (>1 percent) and/or relatively high volatile content (>26 percent). The Donkin coal will have a low to medium propensity for sponcom. Procedures will be in place to effectively manage this potential hazard in various situations including hot ROM coal, stockpiling, coal waste disposal piles, and developed fires. Washing of the coal is normally an effective inhibitor to sponcom as it reduces the sulphur level and the fact that it is doused with water.

Stockpiles will be designed and maintained to further reduce risk of sponcom (*e.g.*, compact stockpiles, longitudinal axis parallel to prevailing wind direction, loadout to be leeward end and/or oldest coal first). If the coal is determined to be susceptible to sponcom, a regular temperature monitoring program will be implemented. If stockpile temperature monitoring shows an abnormal and/or rapid increase in temperature, a program will be put in place to either load out coal or implement measures to address potential coal fires.

2.5.2.3 Coal Trucking

XCDM received EA approval for trucking product coal to customers during Donkin Mine's exploration phase. The preferred method of transportation of coal for the Export Coking Coal Project is marine transportation, although coal will be trucked to domestic customers and to the Port of Sydney, should marine transportation to these destinations prove impractical at any time.

A Traffic Impact Study (AR&TM 2009) was conducted in 2009 to identify and assess a preferred haul route. The haul route consists of six main sections as shown in Table 2.5.1 and Figure 2.5.3 (a-c).

Table 2.5.1 Identification of Haul Route Sections (AR&TM 2009)

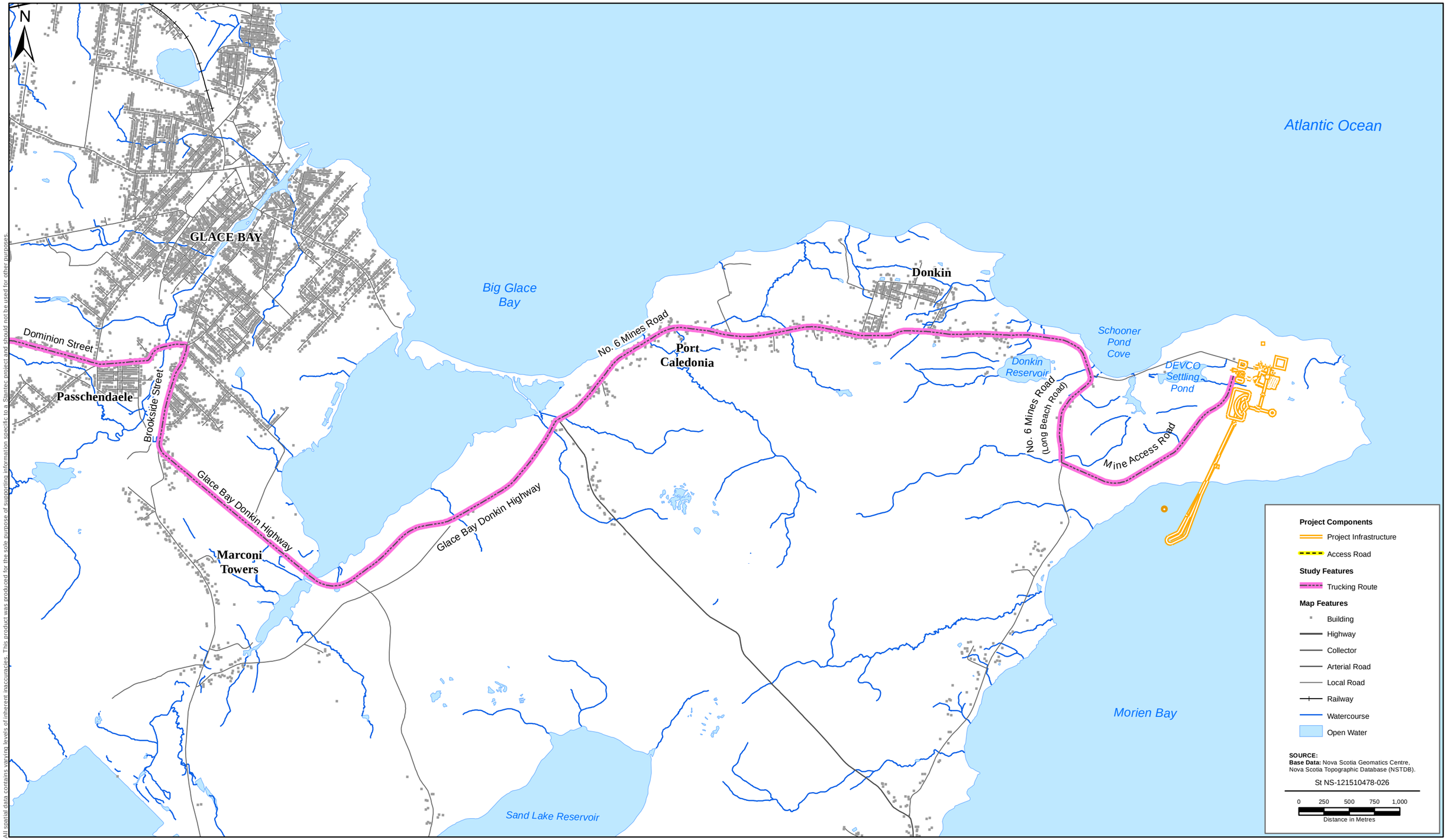
Section	Description	Length (km)
1	Mine Entrance through Donkin to Dearns Corner on No. 6 Mines Road	6.8
2	No. 6 Mines Road at Dearns Corner to Route 255 (Glace Bay Donkin Highway) – Glace Way Limit	5.1
3	Glace Bay south Town limit to Route 255 (Brookside Street) – Dominion Street	1.0
4	Route 255 (Brookside Street) to Wilson Road and Dominion Street – Trunk 4	4.1
5	Wilson Road to Trunk 4 (Reserve Street) – start of 4-lane roadway	2.3
6	Start of 4-lane roadway at Reserve to Trunk 4 (Grand Lake Road) – SPAR/Highway 125*	8.7
	Total Length of Proposed Haul Route	**28.0**

*SPAR, Highway 125 and Gardiner Road were all considered potential coal haul routes as part of the Traffic Impact Study and are all designated as maximum weight roads.

The Traffic Impact Study analysis was based on transport of 300,000 to 500,000 tonnes of coal per year for three to four years. The Study concluded that although some specific road and bridge upgrades would be required, the proposed haul route would provide satisfactory levels of performance and safety while accommodating traffic generated by construction and operations of the Donkin Coal Mine from 2009 to 2014 (the originally proposed exploration phase) (AR&TM 2009).

Traffic engineers reviewed the proposed haul route in October 2011 and have determined that other than replacement of the Glace Bay Lake Bridge east of Glace Bay by the Department of Transportation and Infrastructure Renewal and addition of concrete curb and sidewalk on Brookside Street on the east approach to Glace Bay, the street infrastructure in the CBRM portion of the Haul Route is essentially the same as that which was evaluated in 2009. Hence they have concluded that the Traffic Impact Study results and recommendations remain valid and have communicated this addendum to both provincial and municipal authorities.

Hence, although trucking is only being considered for transport to domestic customers and to the Port of Sydney should marine transportation to these destinations prove impractical at any time, the Traffic Impact Study results and recommendations remain valid.



PREPARED BY:	K Keizer
REVIEWED BY:	E. Hickey
CLIENT:	xstrata Coal

Donkin Export Coking Coal Project

Proposed Truck Haul Route (Map 1 of 3)

FIGURE NO.:	2.5.3 a
DATE:	Apr 25, 2012

Stantec

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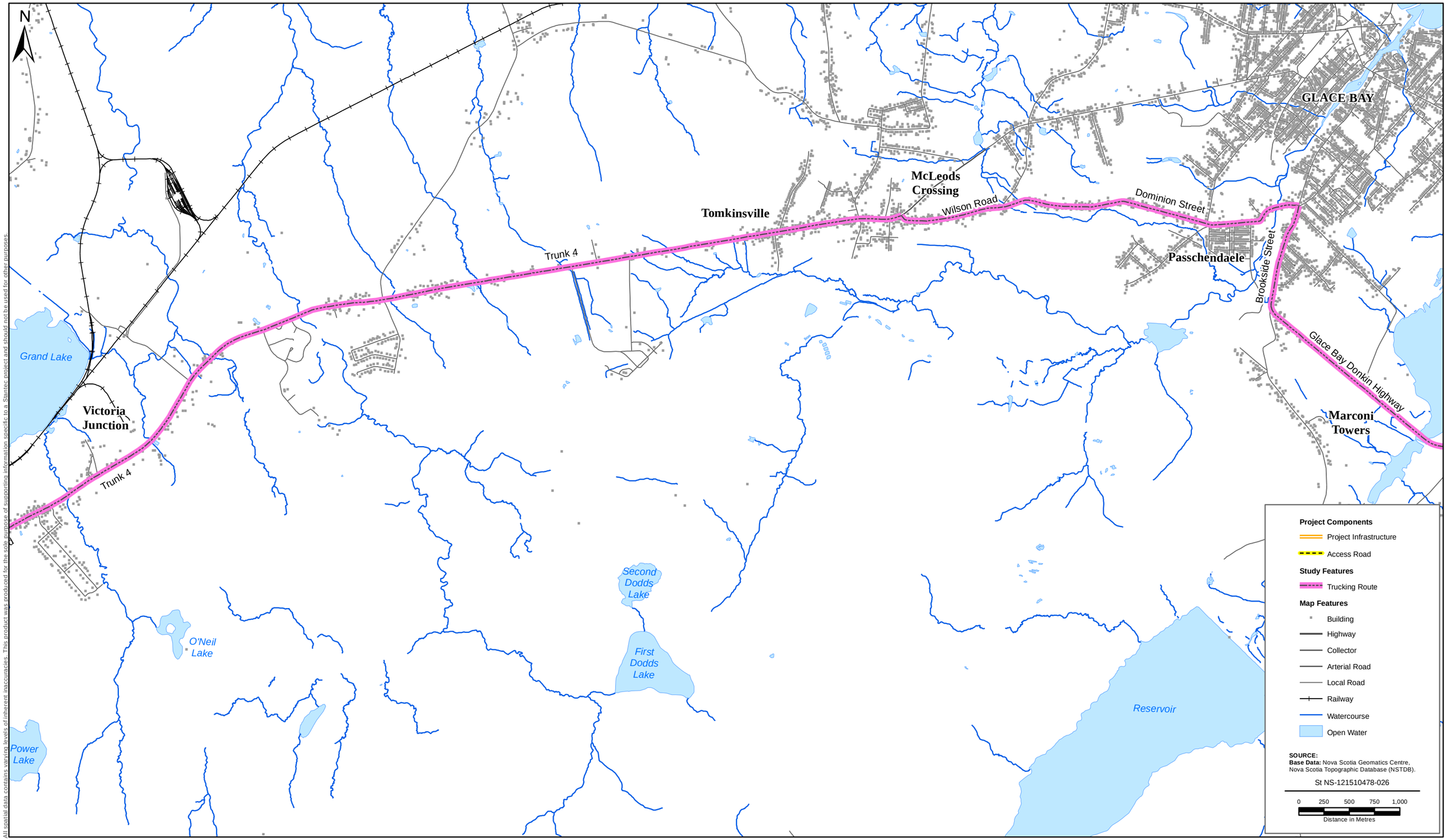

All spatial data contains varying levels of inherent inaccuracies. This product was produced for the sole purpose of supporting information specific to a Stantec project and should not be used for other purposes.

PREPARED BY: K Keizer REVIEWED BY: E. Hickey CLIENT: xstrata Coal	Donkin Export Coking Coal Project **Proposed Truck Haul Route (Map 2 of 3)**	FIGURE NO.: 2.5.3 b DATE: Apr 25, 2012 Stantec

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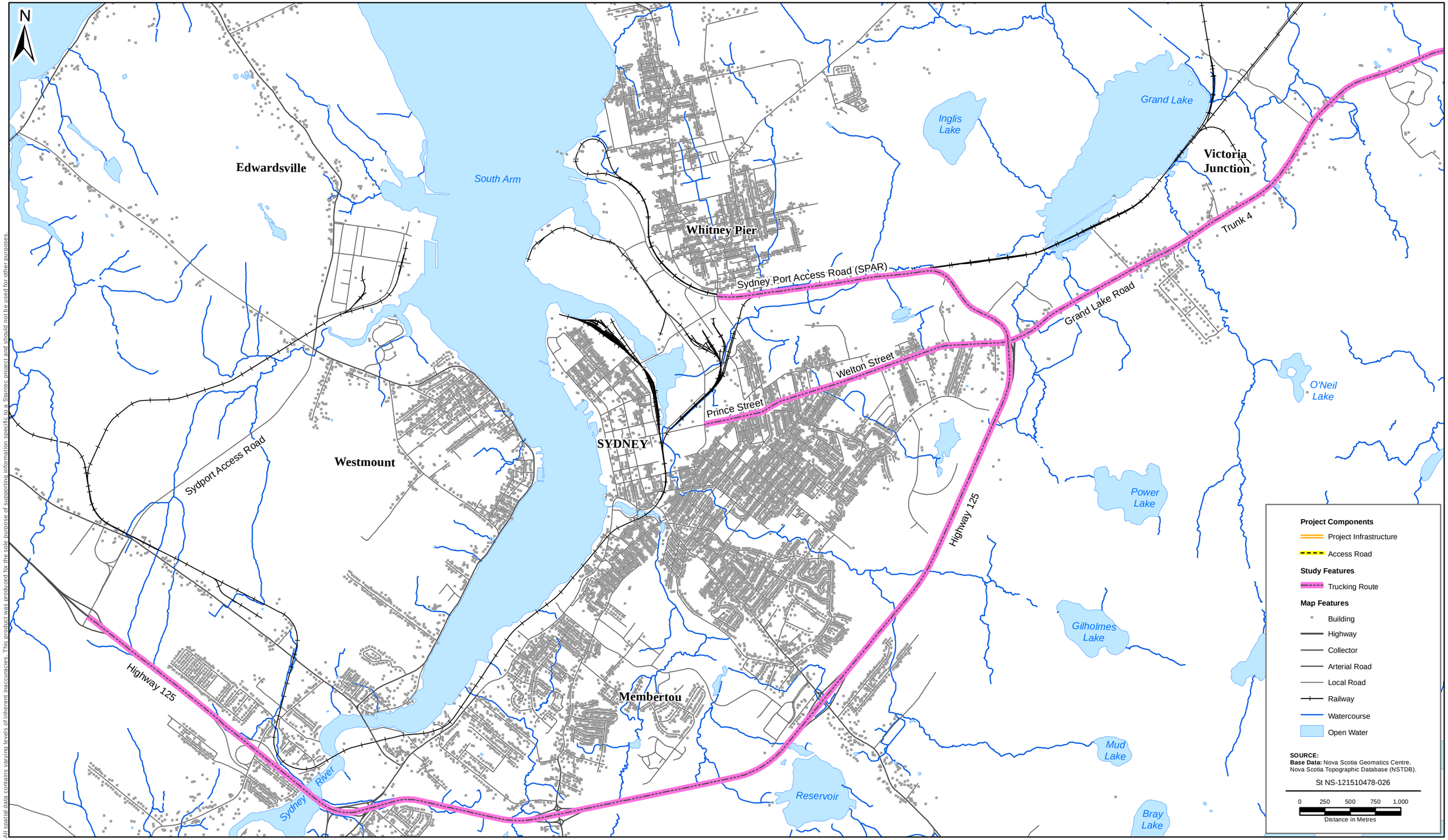

PREPARED BY:	K Keizer
REVIEWED BY:	E. Hickey
CLIENT:	xstrata coal

Donkin Export Coking Coal Project

Proposed Truck Haul Route (Map 3 of 3)

FIGURE NO.:	2.5.3 c
DATE:	Apr 25, 2012

Stantec

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2.5.2.4 Marine Loading and Transportation

Overview

Marine shipping is the preferred method of transportation of product coal. Product coal from the CHPP will be conveyed to a product stockpile where it will then be reclaimed to an overland conveyor that traverses the onshore section from the product stockpile to accommodate the direct loading of circa 4,000 tonnes coastal barges. The near shore loading berth is located in depths of approximately 6 m. The barge will then be moved to a transshipment area located southwest of Cape Morien, approximately 4.75 nautical miles (8.8 km) from the barge load-out facility, at a water depth of approximately 24 m. At the transshipment location, a large floating crane will transfer coal from the barge to ocean going vessels ranging from Panamax size to Cape Size for shipping.

Barge Load-out Facility

Design parameters for vessels considered in the marine engineering study are shown in Tables 2.5.2 to 2.5.6.

Table 2.5.2 Tug Boat Design Parameters – 5,000 HP

5,000 HP TUG BOAT	
Length overall, LOA (m)	35
Beam (m)	12
Draught (m)	6

Source: Moffatt & Nichol from Clarksons database

Table 2.5.3 Floating Crane Design Parameters

Gottwald 8400 Floating Crane	
LOA (m)	76.2
Beam (m)	22
Draught (m)	3

Source: Moffatt & Nichol from Clarksons database

Table 2.5.4 Vessel Design Parameters - 150 to 205K dwt Capesize Bulkers

99%	
LOA (m)	311.5
Length between perpendiculars, LBP (m)	300.0
Beam (m)	50.0
Draught (m)	18.5
dwt	207962

Source: Moffatt & Nichol from Clarksons database

Table 2.5.5 Vessel Design Parameters - 65 to 75K dwt Panamax Bulkers

99%	
LOA (m)	242.0
LBP (m)	228.0
Beam (m)	32.3
Draught (m)	14.5
dwt	74928

Source: Moffatt & Nichol from Clarksons database

Table 2.5.6 Coal Scow Design Parameters – 4,000 dwt

4,000 dwt COAL SCOW	
LOA (m)	66
Beam (m)	15
Draught (m)	5.5
dwt	4,000

Source: Moffatt & Nichol from Clarksons database

During loading of the barge at the load-out facility, the barge will be moved into position by a winch. This operation requires a continuous dock to facilitate moving and securing the barge with minimal interruption to the loading process. It is proposed to store the four barges, two tug boats and the loading crane at the dock when not in use and during storm conditions. An empty barge/scow has a draft of 0.4 m and will require a tug to move the barge to the dock.

A radial, luffing, telescopic stacker will be used to load coal from the overland conveyor to the coal barges. The transfer point from the overland conveyor to the stacker will be totally enclosed with a dust collection system.

Tug Operations

As the 5,000 hp transfer tug and 4,000 dwt coal barges are to be purpose built for this operation, the owners have the option to specify the towing mode to be used. Hence, it is proposed to have a transit tug to push the barges between the load-out facility and transshipment site. This mode includes a small notch in the stern of the barge fitted to the bow of the tug. The tug is secured to the notch with wire cables. This mode allows the tug to easily stop or turn the barge. However, the tug may work excessively in the notch if operating in seas close to the 1.5 m crane barge operations limit planned for coal transfer. Hence, in higher wave conditions, the tug may tow with bridal and cable. A single transit tug of 5,000 horsepower (hp) will be capable of safely moving a 4,000 dwt barge or a large floating crane. At 5,000 hp, the transit tug speed will be approximately 5 nautical miles (knots) per hour with a full scow and 7 knots with an empty scow.

Upon clearing the loading port breakwater and mole, the tug and full barge would cross Morien Bay and round Cape Morien at a sufficient distance for navigational safety (refer to Figure 1.3.1 for planned vessel route).

At the transshipment site, a second helper tug (approximately 500 hp) will also be required to assist with barge handling at the floating crane and may also assist in repositioning the floating crane against the ship. The helper tug will also meet the bulk carrier at the transshipment site and assist in line handling.

Vessel Operating Plan for Transshipment Operation

The vessel operating plan described below is adapted from a marine engineering study conducted by CBCL for the Donkin Project (CBCL 2012).

Mobilization begins with the arrival of a bulk carrier at the transshipment site. Bulk carriers will likely range from 70,000 dwt (Panamax) to 200,000 dwt (Cape Size), depending on the shipping distance, consignment volume and receiving ports. While the ship is being secured to the SBM, the 5,000 hp transit tug will transfer the floating crane from its berth at the barge load-out facility to a position alongside the bulk carrier. When the transit tug returns from delivering the floating crane, the first coal barge will have completed loading and been moved to the full scow berth. The transit tug will assist the wharf operations by holding two of the three empty scows while the remaining empty scow is advanced to the scow loading berth. The transit tug will then re-secure the two empty scows at the empty scow berth and deliver the full coal scow to the transshipment point, at which time vessel loading will begin.

The transit tug will return to the coal loading port and assist with moving the second empty coal scow prior to returning to the transshipment site with the second full coal scow. This will result in one full scow being unloaded to the bulk carrier, one full scow in transit, one empty scow at the empty scow berth and one empty scow being loaded at the coal loading berth.

This pattern continues until the bulk carrier is loaded. The bulk carrier will likely remain on station for a week or more during transshipment operations (Table 2.5.7). Demobilization takes place in the reverse manner. Empty scows will be returned and positioned at the barge load-out facility and the transit tug will return the floating crane to the full scow berth and both tugs would raft to the outside of the floating crane.

A maximum full productivity working sea state of 1.5 m is assumed with possible operation up to 2.0 m at reduced productivity, when necessary. Marine engineering studies for the Project to date have included a downtime analysis based on available offshore wind and transformed wave climate conditions. They have concluded that heavy wind and wave conditions are expected to restrict operations an average of 3 to 5 percent of the time during the summer and 24 to 29 percent of the time during the winter months. Under the worst observed case, this could increase to 13 to 33 percent of the time in the summer and up to 64 percent in the winter to mid-spring months. Additionally sea ice conditions at the location were estimated from charts provided by Environment Canada for the years 1971 to 2000. The months with significant observed sea ice are limited to February and March. The graphs show the potential weather and sea ice impacts on available operating days (Figure 2.5.4 - average and Figure 2.5.5 - worst case). A worst case scenario for weather and ice would result in 200 days availability for operations. It is assumed that approximately 20 percent of available days during the months of February and March will be lost due to excessive sea ice. Provision for ice breaking from the Canadian Coast Guard may be required for operations during this period.

Figure 2.5.4 Average Year Working Days

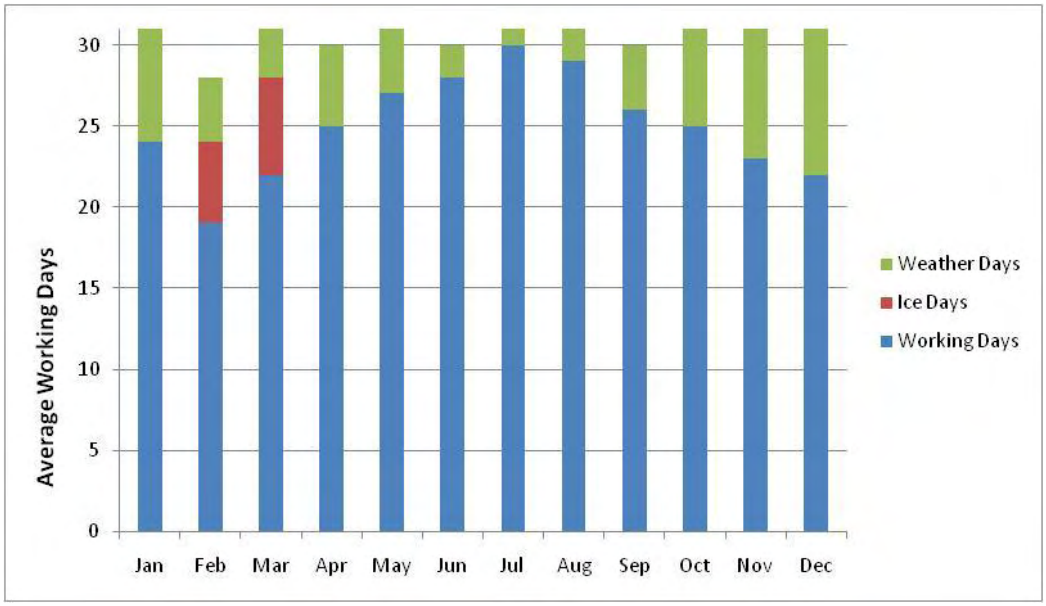
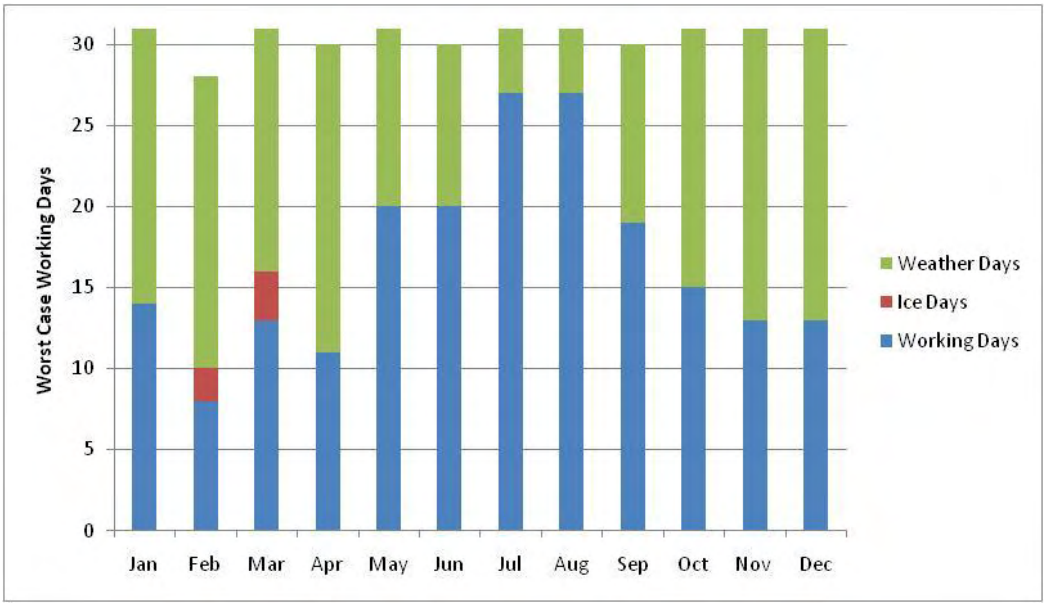


Figure 2.5.5 Worst Case Year Working Days



A minimum daily vessel loading rate of 20,000 tonnes per day (t/d) with 95 operating days a year is required to attain the expected annual export tonnage of 2.75 million tonnes. The coal loading wharf will be capable of loading 1,200 t/h (net of down time). Likewise the floating crane net operating capacity will be approximately 1,200 t/h.

The size of the bulk carrier will determine the number of tug and scow round trips and operating hours. Table 2.5.7 summarizes the proposed vessel operating plan assuming different bulk carrier scenarios**.**

Table 2.5.7 Vessel Operating Plan

Scenario	No. Vessel/ Year	No. Loading Days/ Year	No. Days Avail/Year (worst case)	No. Round Trip Barges/ Year	No. Round Trip Cranes/ Year	No. Round Trip Barges/ Ship	No. Days to Load a Ship (incl mob/demob)	Ave No. Round Trip Barges/ Loading Day
All Cape Size Vessels (200,000 dwt)	14	95	200	675	14	50	10	7.1
All Panamax Vessels (70,000 dwt)	39	95	200	675	39	18	4	7.1
80% Panamax 20% Cape	31 Panama 3 Cape	95	200	675	34			7.1

Regional Navigation Considerations

There is a substantial amount of international and domestic commercial traffic along the Scotian Shelf consisting of tankers, bulk and containerized cargo carriers, fishing vessels, cruise ships and various government vessels (DFO 2011a). The following are the main shipping routes along the Scotia Shelf (Canadian Coast Guard 2011).

- The “great circle route” – international shipping between Europe and the eastern seaboard of the United States and Canada;
- Along the coast of Nova Scotia – international and domestic shipping bound to and from the United States, Bay of Fundy, Gulf of St. Lawrence and Newfoundland;
- Cabot Strait – major sea route linking trans-Atlantic shipping routes to the St Lawrence Seaway and the Great Lakes; and
- Major ports – traffic associated with the Ports of Saint John, Halifax, Port Hawkesbury and Sydney.

Although there is substantial vessel traffic along the Scotian Shelf, international and domestic commercial traffic near Morien Bay and Mira Bay is minimal (J. Gaudet, Canadian Coast Guard, pers. comm. 2012; S. Coffen-Smout, DFO, pers. comm. 2012; D. Rowe, Sydney Ports Corporation, pers. comm. 2012). Most traffic travelling in the area travels in shipping routes east of Scatarie Island from the Gulf to the Eastern Seaboard (D. Rowe, Sydney Ports Corporation, pers. comm. 2012; J. Gaudet, Canadian Coast Guard, pers. comm. 2012). The key issue within the Project area is vessel interaction with the local commercial fishery (J. Gaudet, Canadian Coast Guard, pers. comm.; S. Coffen-Smout, DFO, pers. comm. 2012 D. Rowe, Sydney Ports Corporation, pers. comm. 2012). Figure 1.3.1 illustrates the navigation route between the barge load-out facility and the transshipment mooring.

Vessel traffic bound to and from the Port of Sydney would be the nearest shipping lane located approximately 4.8 km from the barge navigation route. It is not anticipated that vessel traffic along these routes will interact with the Project. The Port of Sydney is the closet port; located approximately 28.1 km (49.1 km along water route) from the Project. Sydney Harbour is located at the entrance to the Cabot Strait with a total of 153 vessels in 2007. These vessels consist of tankers, cargo ships, government ships and passenger ships. Additionally the Marine Atlantic operates ferries from North Sydney to Argentia (seasonal) and Port Aux Basques in Newfoundland, with the number of departures ranging from 13 to 22 per week to Port Aux Basques and 1 to 3 per week for Argentia, depending on the time of year.

The Canadian Coast Guard Maritimes Region encompasses three provinces; New Brunswick, Nova Scotia and Prince Edward Island with a fleet of six helicopters, 25 vessels, including one heavy icebreaker, five ice-strengthened vessels, three science vessels, nine lifeboats and six inshore patrol vessels (Canadian Coast Guard 2011). The Canadian Coast Guard supplies the

services provided by the Marine Communications and Traffic Services (MCTS). Their responsibilities include safety radio-communication services, 24/7 commercial marine telephone calls service, and the monitoring of traffic entering Canadian waters and local zones (Canadian Coast Guard 2011). MCTS provides the Canadian Coast Guard with enhanced information on vessel transit (Canadian Coast Guard 2011). MCTS advises vessels in the zones of the movement of other vessels; receives and relays messages between the Pilots, Harbour Authorities, Government Agencies and ships; monitors and broadcasts information on hazards, weather conditions and Notices to Shipping; advises on the safety of navigation in the area; and reports on non-compliance.

Vessels operating in the area, as in all other Vessel Traffic Services (VTS) Zones, must comply with the requirements of the *Vessel Traffic Services Zones Regulations.* All Traffic will be required to report to the Eastern Canada Vessel Traffic Services Zone (ECAREG) as required by the *Eastern Canada Vessel Traffic Services Zone Regulations* and the normal practices of seafarers. ECAREG consists of all Canadian waters on the east coast of Canada south of the sixtieth parallel of north latitude and on the St. Lawrence River east of 66°00′ west longitude except the waters within Ungava Bay and the waters within the VTS Zones (Canadian Coast Guard 2011). There is no local VTS Zone for the Project area, and therefore reports are made to ECAREG. All vessels more than 500 tonnes are required to report to ECAREG and therefore required for all barges and bulk carriers associated with the Project to report and follow ECAREG regulations.

Transport Canada requires that the vessels operating at the terminal comply with all applicable provisions of the Act and Regulations, and international conventions such as, but not limited to: Safety of Life at Sea (SOLAS), International Convention for the Prevention of Pollution from Ships (MARPOL) and Standard for Training, Certification and Watchkeeping (STCW). All vessels must comply with the following regulations: ECAREG Regulations; VTS Regulations (for reporting); Ballast Water Management Regulations; Cargo, Fumigation and Tackle Regulations; and the following Marine Safety Publications:

- TP 5761 – Canadian Guide of Safe Practices for Solid Bulk Cargoes;
- TP 10944 – Notice to Ship Masters Loading Coal;
- TP 13617 – Guide to Ballast Water Management Regulations;
- TP 14335 – Winter navigation on the River and Gulf of St. Lawrence.

Port Warden duties involved with the loading will be detailed for the Project, *i.e*., the checking of instruments on board, maintenance of records, cargo information to Masters. There is also a requirement to comply with the SOLAS requirements. The proponent will also make sure to consider TP 10944 “Notice to Ship Masters Loading Coal”, based on the project activity.

Vessels will be inspected by Transport Canada Marine Safety Inspectors conducting Port State Control Inspections as part of Transport Canada's international commitments.

Morien Bay and Mira Bay are not currently compulsory pilotage areas. Compulsory pilotage areas pursuant to the *Pilotage Act*, are areas where incoming and outgoing vessels are directed and controlled through nearshore and inshore waters unfamiliar to the ship's master (APA 2010). Regardless, the Atlantic Pilotage Authority (APA) continues to monitor and assess all areas within its mandate to determine if any change in factors or circumstances has an impact on safety (APA 2010). APA will contract an outside facilitator to conduct a Pilotage Risk Management Methodology (PRMM) if a change in circumstances warrants a closer review. Criteria for determining if a port should become compulsory include: degree of difficulty and hazard in the approaches and within the port itself; amount of vessel movement and maneuverability and the size of those vessels; design of wharves, slips, and actual space available for maneuvering; nature of cargo carried on board (*e.g.*, oil, gas, explosives, hazardous materials) and environmental concern and the preservation of the ecosystem (APA 2010).

A Marine Terminal Manual will be developed in consultation with Transport Canada Marine Safety, the Canadian Coast Guard, and the Atlantic Pilotage Association. The Marine Terminal Manual shall be submitted to Transport Canada Marine Safety for written approval and in advance of any vessels arriving for loading. A draft of this plan shall be submitted to Transport Canada Marine Safety, the Canadian Coast Guard, and the Atlantic Pilotage Authority, six months in advance of the first shipment from the facility. Further, the Proponent shall require adherence to the approved Marine Terminal Manual as a condition to the acceptance of all vessels at the terminal.

The Terminal Operations Manual will address, but not be limited to:

- What kind on mooring arrangement is planned for between the buoy and the vessels?
- What industry standards are being followed?
- Will the vessel be required to have special fittings, similar to the chain stoppers fitted on tankers calling at single point mooring buoys?
- Tug on stern to keep vessel off from the buoy?
- Weather monitoring from ashore?
- Emergency procedures to abandon the operation, time frames, *etc.*
- Arrangements with towing companies for tug standby for emergencies.

- Emergency firefighting arrangements for coal fires on board the barges and the loading vessel.

As a result of recent discussions with local fishers, a conceptual layout of transit and access channels and manoeuvring areas with safety zones has been developed in an effort to separate Project vessel activity from local fisheries activities. The concept layout is based on Permanent International Association of Navigation Congresses (PIANC) design standards which are the most conservative guidelines. They require an approximate width of 200 m for a one way traffic channel of ocean going vessels approaching the offshore transshipment site. One way barge/tug transit between the barge load-out facility and the transshipment mooring would require close to a 100 m of channel width. An additional 50 m clearance beyond the channel boundaries is recommended for supplementary buffer space between vessel transit operations and local fishing activity to prevent fishing vessels and/or equipment from impinging on the active transit routes. The layout is portrayed in Figure 1.3.1. Effort was made to identify the least obtrusive channel arrangement for transiting bulkers within waters used for fishing. Further discussions with local fishers are planned to further define this channel arrangement (Section 5.8).

2.5.3 Site Decommissioning and Reclamation

The Mine Closure and Reclamation Plan (MCRP) for the Donkin Export Coking Coal Project (Project) will be developed and managed in strict compliance with applicable Municipal, Provincial and Federal Acts and Regulations (refer to Appendix D for conceptual outline). The MCRP will be based on the Xstrata Coal (XC) *Mine Closure Planning Standard (13.1)* that takes into account the economic, social, and environmental factors to ensure a sustainable mine closure outcome.

Specifically, the MCRP for the Project will be based on the following objectives:

- Prevention of access to disused underground workings;
- Management of water for operations and post-closure conditions;
- Management of physical characteristics that may constrain site re-vegetation;
- Management of potential acid rock drainage as a consequence of the oxidation of sulfides;
- Minimization of environmental effects during decommissioning activities;
- Return of land affected by mining to conditions capable of supporting prior land use, equivalent uses, or other environmentally acceptable uses; and
- Inclusion of socio-economic considerations in post-closure objectives.

All XC operations are required to prepare a Life of Mine (LOM) plan for XC approval. Mine closure planning is then undertaken throughout all phases of the operation including:

- Exploration;

- Prefeasibility;
- Feasibility;
- Operations with a reserve LOM greater than 5 years;
- Closure/Rehabilitation;
- Post-closure Care and Maintenance; and
- Disposal of Land Asset.

Decommissioning and reclamation measures to be incorporated into the MCRP for the Donkin Export Coking Coal Project are included in Appendix D.

Reclamation principles for the Project will be based on re-contouring and re-vegetation of degraded land surfaces, containment of potential acid rock drainage (ARD) from coal rejects and the adoption of long term water management measures.

Appropriate care and maintenance rules will also be adopted for the long term benefit of the local community. This will include adopting preventative measures against slope failure, management of the rejects that could limit re-vegetation, and the treatment of acid rock drainage from the rejects stockpile.

Once the mine operation has concluded, the site will be restored to a condition that will provide opportunities for other land use. The final reclamation plans will clearly identify and describe sequential land use objectives that are compatible with surrounding landscapes and existing or established land use. Landscape design and visual assessments will be incorporated into the MCRP to provide more certainty that the final site design will maintain scenic views and be compatible with surrounding landscapes.

The preliminary post-closure land use options for the Project are wide ranging and include:

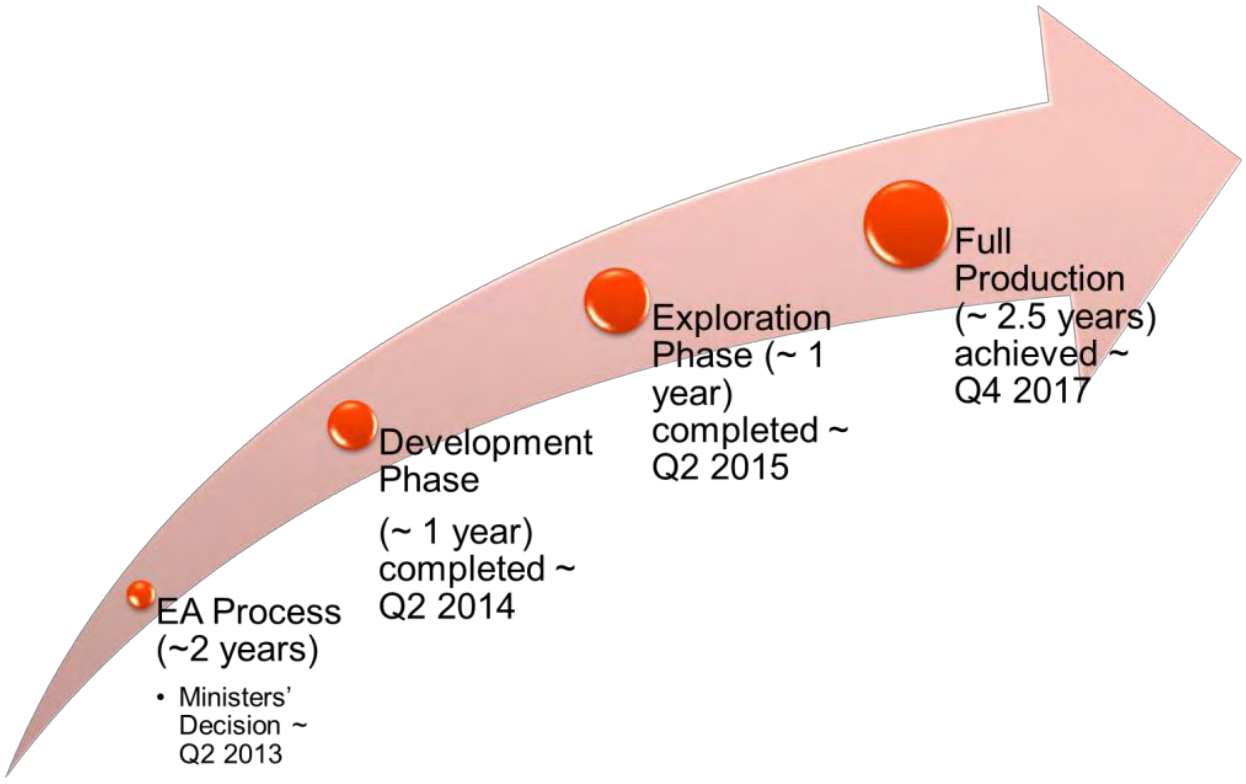
- Natural preservation of the existing habitat on all coastal lands around the Project site that will not be covered by the footprint of the mining operation (*e.g.*, CHPP and ancillary buildings, coal stockpiles, rejects stockpiles, *etc.*) to provide opportunities for future recreational activities by local residents (*e.g.*, nature trails, bird watching, hiking, *etc.*);
- Preservation of selected ancillary mine buildings and utilities to promote future industrial and/or commercial cottage industries; and
- Ecological restoration of the rejects stockpiles for compatibility with local landscapes.

2.6 SCHEDULE

Pending regulatory approval, mine development is planned to begin in Year 1 with the Exploration Phase and some further construction activities for this Export Coking Coal Project (*e.g.*, CHPP construction). Full production for this Project will be staged progressively (refer to

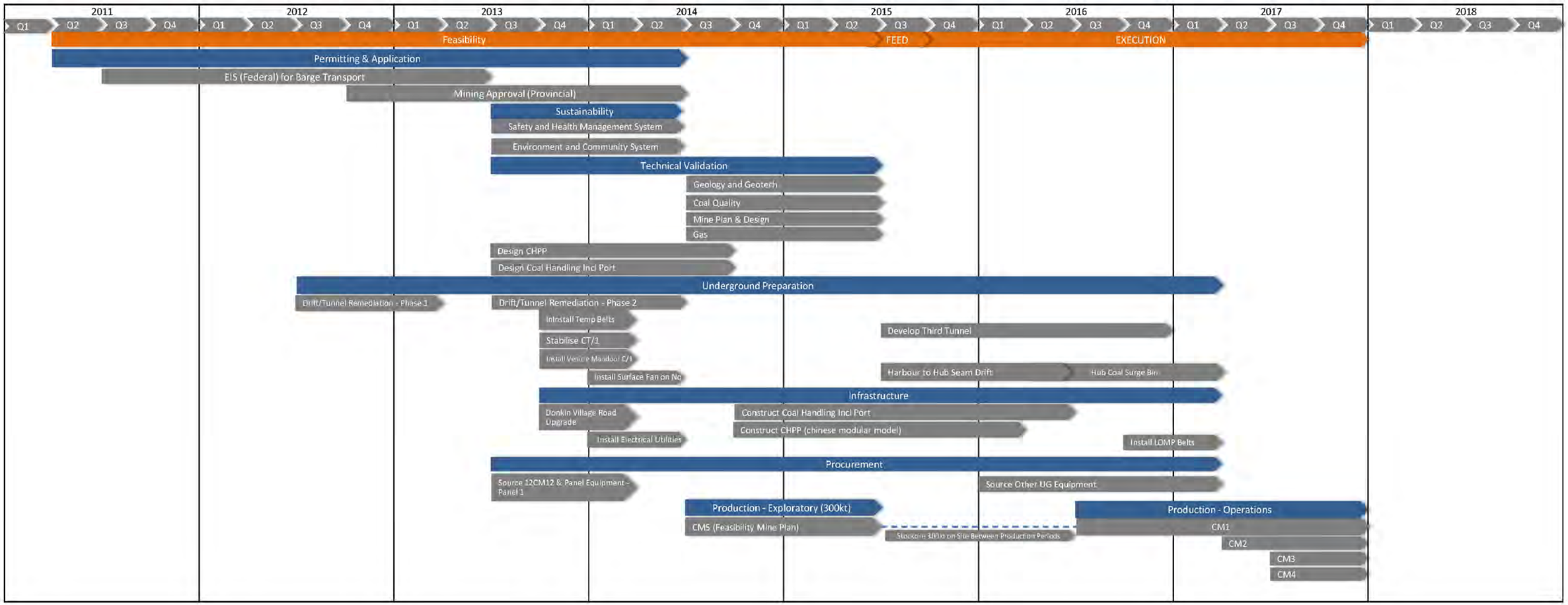
Figure 2.6.1). This operational rate is expected to continue for the life of the Special Lease and possibly longer should market demands allow (*i.e*., 30 years or more).

Figure 2.6.1 Project Schedule Overview



Donkin Mine is expected to operate 360 days a year and produce coal five days per week, with five shut down days corresponding to public holidays. Generally weekend work will involve maintenance activities although production may be conducted on weekends on occasions. Coal delivery and vessel loading schedules will dictate whether these operations be carried out on weekends.

Construction of the barge load-out facility is planned for start of Q4 2014 for completion by Q2 2016. It is expected that it will take approximately 17 months to construct and commission the CHPP once construction starts in 2013 as planned. Figure 2.6.2 presents an overall timeline for key Project development milestones.



PREPARED BY: M. Huskins-Shupe	Donkin Export Coking Coal Project	FIGURE NO.: 2.6.2
REVIEWED BY: R. Federico	**Overall Estimated Project Development Schedule**	DATE: Apr 23, 2012
CLIENT: xstrata coal		Stantec

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2.7 EMISSIONS, DISCHARGES AND WASTE MANAGEMENT

2.7.1 Coal and Mineral Rock Waste

During the 30 year operation of the mine, there will be approximately 19.6 million m^3 of coal rejects and tailings generated that will require disposal. In addition, there will be approximately 180,000 m^3 of waste rock generated from Tunnel #1 construction (Year 4), and up to 11,250 m^3 of dredge spoils (Year 1) from marine works. A range of waste management options have been and will continue to be reviewed as part of the future phases of the Project (refer to Section 2.9.2.5). A conceptual study on coal waste disposal options (Stantec 2012) recommended onsite surface disposal for commingled CHPP reject waste, tunnel rock (Tunnel No. 1 excavation) and dredge spoil waste. Predicted waste quantities for these streams over the life of the mine are presented in Table 2.7.1.

Table 2.7.1 Predicted Waste Quantities

	Material Type (Source)		
	CHHP Process reject waste (on-going)	**Third Tunnel (Tunnel No. 1) Development Waste (Year 4) (one time development)**	**Dredge Spoils for Product Marine Structures (Year 1) (one time development)**
Daily, t/h	80	--------	--------
Daily, m^3/h	61.5	--------	--------
Annual tonnage, t	850,000	200,000	--------
Annual volume, m^3	654,000	180,000	11,250
Life of mine, t	25.5 million	200,000	--------
Life of mine, m^3	19.6 million	180,000	11,250

Each of these waste streams is described in more detail below.

2.7.1.1 CHPP Process Rejects

Due to concerns with potential effects of tailings (waste rejects) on groundwater from a conventional tailings dam, a full dry disposal system for the CHPP reject has been proposed. A dry disposal system in this sense is understood to mean disposing of the combined streams of dewatered tailings and coarse reject. In the dry disposal reject handling at this stage of project development, it has been assumed that belt press filters will be used. Coarse and mid-size reject will discharge from their respective screens onto the main reject conveyor.

Thickener underflow will be pumped to the filter feed sump and flocculated prior to being fed to belt press filters. Dewatered tailings cake from the belt press filters will discharge via chutes onto the main reject conveyor. This conveyor will convey all reject to the coal waste stockpile. A weigh scale will record the instantaneous tonnage of total reject and tailings material

generated by the plant. In addition, a reject sampling system will be included for sampling waste prior to stockpiling.

A combined stream of dewatered tailings and coarse reject will be conveyed from the CHPP by a fixed stacking conveyor and/or off-road haulers and placed onto a conical stockpile

Although the reject coal waste from the CHPP process is the most substantial waste stream requiring disposal, there are two other sources of similar material noted below that will be generated and it is proposed that this waste also be disposal on site.

2.7.1.2 Development Waste

The development of a third access tunnel to the coal face is planned for year 4 of the Project development and would result in approximately 200,000 tonnes of waste likely composed principally of mudstone and sandstone. It is likely that construction would be carried out using a tunnel boring technique and so the waste would likely be similar to a uniformly graded minus 75 mm minus crushed rock.

At present 450,000 tonnes of development waste from the past construction of tunnels 2 and 3 exists on the surface at the site. This material was the subject of an acid characterization review in 2011 and was found to be non-acid generating and a non-sulphate bearing material and is therefore of limited environmental concern for disposal.

For the development of the concept plan for reject coal disposal this 200,000 tonnes of material was incorporated into the waste stream from the CHPP and co-deposited with the reject coal (approximately 0.8 percent of the total waste volume).

2.7.1.3 Dredge Spoils from Marine Works

It has been predicted that approximately 11,250 m^3 of organic silt dredge spoil could be generated during the barge load-out facility construction (CBCL 2012). At present it is proposed to deposit the dredge spoils in the CHPP reject waste storage area, depending on the construction timing and stage of development. The placement of this benign silt waste in the rejects pile would be inconsequential to the overall potential storage volume (0.26 percent of Phase I coal waste stockpile's capacity).

2.7.1.4 Surface Disposal of Waste

A concept study on coal waste disposal was undertaken to evaluate various options for disposal (refer to Section 2.9.2.5 and Appendix E for more information). This study evaluated various coal waste disposal alternatives including several onsite surface disposal options. The preferred disposal option involves developing two main coal waste disposal piles (East Waste Disposal Pile and West Waste Disposal Pile) in three phases over the life of the mine (refer to Figure 2.7.1 for conceptual site disposal plan).

NOTES:
1. WASTE WATER PIPED / PUMPED FROM RUN-OFF PONDS TO TREATMENT PLANT. WASTE PILE SUBGRADE TO BE SHAPED SO AS TO DRAIN WASTE WATER TO HOLDING PONDS.
2. WASTE PILES TO BE SHAPED TO ACCOMMODATE PLACEMENT OF HOLDING PONDS.

LEGEND

DIRECTION OF WATER FLOW

SCHOONER POND COVE

LONG BEACH ROAD

PROPOSED TREATMENT PLANT LOCATION
ALLOW 100 m X 100 m SURFACE AREA

PROPOSED EAST
RUN-OFF POND
CAPACITY: 60,000 m^3
DEPTH: ± 2 m
LENGTH: ± 250 m
WIDTH: ± 120 m
(SEE NOTE 2)

EXISTING
SERPENTINE
POND

RELEASE TO
ENVIRONMENT

ATLANTIC OCEAN

PROPOSED WEST RUN-OFF POND
CAPACITY: 57,000 m^3
DEPTH: ± 2 m
LENGTH: ± 360 m
WIDTH: ± 80 m
(SEE NOTE 2)

PROPOSED EAST WASTE DISPOSAL PILE

PROPOSED WEST WASTE DISPOSAL PILE

DONKIN MINE ACCESS ROAD

0 100 200m
SCALE

PREPARED BY:	JL
REVIEWED BY:	PEP
CLIENT:	xstrata coal

Donkin Export Coking Coal Project

Coal Waste Disposal Piles and Associated Water Treatment Conceptual Design

FIGURE NO.:	2.7.1
DATE:	Apr 26, 2012

Stantec

The CHPP waste will have a strong potential to generate acid drainage, therefore design of any surface storage facility will include provision for containment of acid runoff. Site preparation for the liner installation would require tree cutting, grubbing of stumps and topsoil and shaping and grading of glacial till and/or borrow material to prepare a competent subgrade for liner installation. At the perimeter of the coal waste piles, a berm would be constructed. The perimeter berm will facilitate installation and anchorage of the HDPE liner and cushion sand. A minimum distance of 2000 mm would be left between the toe of the inside of the perimeter berm and the toe of the coal waste slope for runoff collection and drainage. Design of the waste cell subgrade would be such as to direct any rainfall runoff to a constructed pond and pumped to a treatment facility at the site (refer to Section 2.7.2 for more information on site water treatment).

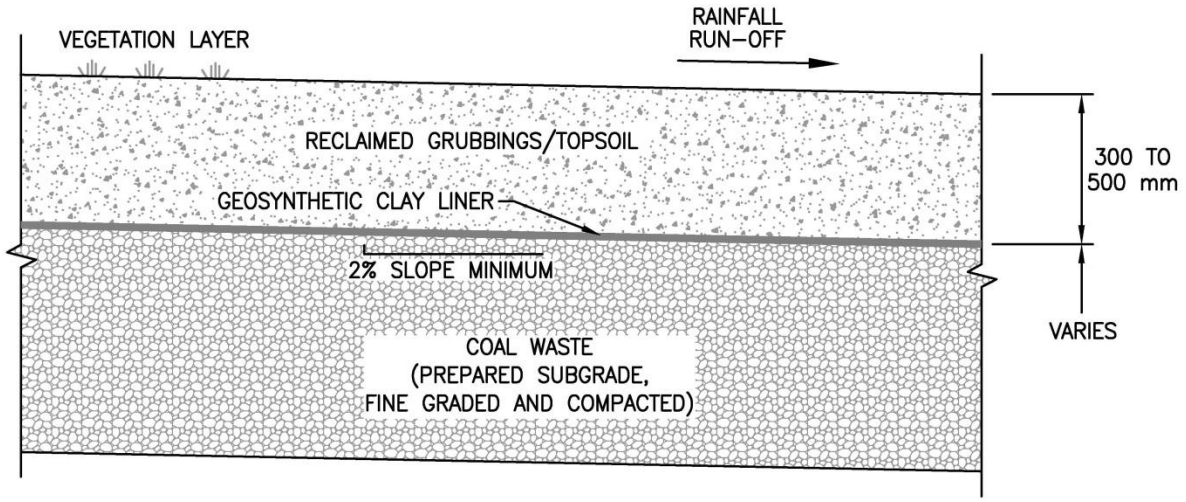
During initial operations, the waste coal generated will be taken from the CHPP by conveyor to the waste rock stockpile, where it could then be spread and placed in lifts with a bulldozer. After a period of time, it may become feasible to utilize off-road trucks to haul the waste rock to the coal waste disposal piles.

Construction of the coal waste disposal piles will be done on a progressive basis. Phased construction is beneficial for financial reasons as well as environmental reasons, by distributing cash flow requirements for construction of waste facilities over a longer period of the Project life and limiting exploitation of land until required. This phased approach will also reserve construction in consideration of future potential additional storage options.

Phased construction would only expose a portion of the site necessary for a couple of years of storage. The limited area exposed would only require handling the runoff from a limited area, as opposed to a large catchment area. Reclaimed grubbing materials could be placed on portions of the coal waste disposal pile that have been shaped to design grade. As the site is exposed, completed portions of the coal waste disposal pile will be progressively capped and seeded so as to limit the runoff that has to be collected and treated (Appendix E).

Final capping for surface storage waste piles, could consist of placing a double non-woven geosynthetic clay liner (GCL) over a graded and compacted coal waste surface, with vegetated reclaimed grubbings acting as the stabilizing cover placed over the GCL. Hydroseeding or other means of introducing grasses could be employed to create a rootmat to limit erosion of the topsoil layer. Figure 2.7.2 indicates the conceptual capping detail of a completed pile.

Figure 2.7.2 Conceptual Capping Detail



It is anticipated that the surface disposal of waste will result in direct alteration of approximately 42.2 ha of wetland habitat on the peninsula. This alteration will require authorization from NSE under the Activities Designation Regulations and habitat compensation to meet the objective of no net loss of wetland habitat. More information on wetland alteration and compensation is provided in Section 5.4. There is also potential for watercourse alteration as a result of surface disposal. This alteration would require, at a minimum, authorization under the Activities Designation Regulations and may also require authorization under the *Fisheries Act* for a HADD (refer to Section 5.6).

2.7.2 Mine Water and Site Run-off

There will be two primary sources of site generated wastewater: mine discharge; and site runoff. These two sources will exhibit similar characteristics of high sediment load, relatively low pH and a presence of heavy metals.

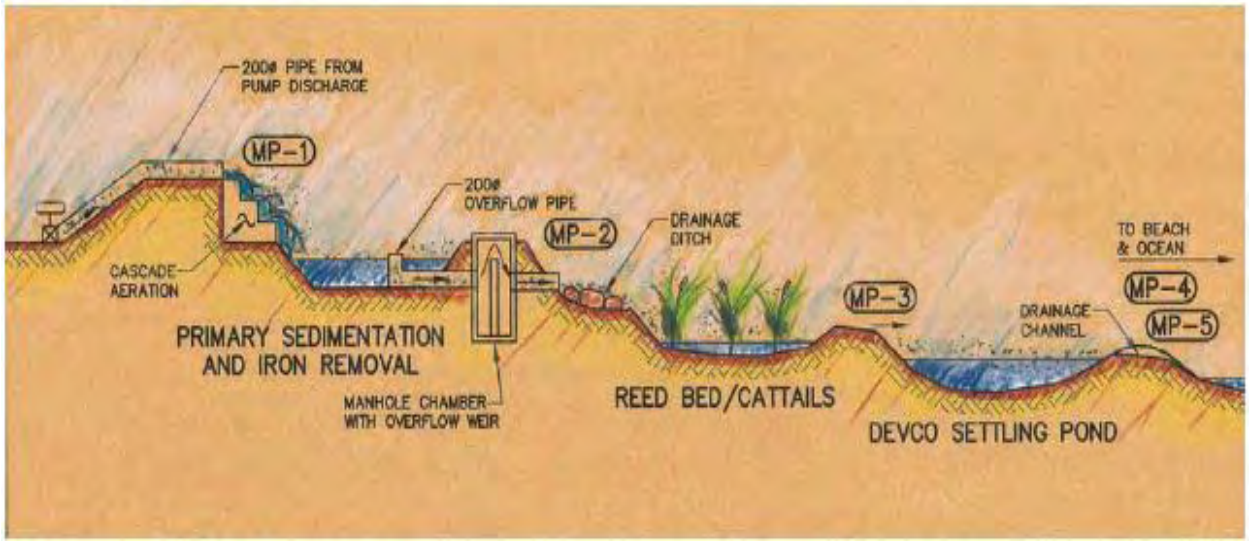
2.7.2.1 Mine Water

As part of the re-commissioning phase for the Donkin Mine in 2006, XCDM conducted a comprehensive consultation and regulatory approval process in order to re-enter the sealed tunnels, establish adequate ventilation and complete dewatering of the mine workings.

A tunnel water treatment system was developed to minimize environmental effects and protect local fisheries and other natural resources. This system includes both the passive tunnel water treatment process and a contingency plan to isolate the tunnel water from the surround environment in the event of an emergency. As of March 2012 the tunnel dewatering process has successfully treated in excess of 1460 million litres of mine water without the need for

implementing the contingency plan. A schematic of the tunnel water treatment process is shown in Figure 2.7.3, with final discharge from the DEVCO settling pond to Schooner Pond Cove.

Figure 2.7.3 Schematic of Existing Mine Water Treatment Process



Ongoing water quantity, quality and toxicity testing is part of the water quality monitoring programs on the site to confirm that environmental impacts are minimized and natural resources are protected from adverse effects. XCDM currently has three Nova Scotia provincial approvals (Environment Assessment Approval, Storage of Water Approval, and Approval to Construct and Operate – Underground Mine), all of which have water monitoring requirements which are addressed as part of the water monitoring program approved by NSE.

There are four primary surface water monitoring locations for assessing the effectiveness of the tunnel water treatment process: MP-1 – inlet to the serpentine pond; MP-2 – discharge from serpentine pond; MP-3 – middle of the natural wetland; and MP-4 – discharge from DEVCO settling pond to Schooner Pond Cove. In addition, water levels are also monitored within the DEVCO settling pond at surface water monitoring location MP-5 (refer to Figure 2.7.4 for monitoring locations) and water monitoring is also undertaken at various locations within the existing underground mine (MP6, sump, BH #2, #2 Slope and #3 Slope). Water quality samples, collected semi-monthly at each of the four primary surface monitoring locations (MP-1 to MP-4); have been assessed and tabulated for the tunnel water treatment process since November 7, 2006 and since 2011 for the underground monitoring locations. Water quality trends for key indicator parameters (namely iron, zinc, pH, Total Suspended Solids – TSS, and conductivity) have been tracked since that time and demonstrate that the mine's current activities have been undertaken in compliance with its water quality license conditions. Trends observed in the key indicator parameters have continued to demonstrate that the tunnel water treatment process

(based on a comparison of inlet and outlet concentrations) is effective in decreasing the concentrations of iron, zinc, TSS, and conductivity from the tunnel water.

Toxicity testing using rainbow trout as the test organism is undertaken on a quarterly basis as required under provincial approval requirements. Water from the DEVCO settling pond, at MP-4 (outlet from the tunnel water treatment process) is collected and analyzed for toxicity on a quarterly basis. To date no samples have been found to be toxic to the test organisms.

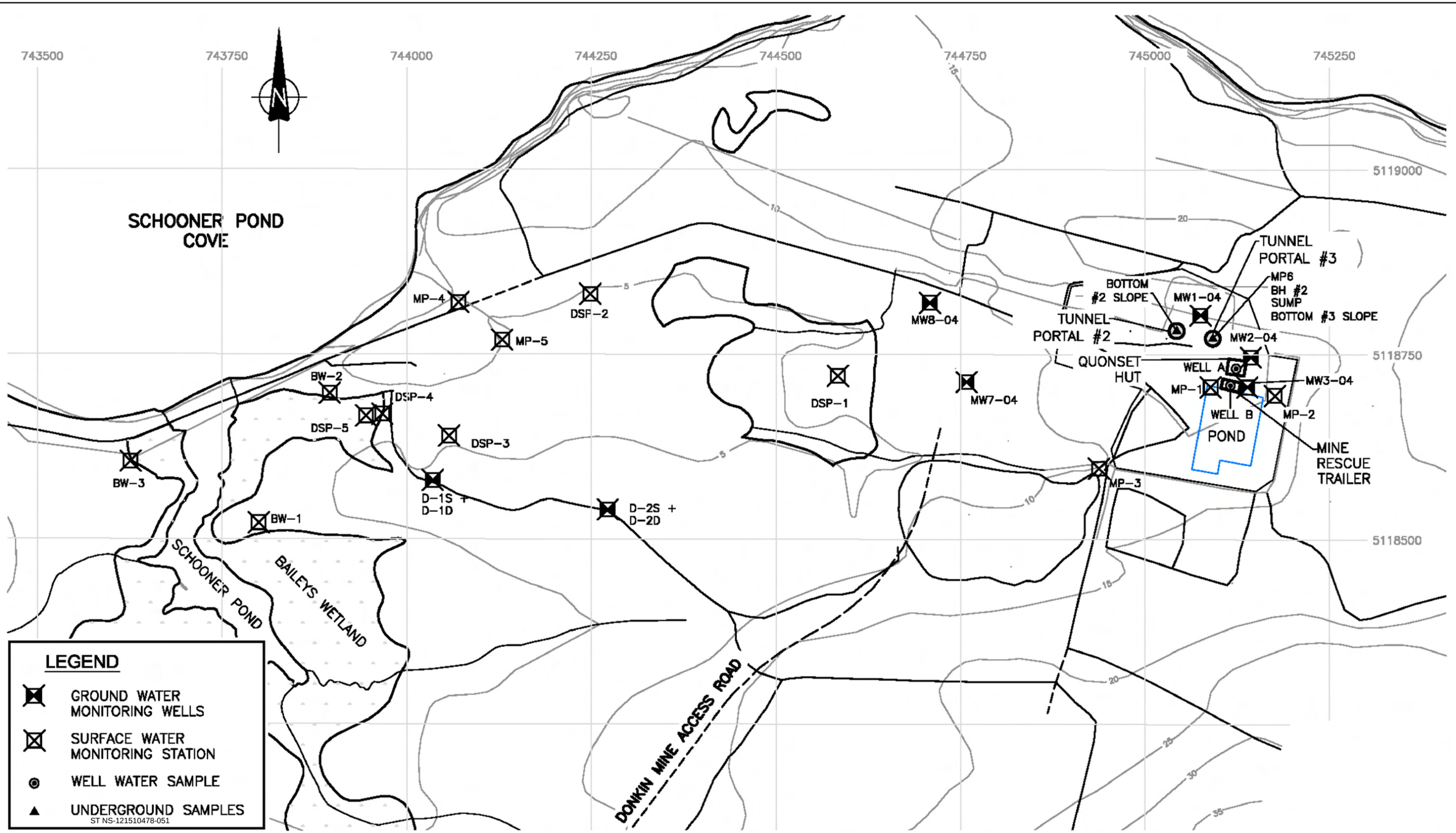
As required under existing provincial approvals, current surface water and groundwater monitoring is focused on the baseline monitoring program that was initiated in 2006. This program is currently being undertaken on a semi-annual basis at the locations shown in Figure 2.7.4. The program currently consists of eight surface water sampling locations (BW-1 to BW-3 at Baileys Wetland, and DSP-1 to DSP-5 at DEVCO settling pond) and nine groundwater monitoring locations (nested deep and shallow pairs D1-D/D1-S and D2-D/D2-S, and shallow wells MW1-04, MW2-04, MW3-04, MW7-04 and MW8-04).

To date this baseline water quality monitoring program has identified elevated metals concentrations as the main parameters of interest, particularly in surface water. Surface water analytical results are compared to the Canadian Council of Ministers of the Environment Fresh Water Aquatic Life (FWAL) and Marine Aquatic Life guidelines, and groundwater samples compared to Health Canada's Guidelines for Canadian Drinking Water Quality as part of the semi-annual program. It should be noted that these guidelines form a basis for comparison, but are not prescribed standards, for current site activities.

Generally low pH and elevated metals concentrations (including high As, Al, Cu, Pb, Fe and/or Zn) have been identified in the DEVCO settling pond area (specifically at locations DSP-1 and DSP-3) since the baseline monitoring program commenced in 2006. The current tunnel dewatering program was established after the initiation of baseline monitoring. The role of the DEVCO settling pond for the removal of solids and other contaminants can result in elevated and/or variable metals concentrations. On-going water quality monitoring will aid in demonstrating the active processes of deposition (or release) of contaminants in the settling pond.

It should be noted that elevated metal concentrations have been historically observed in the Baileys Wetland. Elevated groundwater metals concentrations could be attributable to historical mine activity, or may be naturally elevated due to the surrounding geological formations.

Nested groundwater monitoring wells were installed between the DEVCO settling pond and Baileys Wetland in an effort to evaluate shallow and deeper groundwater flow paths between these two water bodies and, hence, further delineate potential source(s) of elevated metal concentrations in the wetland and groundwater.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC LIMITED REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

All spatial data contains varying levels of inherent inaccuracies. This product was produced for the sole purpose of supporting information specific to a stantec project and should not be used for other purposes.

PREPARED BY: SJT	Donkin Export Coking Coal Project	FIGURE NO.: 2.7.4
REVIEWED BY: PEP	**Monitoring Wells and Sampling Locations**	DATE: Jun 27, 2012
CLIENT: xstrata coal		Stantec

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XCDM's provincial water approval required it to increase the factor of safety of the DEVCO settling pond berm from its as-built 1980s standard to modern standards by the end of 2010. As part of these works, XCDM sealed the dam overflow structure to prevent any seepage from the DEVCO settling pond reaching the wetland.

2.7.2.2 Site Runoff

Site runoff wastewater will be collected through a series of ditches and culverts and the runoff directed towards the existing serpentine pond on the eastern edge of the site. The underground mine discharge will be piped directly to the serpentine pond.

The existing serpentine pond will serve as the treatment system for both mine water and runoff from mine disturbed areas (*i.e.,* site runoff) with a backup chemical feed system included should the mine water chemistry change from alkaline to acidic.

Site runoff wastewater will include storm water and dust suppression flows. These flows will be directed to the serpentine pond for sediment drop out. Once the fines have settled out of the discharge, the wastewater will flow over a weir and into the existing onsite settling pond (the DEVCO settling pond) to be used as recycled mine process and firefighting water.

2.7.2.3 Passive and Active Water Treatment Processes

As the Project proceeds to production, water treatment will be handled through a combination of passive and active water treatment systems. As described above, mine water (groundwater intrusion) and site runoff is currently treated through a passive water treatment system which consists of an existing serpentine pond for sediment settling. Once the fines settle out of the discharge, the wastewater flows over a weir and into the existing onsite settling pond (DEVCO settling pond) which is used as recycled mine process and fire fighting water. Ultimately, overflow from the DEVCO settling pond flows to Schooner Pond Cove.

In recognition of the potential to create acidic water conditions from runoff from coal waste disposal piles as the Project proceeds to the production phase, additional water treatment systems will be required in addition to the current system. Although detailed design has not yet been initiated, it is anticipated from the conceptual design that acid generation from the coal waste disposal areas will have technical implications in the process between the collection of acidic surface runoff and seepage (collectively referred to as drainage) to the release of drainage to the environment. Detailed design will be completed after approval of the coal waste pile final design. Although the treatment system will require project specific design due to the volumetric capacity, project specific ARD quantities and total acidity, the system is expected to be standard. A similar plant began operations in 2009 in New Waterford, Nova Scotia, with a capacity of 2.5 million gallons a day. The following paragraphs summarize the implications to the Project as a result of acid rock drainage (ARD) from the coal waste piles.

2.7.2.3.1 Site Hydrology and Drainage Collection System

Drainage will consist of combined runoff and seepage from the waste disposal areas. Based on climate normals, short duration rainfall intensity data and 24 hr duration, 1 in 25 year return interval design storm intensity data obtained from Environment Canada from the years 1971 to 2000 for Sydney, NS, design storm (24 hr) runoff volumes resulted in 60,000 m^3 for the Phase I/II coal waste disposal pile and 57,000 m^3 for the Phase III waste pile.

As indicated in Figure 2.7.1, a drainage control and treatment system would be installed and would consist of perimeter ditches, a design storm holding pond, and a treatment system. Perimeter ditches and storm runoff holding ponds would collect drainage directed from the waste disposal areas, which would then be pumped from the holding ponds to the active treatment system.

The system would be operated to maintain the stormwater holding ponds at close to “empty” to ensure the availability of capacity for design storm conditions. The treatment system will be required to neutralize the drainage; separate precipitated metal hydroxides from the water; and pump the iron-rich sludge to a disposal area. A treatment plant flow rate of approximately 100 m^3/h will be adequate for normal runoff conditions. A peak treatment plant flow rate of approximately 550 m^3/h will provide adequate capacity for treatment of drainage resulting from the design storm. Rainfall amounts from IDF curves-Station 8205700 (Sydney Airport) are included in Appendix I Table 6.

2.7.2.3.2 ARD Quantities and Total Acidity

Coal waste will contain approximately 24 wt% pyrite and, based on past history at the Sydney Coal Field, will have a strong potential for the generation of acid rock drainage. Predicted rates of acid generation (as $CaCO_3$) for both coal waste disposal piles are between 3.0 and 7.2 tonnes of acid per day (t/d), with a median acidity of pH 4.4 for the Phase I/II waste pile and pH 4.8 for the Phase III waste pile. The mean annual drainage acidity (mg/L as $CaCO_3$) is to be 3,400 for the Phase I/II waste pile and 3,900 for the Phase III waste pile.

The objective for active water treatment for drainage from the piles is to be of suitable quality for discharge to passive treatment. Technology for treatment of ARD drainage is technically and economically proven for this scale of operation.

2.7.2.3.3 Treatment Materials Balance

Active treatment will require approximately 1,300 t/a of hydrated lime and generate approximately 4000 m^3/a of sludge, at approximately 15 wt% solids. The sludge can be further dewatered to approximately 50 wt% solids, if desired to minimize sludge volume. The volume of sludge, relative to the volume of coal wastes disposed of on an annual basis, would be in the range of 1 to 3 percent, depending on the degree of sludge dewatering. The sludge, once removed, is co-mingled with the coal waste where it will continue to have a neutralizing effect.

Following reclamation and a post closure period of stabilization, drainage from the waste disposal areas would be suitable for passive treatment methods, involving minimum maintenance requirements.

2.7.3 Sewage

During the exploration phase, sewage will be directed to a holding tank and pumped out by truck. During the production phase, sewage flows from the administration, amenities, support services and maintenance buildings will be collected by gravity drainage and pumped to a treatment plant. A package wastewater treatment plant will be utilized using a circulating sand treatment system or similar system. No sewage outfall pipes are envisioned for the Project.

2.7.4 Solid Waste

Potential sources of nonhazardous or solid wastes generated by the Project include domestic waste (*e.g.,* office and lunchroom wastes) and construction wastes. As is current practice at Donkin Mine, these wastes will continue to be segregated as recyclable and non-recyclable, with recyclable material collected and transported to a licensed recycling facility using authorized local services in compliance with the Nova Scotia Solid Waste-Resource Management Regulations. Efforts will continue to be made to minimize the amount of waste generated by application of 4-R principals (reduce, reuse, recycle and recover) to the extent practical. Non-recyclable wastes will continue to be transported offsite to a permitted landfill.

2.7.5 Hazardous Waste

Hazardous waste that is expected to be generated from Project construction and operation sources are considered to be minimal and includes small quantities of waste oils and solvents. As is done currently at Donkin Mine, hazardous waste will be stored onsite in a separate temporary hazardous waste storage area provided with full containment. Hazardous wastes will continue to be removed from site by a licensed contractor and disposed at an approved facility. Other control measures for hazardous waste include updating and implementing an emergency spill prevention and response (contingency) plan to avoid impacts from release of potentially hazardous materials. All hazardous waste materials will continue to be handled and stored in compliance with all applicable regulatory requirements and industry best practices.

2.7.6 Dust

Air quality impacts associated with construction activities are generally related to the generation of dust and routine emissions from the operation of construction equipment (refer to Section 5.1 for more information on effects of and mitigation for dust). Control measures, such as use of dust suppression techniques (*e.g.,* sprays, suppressants), will be used in construction zones to minimize fugitive dust. The air emissions from the construction equipment will be localized and temporary, lasting the duration of the construction activities. Regular inspection and maintenance of construction equipment will minimize exhaust emissions.

Effective mitigation of fugitive airborne dust during Project operations is essential. Coal dust particles can escape from ROM coal piles, particularly when the storage area is exposed to dry and blustery conditions. These areas typically include coarse reject, topsoil, and overburden as other contributors to airborne dust.

Fugitive dust emissions from coal storage piles have been estimated to be 13.5 kilograms per hectare per hour. As a function of wind speed, this initial assessment assumes that the total suspended particulate matter has an aerodynamic diameter of less than 30 µm and that wind speeds are 7.5 m per second, based on average wind speeds at a 30 m height for the Donkin mine site (NSE 2011).

An effective particulate monitoring plan combined with a fugitive dust suppression program will be implemented. Design mitigation to minimize dust emissions include barriers and dust suppression techniques.

Dust Control Mitigation

The following dust control measures are proposed:

- Discharge of ROM coal from the tunnel will be through a covered conveyor. There will also be misting sprays at the head chute of the conveyor such that the free fall of coal would pass through the water mist.

- Open coal stockpiles will be serviced by a Rain Bird-type dust suppressant system. Rain Birds provide a high volume spray with the capacity to soak the stockpile. The system will consist of a dedicated weather station and computerized system loaded with predetermined criteria for automatic operation. Weather data will be used to alert the operator that the Rain Birds and misters are to be activated.

- Overland conveyors will have dust hoods to prevent dust migration. The transfer point from the overland conveyor will be totally enclosed and the stacker chute of the radial stacker used to load the barges will sit on the coal surface in the barge so there is no free fall of the coal through the air column.

- Coal stockpiles, waste rock and topsoil stockpiles will be stabilized, when necessary, with vegetation or by other suitable means to minimize fugitive dust emissions.

- The use of dust screens will be considered for installation at stockpiles where appropriate.

Section 5.1 (Atmospheric Resources) contains additional information on dust control measures and monitoring.

2.7.7 Greenhouse Gas and Methane Management

Greenhouse gases will be emitted as a result of the combustion of fuel in various pieces of construction and operating equipment, trucks and marine vessels. However the majority of the emissions will result from the underground mining of coal and the subsequent fugitive methane releases.

XCDM has considered a number of GHG control methods in prefeasibility studies keeping health and safety the prime objective in its operations; this has been addressed in part by providing sufficient ventilation air for the dilution of methane below flammable limits. This ventilation approach safely dilutes the air, but also results in a composition of air exiting the mine that does not directly sustain combustion, and cannot be easily flared without providing additional fuel gas to promote combustion. Directly discharged ventilation air results in the discharge of methane to the atmosphere. Options under consideration include degasification of the coal before extraction and/or use of thermal or catalytic oxidation technology to combust the methane at the ventilation exhaust from the mine, forming carbon dioxide, which is 21 times less effective as a GHG than methane.

The Project continues to research the opportunities for methane recovery and destruction, and commits to develop a Greenhouse Gas Management Plan to address the methane emissions. At this time, pre-drainage of working sections is identified as a viable option. The Project will also investigate the practicality of other GHG abatement opportunities during Project development such as oxidation of ventilated air methane (VAM), improved energy efficiency of project activities (*e.g.*, high efficiency electrical motors), and GHG offset projects such as large capacity wind generation onsite. These measures will be detailed in the GHG Management Plan; the objective being to reduce the GHG emissions as much as is practically and economically feasible, and to recover energy from the coal-bed methane resource where it is technically and economically feasible to do so. For more information on greenhouse gas emissions and proposed mitigation refer to Section 5.1 (Atmospheric Resources).

2.7.8 Noise

The proposed Project site is located in a rural environment; the nearest occupied residence is approximately 1.5 km from the hub of the surface activities, while the nearest township, Donkin, is approximately 3 km from surface activities. Ambient noise levels on the peninsula include natural sounds associated with the wind and waves and current site maintenance activities.

During the construction of the surface facilities, it is anticipated that there will be periodic increases in ambient noise levels at the site. Site works, for example will include grading and excavation, the installation of utilities, roadways, and the construction of the site buildings and water treatment facilities. Such activities typically involve the use of heavy equipment including tractors and loaders. Trucks will also be used to deliver equipment and building materials to the site and to haul away waste materials. Smaller equipment, including pneumatic tools, saws and

hammers will be used extensively during construction. This equipment can generate both temporary steady and episodic noise that may be heard both within and off the Project site.

CBRM has a noise by-law that outlines the times of day that noise from construction activities is permitted. Exempted activities outlined in Schedule C of the by-law include “Activities at Pits, Quarries or Mining Operations for which a permit has been issued by the NSE which expressly regulates sound levels”. Therefore, the permissible noise levels for the Project site will most likely form part of the Environmental Approval governing the Project that will be issued by NSE.

While, due to the location of the Project site on a largely forested peninsula, noise from the mine itself is not anticipated to be a major issue. Noise associated with marine transportation and construction is considered as part of this EA.

Current approval requirements require XCDM to monitor noise levels relative to prescribed equivalent sound levels at NSE’s request and must comply with the *Guidelines for Environmental Noise Measurement and Assessment*. Based on the results of the monitoring program as proposed, the Approval Holder must make necessary modifications to mitigation plans and/or operations as required by NSE. Refer to Section 5.1 (Atmospheric Resources) for more information on predicted noise emissions and mitigation.

2.7.9 Light

General site lighting is proposed to be provided by high pressure sodium fixtures installed on high-mast poles for parking and outdoor utility areas. Flood and spot light fixtures will be installed in areas requiring additional illumination, and throughout the coal storage area.

All site lighting including lighting at the marine terminal will be designed to minimize excess light and offsite light (*e.g.*, light cut off) as per good electrical engineering lighting design practice. Lighting on the barge and transshipment facility will be designed to meet Canadian Coast Guard standards. The International Maritime Organization has established specific lighting, warning and safety rules under a protocol commonly referred to as International Regulations for Preventing Collisions at Sea (COLREGS) 72 for marine vessels. This protocol provides guidance for lights displayed by power-driven vessels under a variety of operating conditions including those proposed for this Project. Conceptual lighting engineering design has been conducted to develop an efficient lighting plan for the Project’s requirements.

2.8 HAZARDOUS MATERIALS MANAGEMENT

Hazardous materials that may be stored at the Project site and/or used during Project activities will be discussed along with best management practices to reduce or eliminate discharges to the environment.

Hazardous materials will be in use at the Project facilities in small quantities relative to other industrial sites. Project staff will be appropriately trained in handling, storage and disposal of

hazardous material. Chemical storage and handling will be done in accordance with the manufacturer's recommendations and federal and provincial regulations, where applicable. Hazardous materials anticipated to be in use throughout the life of the Project include:

- Fuels and oils;
- Solvents and grease; and
- Batteries.

A self-contained 10,000 litre diesel storage tank with a dispensing station for fuelling the diesel mine equipment is located on an existing concrete pad near Tunnel #2 and is expected to be utilized for this Project. There will also be a 200,000 litre diesel tank and containment berm with fuel lines in close proximity to the barge load-out facility to fuel marine vessels.

To minimize, contain and control any potential releases of hazardous material, a site-specific emergency spill prevention and response (contingency) plan is in place for current activities at Donkin Mine and will be updated for the Donkin Export Coking Coal Project. Requirements of the Environmental Emergency Regulations under Section 200 of the *Canadian Environmental Protection Act* (CEPA) and the Implementation Guidelines for the Environmental Emergency Regulations under Section 201 of CEPA will be implemented as required.

2.9 PROJECT ALTERNATIVES

As required under Section 16(2)(b) of CEAA, every comprehensive study of a project requires consideration of alternative means of carrying out the project that are technically and economically feasible as well as consideration of the environmental effects of any such alternative means. In addition, the EIS Guidelines for this Project require analysis of alternatives to the project – a factor which is at the discretion of the Responsible Authority or Minister, under Section 16(1)(e) of CEAA.

Alternatives to the Project and alternative means of carrying out the Project are discussed in the following sections.

2.9.1 Alternatives to the Project

Consideration of alternatives to the Project involves analysis of functionally different ways to achieve the Project's purpose. The Project's purpose is the primary criteria used to identify potential alternatives for evaluation. Any feasible alternative would be subject to further evaluation considering environmental, economic, and technical costs and benefits.

As indicated in Section 2.2, the purpose of the Project is for the development and operation of a commercial underground coal mine to produce a coal product that is primarily suitable for export sales into the international coking coal markets but, depending on prevailing market conditions, may also produce thermal coal. The Project is proposed to be developed on Donkin Peninsula

in a manner that is socially, environmentally and technically feasible and will provide a reasonable return on investment to Company shareholders. XCDM intends to collaborate with the Province to consider strategies to contribute to the sustainability of the Province's natural capital in the mining sector as set out in section 4(2)(u) of the *Environmental Goals and Sustainable Prosperity Act*. The Donkin Resource Block is an important component of the region's natural capital. The Project is committed that, if economically viable and approved, it is developed in a manner that brings maximum benefit to the local area and to the Province not only with minimum effect on the receiving environment, but in a manner that leaves a positive legacy. Section 2.11 provides additional information on the Project's commitment to sustainability.

There is essentially no alternative to the Project which still meets the Project's purpose as defined above. The "null alternative" which consists of doing nothing would not satisfy market needs or provide a reasonable return on investment to Company shareholders. Likewise, the alternative of energy conservation or development of renewable energy to reduce market demand for coal, or increased production of other fossil fuels such as natural gas, also does not meet any portion of the Project's purpose and objectives. Local and international demand for coal remains strong and is likely to continue as a viable market for the life of the Donkin Project. The Project as proposed will see extraction of a valuable resource in a manner that is environmentally acceptable and which will bring economic and social benefits to Cape Breton, Nova Scotia, the Mi'kmaq of Nova Scotia, and Company shareholders. The proposed Project has been shown to be technically and economically feasible as evidenced by engineering feasibility studies and market research that has been commissioned by XCDM. The Project will continue to prove its economic feasibility through the exploration stage of the Project. XCDM considers alternatives to the Project as not meeting basic Project objectives and are therefore not feasible.

2.9.2 Alternative Means of Carrying Out the Project

The following section discusses key alternative means of undertaking the Project that were considered in Project planning. Only those alternative means that were found to be technically and economically feasible are carried forward for the analysis of environmental and socio-economic effects. Preferred options are indicated based on this analysis.

The alternative means for carrying out the Project as identified in the EIS Guidelines are:

- Mining methods (longwall/continuous miners);
- Product coal (process(es) for preparing coal for coking and thermal markets);
- Coal transportation (marine, rail, road);
- Wharf design;

- Coal rejects management;
- Water treatment (passive and active); and
- Disposal of dredged material.

Specific criteria were applied to the evaluation of these alternative means. Technical feasibility was evaluated during engineering feasibility studies commissioned by XCDM. XCDM also evaluated economic feasibility of alternatives including capital, operating and lifecycle costs.

In summary, the process followed in the assessment of alternative means of carrying out the Project was:

- identification of the range of alternative means of carrying out the specific components or aspects of the Project;
- evaluation of the technical feasibility of alternative means of carrying out the Project;
- evaluation of the economic feasibility of alternative means of carrying out the Project;
- consideration of the environmental and socio-economic effects of technically and economically feasible alternatives of carrying out the Project; and
- selection of the preferred alternative means of carrying out the Project.

Each category of alternative means is discussed below; a summary analysis is provided in Table 2.9.1.

2.9.2.1 Mining Method

Two general mining methods have been investigated for the Donkin Mine: longwall and use of continuous miners. XCDM originally conceived the mine as a longwall mining operation to produce thermal coal including supply to local thermal generating plants. In this scenario, production targets ranged from 4 Mtpa to 5 Mtpa. The capital and timing of the capital investment requirements for a longwall mine were significant and considered the somewhat limited geological database (indicated and inferred resources), the business risks were considered unacceptable (Marston 2011). Furthermore, the inability to complete contracts with the local power utility due to changing requirements, led to additional feasibility planning for the mine where it was decided to reconfigure the plan for a reduced production level using multi-continuous miners. This was considered a more cost effective method to produce coal for the intended coal markets. Both mining methods are technically and economically feasible and have similar environmental effects. The increased production that would be associated with longwall mining could potentially have proportionately greater rates of wastes, effluents, emissions and potential for subsidence than the proposed continuous mining operation although

it is anticipated that they could be successfully managed. In summary, the continuous mining method was selected as the preferred alternative because of cost efficiencies within the current business model.

2.9.2.2 Product Coal

XCDM's initial objective was to develop Donkin Mine as a thermal coal resource with mine product being used locally and or for selected export markets. However, with new air emission targets established by the *Environmental Goals and Sustainable Prosperity Act,* the local market for unwashed thermalcoal declined. In light of easier marketability and higher prices of coking coal, the preferred approach is to process the raw coal to a coking coal specification that may also be marketable as a thermal coal.

Processing trials of bulk samples at the Victoria Junction Coal Processing Plant and through a pilot plan by Canada Centre for Mineral and Energy Technology (CANMET) indicate potential to produce a coking coal at an acceptable yield via a conventional processing method. These trial results also indicate a relatively high sulphur content in the coal, thereby requiring additional processing for sale as thermal coal to markets with restrictions on sulphur content.

The main differentiation in terms of environmental effects is the additional infrastructure (and therefore larger footprint) required for coking coal processing. The CHPP will generate a substantial amount of waste over the lifetime of the Project which is to be managed on site but will result in habitat loss including wetland habitat which will be compensated to achieve a no net loss objective for wetland habitat. Given that these environmental effects can be managed and the coking coal market has greater viability, coking coal is the preferred product.

2.9.2.3 Coal Transportation

It is estimated that during full scale production, 2.75 Mtpa of coal product will be transported from the mine. Three coal transportation options have been evaluated during prefeasibility planning: rail, marine, and road transportation. Each of these scenarios is described below.

- **Case 1: Rail option** – Product coal is reclaimed to a rail load-out bin that loads coal wagons for transportation of the coal by rail along a section of new and rebuilt rail line to Victoria Junction where the train enters the common rail line and on to the Port of Sydney for transfer to ocean going vessels.

- **Case 2: Marine option** – Product coal is reclaimed to an overland conveyor on site that traverses the onshore section from the product stockpile to accommodate the direct loading of circa 4,000 tonnes coastal barges at a barge load-out facility. This near shore loading berth is located in depths of approximately 6 m. The barge will then be moved to a transshipment area located 8 km southwest of Cape Morien where a barge grab crane will load the product coal to ocean going vessels.

- **Case 3: Road option** – Product coal is loaded into transport trucks which will haul the product via public roadways to various locations including local customers and the Port of Sydney.

Each of these three options is technically feasible. Economic feasibility will depend on the location of specific markets and volumes produced; local markets may be efficiently served by truck transport with international markets more efficiently served by rail or marine transport. The rail alternative, however, was determined to have higher capital and operating costs than the marine transport option.

Each alternative has variable environmental and socio-economic effects. The rail option would involve construction of approximately 22 km of new track which would represent a change in land use in local communities and involve habitat loss. Numerous watercourse and wetland crossings would require regulatory authorization and compensation for lost habitat.

The marine option involves permanent infilling of nearshore marine benthic habitat for the construction and operation of a barge load-out facility in Morien Bay as well as development of a transshipment operation in Mira Bay. This will affect marine habitat and fishing activities. This transportation option is constrained by weather conditions more so than the other two options, although feasibility studies (CBCL 2012) have concluded that the proposed marine option is feasible and construction and operations can be properly controlled and executed in an environmentally safe manner. Additional detail on this alternative is provided in Section 2.5.2.4.

Transport by road was the sole transportation option considered and approved for XCDM's exploration project approved in 2008. A detailed traffic impact study was completed in 2009 (AR&TM 2009) to assess existing traffic along the likely truck transport routes and predict potential Project-related effects on traffic infrastructure and level of performance. This analysis was based on transport of 300,000 to 500,000 tonnes of coal per year for three to four years and not full production. Section 2.3.2.3 of the EIS provides more information on proposed road transport for the Project including the haul route.

At a production rate of 300,000 to 500,000 tonnes of coal per year, it was estimated that approximately 60 tri-axle semi-trailer units would be required per day (five loaded and five unloaded trucks per hour) or 48 B-Train unit trucks would be required per day (four loaded and four unloaded trucks per hour) (AR&TM 2009).

The Traffic Impact Study concluded that although some specific road and bridge upgrades would be required, the proposed haul route would provide satisfactory levels of performance and safety while accommodating traffic generated by construction and operations of the Donkin Coal Mine from 2009 to 2014 (the originally proposed exploration phase) (AR&TM 2009).

Road transport is therefore considered to be a technically and economically feasible transport option, depending on the production rate and intended markets. When an alternative to marine

transport is needed (*e.g.*, due to weather or other shutdowns of marine operations), road transport is the preferred transportation option. Potential environmental and socio-economic issues associated with road transport are primarily related to the generation of noise and air (dust) emissions along the haul route and associated effects on land use. There is also a concern with any incremental risk of traffic accidents due to the addition of transport trucks. These issues are addressed in Section 2.5.2.3 and the Traffic Impact Study (AR&TM 2009).

In summary, due to higher capital and operating costs, rail transportation was found to be less preferred than the other two options. The marine-based option (barge load-out with transshipment) was selected as the most technically and economically feasible option for the proposed Project, with road transport as a preferred alternative for domestic customers and/or should marine transportation prove impractical at any time. Potential environmental effects from all transportation alternatives are considered manageable through standard mitigation. Environmental effects associated with the preferred alternatives (coal trucking and marine transport) are evaluated as relevant to applicable Valued Environmental Components (VECs) in Section 5.

2.9.2.4 Wharf Design

Various options were considered for design of the marine load-out facility including a conveyor with trestle (no breakwater) and different breakwater options (concrete caisson or timber crib,). Design options that did not include a breakwater were considered not to be technically feasible and were not evaluated further as alternatives. Breakwater design options included use of concrete caissons and timber cribs. Both options are technically and economically feasible.

Concrete caisson and timber cribs provide a similar structural function for wharf design. Both are essentially boxes that are placed on rock mattresses, filled with ballast and finished with concrete decks. Dredging of the marine substrate may be required to prepare the bottom for placement of the mattresses. Any dredged material will be disposed on land. Concrete caissons are considered to have a design life greater than 60 years with maintenance and are considered most economical for larger projects in deep water. The timber crib structure is expected to have a design life of greater than 40 years with maintenance (CBCL 2012).

Both options have similar footprints on the seafloor and are expected to have similar environmental effects in terms of fish habitat loss and potential displacement of fishing activity. However, a timber crib is less cost to construct and can be built with local labour and materials. Although a concrete caisson is more durable than a timber crib, it is not expected that the structure will be subject to the damaging conditions that would require a concrete caisson (CBCL 2012). Therefore, the timber crib breakwater option was selected as the preferred option (see Section 2.4.2).

2.9.2.5 Coal Rejects Management

During the 30 year operation of the mine, there will be approximately 19.6 million m^3 of coal rejects and tailings generated that will require disposal. In addition, there will be approximately 180,000 m^3 of waste rock generated from Tunnel #1 construction (Year 4), and up to 11,250 m^3 of dredge spoils (Year 1) from marine works. A range of waste management options have been and will continue to be reviewed as part of the future phases of the Project. Based on the grain size distribution, properties, and behavior of these waste materials it is believed that it is feasible to combine waste streams. Appendix E contains a Concept Study on Coal Waste Disposal Options-Donkin Mine. This report forms the basis for the following discussion on disposal alternatives which include: surface storage, underground disposal, and disposal at sea.

Surface Disposal

Surface disposal options were considered both at the Donkin site and at other locations in the local region. Various disposal options were considered at the Donkin site, with effects on visual aesthetics, air quality, and habitat being considered for each.

An analysis of various onsite disposal options concluded that land disposal options were constrained by the limited land mass available on the peninsula. Higher coal waste disposal piles with less of a footprint would be visually prominent and subject to greater wind erosion; lower piles would have a larger footprint and encroach on a greater amount of habitat, including wetlands and freshwater habitat. Appendix E provides more detail on the various waste options considered and requirements for design and construction of containment cells for surface disposal including measures to mitigate environmental concerns (*e.g.*, acidic runoff, visual impacts and habitat footprints).

As part of the identification of potential sites for surface storage of waste, the local region was reviewed for abandoned surface open pits, large valley structures or other large tracts of land within 75 to 100 km from the Donkin site that could be accessed using existing transportation routes. No offsite areas were identified that are sufficient to handle the proposed volume of waste that will be generated.

Underground Disposal

The practice of returning some or all of mine waste into worked-out underground voids, which is generally referred to as “backfilling” has been adopted at many mine sites, although it has limited use in coal mining applications. Key advantages to this disposal option include the potential for reduction of subsidence of historic mine workings, and reduced environmental effects on the land and marine environments compared to conventional disposal options. However, the engineering for this process is complex and the economic and technical feasibility of backfilling is largely site-specific. Most frequently, backfilling techniques are employed at the same mine site from which the mine wastes originated.

In the case of the Donkin Mine, it was determined that exploitation of the underground areas for waste disposal was not compatible with the potential long-term exploitation of additional coal resources found at depth below the level presently planned for production. Based on this limitation, this option was not investigated further at this time, but it was recommended for consideration as an option in the future should the mine and resource development plans change in the future.

Due to the large volume of coal mined in the region, consideration was also given to disposing of waste back into the numerous abandoned underground workings offsite. However, implementing a backfilling operation at an abandoned mine site would require "re-opening" of the mine and require design and implementation of three main elements: mine waste transport system (system for transporting mine waste from the source mine to the proposed underground storage mine); process plant (intended to process mine waste to achieve desired physical properties for backfilling); and conveyance system (system to transport modified waste to underground workings for permanent storage). The feasibility of backfilling abandoned underground mines would be highly influenced by physiographical and socio-economic factors associated with the proposed receiving mine site.

Thirteen mine sites in Glace Bay and Morien were considered for this analysis. Details of this analysis are provided in Appendix E. It was concluded that backfilling of abandoned mine workings as a management practice for mine wastes generated from the Donkin Mine is theoretically technically feasible, but not economically feasible considering known constraints, uncertainties regarding the condition of historic mine workings.

Disposal at Sea

Disposal at sea was considered as a third option for mine waste disposal. Not unlike the previous two coal waste disposal options, ocean disposal would require specific engineering design and environmental studies to develop the option for further consideration.

Ocean disposal could involve installation of a nearshore discharge system and/or hauling coal waste by barge to a disposal site. Given the slurry composition of the coal waste, thickening of and/or removal of air bubbles from the coal waste would need to be undertaken prior to ocean disposal to prevent entrainment to the water surface creating a surface plume. The coal waste would be expected to inundate the seafloor near the discharge point resulting in localized mortality of marine benthic species, substantially affecting the productivity of the benthic environment in the area of deposition. This disposal option could also have a substantial effect on commercial and Mi'kmaq fishing activities.

Specific federal approvals would be required to permit disposal at sea, including authorization under the *Canadian Environmental Protection Act* (s. 127), and the *Fisheries Act* (s. 35(2)). Authorization for disposal at sea would require a demonstration that the waste material was inert geological matter, that it would not pose a risk to the marine environment, and that there is

no viable alternative to ocean disposal of coal waste. The latter requirement may pose a considerable constraint to this disposal option as surface disposal at the Donkin site is considered a feasible alternative.

Given the perceived regulatory burden and risk that this option may not be approved given the availability of alternative disposal options, along with potentially substantial effects on marine benthic habitat and commercial and Mi'kmaq fisheries, detailed analysis was not undertaken for this disposal option.

Summary

In summary, the preferred method for disposal is the onsite surface disposal option. Section 2.7.1 provides additional details on this preferred option and Appendix E provides additional information on the various disposal options considered.

2.9.2.6 Water Treatment

Currently, during the care and maintenance phase of the Donkin Mine, surface water at the mine site currently flows through a drainage ditch which travels along the east side of the mine site and drains through a series of settling ponds to Schooner Pond Cove (see Section 2.7.2). In addition to channelling surface water flows, this system also receives mine water. Passive water treatment occurs through infiltration prior to discharge to Schooner Pond Cove. Ongoing surface water quality monitoring conducted according to NSE approval stipulations, has demonstrated the treatment system to be effective in decreasing the concentrations of iron and other metals and total suspended solids from the tunnel water. In addition, fish toxicity testing, which is done on a quarterly basis, has shown no samples found to be toxic to fish (rainbow trout).

Surface disposal of coal rejects and tailings are likely to generate acid rock drainage. The products of acid generation would discharge from the piles as acidic seepage and runoff. The acidic drainage will be collected for treatment by neutralization and aeration to neutralize mineral acidity and to precipitate metallic contaminants.

Both active and passive water treatment systems are technically and economically feasible options, depending on their application. Passive water treatment is the preferred alternative to continue to treat suspended solids in surface runoff and mine water. This process would not be as appropriate however, for the neutralization of acid drainage which will likely occur from the coal waste disposal piles. Therefore, the preferred alternative is to employ both methods for different functions as appropriate. Section 2.7.2.3 provides more information on passive and active water treatment processes that will be employed at the mine.

2.9.2.7 Disposal of Dredged Material

As discussed in Section 2.9.2.5, it is anticipated that dredged material will be comingled with coal waste for disposal. Therefore the disposal options discussed in that section of the report remain relevant for disposal of dredged material, although it should be noted that the volume of dredged material is expected to be in the range of 11,250 m^3 which would be a negligible contribution to overall waste volume for storage/disposal.

Alternatively, if the dredge waste were not to be comingled, options for disposal include on-land containment or ocean disposal. The proposed alternative for on-land disposal consisted of a 75 m x 75 m containment area which could be constructed along the outhaul conveyor route. This alternative will result in terrestrial habitat loss. Ocean disposal would present similar constraints as discussed above in Section 2.9.2.5, on a substantially reduced scale. Given the availability of technically and economically feasible alternatives to ocean disposal (including the proposed containment area along the conveyor route and/or surface storage with coal waste), it is assumed that regulatory authorization of ocean disposal would be a challenge. Land disposal of dredged material comingled with coal waste disposal is therefore the preferred option.

2.9.3 Summary of Alternatives Analysis

Table 2.9.1 summarizes the analysis of the various Project alternatives considered, indicating preferred options which have been incorporated into Project design.

Table 2.9.1 Summary of Analysis of Alternative Means of Carrying out the Project

Major Component of Analysis	Alternative Means of Carrying Out the Project Considered	Technical Feasibility	Economic Feasibility	Environmental Effects	Preferred Option
Mining Method	• Longwall mining: a long wall of coal is mined in a single slice; as a longwall miner advances along a panel, the roof behind the miner's path is allowed to collapse.	Technically feasible.	Economically feasible at a scale larger than currently proposed production rate due to high capital investment.	There is no significant differentiation in environmental effects of longwall and continuous mining processes. However, longwall mining would only be completed at a larger production scale so there would likely be more wastes and potential emissions associated with a longwall mining operation.	
	• Continuous miner: coal deposits are mined by cutting a network of rooms into the coal seam with pillars of coal left behind to keep up the roof. These pillars can be extracted at a later stage.	Technically feasible.	Economically feasible and most efficient for the production scale proposed for the Project.	There is no significant differentiation in environmental effects of longwall and continuous mining processes. However, continuous mining would be the preferred method for a smaller scale production and therefore there would be less wastes and emissions associated with a continuous mining operation.	✓
Product Coal	• Thermal Coal Product (for international export and/or domestic customers).	Technically feasible.	Economically feasible - Although thermal coal has a lower market price, local markets (if available) bring a transportation advantage resulting in a competitive realization.	Donkin coal does not necessarily require washing before use to meet thermal coal markets, therefore processing of unwashed thermal coal generates fewer emissions.	✓(dependent on market conditions)
	• Coking Coal Product for international export metallurgical markets).	Technically feasible.	Economically feasible.	Donkin coal requires washing to meet coking coal specification therefore there is more potential for environmental effects primarily due to increased Project footprint (for CHPP and coal waste disposal piles). Water consumption will be limited as the CHPP will usea closed loop system.	✓

Table 2.9.1 Summary of Analysis of Alternative Means of Carrying out the Project

Major Component of Analysis	Alternative Means of Carrying Out the Project Considered	Technical Feasibility	Economic Feasibility	Environmental Effects	Preferred Option
Transportation	• Marine: Product coal is reclaimed to an overland conveyor from the product stockpile to marine barge load-out facility with towing of barge to deeper waters to allow transshipment by floating crane to vessels up to Cape Size.	Technically feasible.	Economically feasible.	Marine option will result in localized fish habitat loss and interact with fisheries and marine navigation in the area. Habitat loss will be compensated under the *Fisheries Act*.	✓
	• Rail: Product coal is reclaimed to a rail load-out bin that loads coal wagons for transportation of coal by rail along a section of new and rebuilt rail line to Victoria Junction where train enters the common rail line and on to Port of Sydney for transfer to ocean going vessels.	Technically feasible.	Economically feasible but with higher capital and operating costs than other options.	Rail option will have a substantial ecological footprint due to requirement for installation of new tracks along a portion of the route. In addition, there would potentially be noise and air quality effects on the local community along the rail route.	
	• Road: Product coal is delivered to local markets and Port of Sydney using an approved haul route.	Technically feasible (depending on product volume/ market).	Economically feasible (depending on product volume/market).	Road transport would result in localized noise and air quality effects along the haul route. There may be interactions with local road traffic although the Traffic impact study indicates a satisfactory level of performance and safety.	✓ (for domestic customers and should marine transportation prove impractical)
Wharf Design	• Conveyor with Trestle (no breakwater).	Not technically feasible.	Economically feasible.	N/A	
	• Concrete Caisson Design.	Technically feasible.	Economically feasible, although less attractive due to specialized labour required and potentially sourcing	Concrete caisson breakwater design will result in fish habitat loss and loss of fishing access. Negligible difference in environmental effects between concrete caisson design and timber crib design.	

Table 2.9.1 Summary of Analysis of Alternative Means of Carrying out the Project

Major Component of Analysis	Alternative Means of Carrying Out the Project Considered	Technical Feasibility	Economic Feasibility	Environmental Effects	Preferred Option
			contractors outside region.		
	• Timber Crib Design.	Technically feasible.	Economically feasible with added benefit of local labour skills availability.	Timber Crib breakwater design will result in fish habitat loss and loss of fishing access. Negligible difference in environmental effects between concrete caisson design and timber crib design.	✓
Coal Rejects Management	• Surface Storage.	Technically feasible.	Economically feasible.	Surface storage will result in aesthetic effects and cover an extensive area of terrestrial habitat including wetland habitat. This option will also require engineered containment and treatment systems to manage risk of ARD.	✓
	• Underground disposal (Backfilling).	Technically feasible.	Not economically feasible	N/A	
	• Ocean disposal.	Not technically feasible (According to EC reject material from coal processing operations is not a CEPA Schedule 5 waste - Disposal at Sea permits are available only for Schedule 5 substances).	Economically feasible.	Ocean disposal would not result in aesthetic effects and would mitigate ARD risk although it would result in substantial loss of fish habitat and potentially affect commercial and Mi'kmaq fisheries in the vicinity of the disposal area. This option would also require additional regulatory authorizations.	
Water Treatment	• Passive water treatment.	Technically feasible (for suspended solids removal).	Economically feasible.	Passive water treatment has been proven to be an effective method to treat mine water and surface runoff with negligible environmental effects.	✓ (for treatment of suspended solids)

Table 2.9.1 Summary of Analysis of Alternative Means of Carrying out the Project

Major Component of Analysis	Alternative Means of Carrying Out the Project Considered	Technical Feasibility	Economic Feasibility	Environmental Effects	Preferred Option
	• Active water treatment.	Technically feasible.	Economically feasible.	Active water treatment would be required to neutralize acidic runoff from coal waste disposal piles. Without active water treatment there is risk of pH lowering, affecting surface water and groundwater resources, terrestrial habitats including wetlands, and freshwater fish and fish habitat.	✓ (for treatment of acid rock drainage runoff)
Disposal of Dredged Material	• Disposal at sea.	Technically feasible.	Economically feasible.	Ocean disposal will result in a loss of fish habitat and potentially affect commercial and Mi'kmaq fisheries in the vicinity of the disposal area. This option would also require additional regulatory authorizations.	
	• On-land disposal.	Technically feasible.	Economically feasible.	The volume of dredged material is considered relatively small. If comingled with coal waste for surface storage on land, it will have a negligible contribution to the effects discussed above for surface disposal of coal waste. If the dredged material is disposed in a dedicated dredge disposal location on land, there will be some habitat loss under the footprint of the dredge disposal.	✓

2.10 PROJECT COSTS AND EMPLOYMENT

2.10.1 Summary of Economic Benefits

The Donkin Coal deposit contains a saleable reserve of 48 million tonnes and further inferred resources of 254 million tonnes suggesting at least 30 years of potential mining activity. The combined capital construction and operations expenditures are predicted to have a substantial economic impact on Cape Breton Island and Nova Scotia as a whole. Spending on goods and services will give priority to local companies and resources where appropriate.

An economic impact analysis was conducted for the Export Coking Coal Project and provides the basis of the economic impact analysis presented in this section.

As shown in Table 2.10.1, Nova Scotia can expect an overall total (direct and spinoff) of 8,497 person-years of employment in the first five years and about 724 annually during operations. The income derived from the Project will be about $335 million in the first five years and $37 million annually during operations. The Gross Domestic Product (GDP) for the province will be $483 million during the development phase and about $63 million annually thereafter. The Federal government will gain a total of $68 million in taxes during the development phase and $49 million in each year of operation. The provincial government will collect $52 million in taxes during the development phase and $54 million annually during operations.

Table 2.10.1 Summary of Overall Economic Impacts for Donkin Export Coking Coal Project (Direct and Spinoff)

	Cape Breton		Nova Scotia	
	Development	Operations	Development	Operations
Indicator	Years 1-5	Year 10	Years 1-5	Year 10
Employment (P-Y)	5,430	408	8,497	724
Income ($ millions)	226	23	335	37
GDP ($ millions)	285	40	483	63
Federal Revenues ($ millions)				
Payroll tax, HST, Excise tax	40	5	66	8
Corporate tax[1]	2	41	2	41
Provincial Revenues ($ millions)				
Payroll tax, HST, Excise tax	30	4	46	7
Corporate tax, Royalties[1]	6	47	6	47

[1]Adapted from Marston 2011

There are very few single prospects in Nova Scotia with the potential to provide economic impacts of this scale. The Project is particularly important for Cape Breton, given the need for high quality opportunities to generate employment and income to stabilize communities. In addition, the Project will contribute to the local and provincial tax base and any local use of the finished coal product will also offset the need to import coal from abroad. Minimizing such

economic leakages from the province would bolster local economies and could stimulate further development.

2.10.2 Expenditures

The total capital investment over 30 years is expected to be $849 million, with most of this (just over $500 million) incurred during a five year development phase and annual operating costs rising from about $35 million in the first year to the $125 million range by year 10. Total spending (capital sustaining and operating) during operations approaches $150 million by year 10. The main expenditure categories are mining equipment, surface infrastructure, distribution, other expenditures, and project management. Table 2.10.2 summarizes anticipated capital expenditures; year 10 is expected to be typical of the annual level over the life of the mine.

Table 2.10.2 Capital Expenditures Summary ($000s)

Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Equip & Infrastructure	$22,530	$11,000	$13,500	$65,000	$62,500	$0
Surface Infrastructure	$0	$0	$12,567	$64,433	$15,000	$0
Distribution	$0	$0	$5,000	$25,000	$7,000	$0
Other	$11,000	$4,750	$26,150	$51,750	$5,250	$0
Project Management	$8,480	$25,363	$26,983	$30,928	$13,463	$13,269
Total	**$42,010**	**$41,113**	**$84,199**	**$237,111**	**$103,213**	**$13,269**

During operations, the main expenditure categories are pit top costs, the CHPP, overheads, and other expenditures, including royalties. Table 2.10.3 summarizes anticipated operating expenditures for the first five years, then for year 10 at steady production.

Table 2.10.3 Operating Expenditures Summary ($000s)

Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 10
Pit top costs	$28,202	$30,668	$17,273	$42,515	$60,855	$80,121
CHPP	$2,221	$2,742	$3,751	$6,840	$11,030	$14,991
Overheads	$4,741	$5,349	$6,530	$10,629	$15,729	$21,323
Other	$452	$558	$763	$5,643	$12,497	$17,808
Total	**$35,617**	**$39,318**	**$28,317**	**$65,627**	**$100,111**	**$134,243**

Aggregate annual operating costs are estimated at $3,897 million, resulting in average annual expenditures of $134 million.

In economic analysis, a discount rate is used to convert a stream of costs and benefits occurring at different points in time to a single value – present value or present worth. This allows two or more projects with different cost and benefit streams to be compared and provides a basis for ranking them using a specified decision criterion (benefit cost ratio, net present value, internal rate of return). Discounting could also be used to choose between two alternative approaches to achieving the same investment objective, where those approaches have different cost and benefit streams.

In the case of the Donkin mine, XCDM has conducted an assessment of the Project's financial feasibility. An appropriate discount rate has been used with respect to the options under consideration, with an assessment of the sensitivity of the results to changes in base case assumptions about such factors as capital and operating costs, cost of borrowing, production rates and product prices.

2.10.3 Employment

CBRM has faced serious economic challenges that have greatly affected its population and labour force. Over the past 40 years, more than 20,000 jobs have been lost due to the elimination of the coal and steel industries in Cape Breton. Sydney and other communities close to the Donkin site have been particularly challenged. The Project is expected to generate both direct and indirect benefits for the economy in the local community and CBRM through local sourcing of labour, services and supplies for the Project.

Most of the direct employment (approximately 90 percent) during mine development occurs in the Cape Breton region (refer to Table 2.10.4). Mine development will also generate substantial spinoffs in supply and service industries in Cape Breton and elsewhere in the province. Cape Breton is expected to capture about 65 percent of the overall employment impacts.

Table 2.10.4 Development Impact – Direct, Spin-off and Total Employment (Person-Years)

	Cape Breton		Total Nova Scotia	
	Development	Operations	Development	Operations
Employment (P-Y)	Years 1-5	Year 10	Years 1-5	Year 10
Direct	3,975	62	4,368	68
Spinoff	835	13	2,994	47
Total	**4,810**	**75**	**7,362**	**115**

Source: Statistics Canada input-output model

Mining operations are expected to generate 527 person-years of direct employment during development with an annual total of 283 person-years over the life of the mine (refer to Table 2.10.5). Virtually all direct employment will be in Cape Breton. Spinoff (indirect or induced) activity brings the overall on-going employment to just over 600 person-years.

Table 2.10.5 Operations Impact - Direct, Spin-off and Total Employment (Person-Years)

	Cape Breton		Nova Scotia	
	Development	Operations	Development	Operations
Employment (P-Y)	Years 1-5	Year 10	Years 1-5	Year 10
Direct	511	275	527	283
Spinoff	109	59	607	326
Total	**620**	**334**	**1,134**	**609**

Source: Marston 2011; Statistics Canada input-output mode

The Project is expected to generate $177 million in direct labour income during development with an additional $4 million generated annually from on-going capital replacement. Much of this direct income will be realized in Cape Breton. Overall construction-generated income (including spinoffs) is estimated at $279 million with another $6 million annually for the remainder of the Project.

2.11 SUSTAINABLE DEVELOPMENT FRAMEWORK

Xstrata's Sustainable Development (SD) Framework is designed to ensure that it manages all its operations and projects to the highest international and leading practice standards, through:

- Xstrata's Statement of Business Principles, SD Policy and SD Standards coupled with a rigorous assurance process;
- an approach that includes SD risk management within our broader enterprise risk management; and
- a SD strategy and planning process that is fully integrated with our operational and business strategy and planning process.

Its SD Framework applies across all commodity businesses, ensuring compliance with common principles, policy and standards. The Group General Manager, Sustainability, who reports to the Group Chief Executive Officer, oversees the implementation and periodic review and updating of the SD Framework.

The SD Framework provides a structure for implementing, reviewing and improving how Xstrata manages sustainability. It is supported by a detailed set of SD Standards. It incorporates a precautionary philosophy and is aligned with international standards including:

- The International Council on Mining and Metals (ICMM) sustainability principles and guidelines
- The UN Global Compact
- Voluntary Principles on Security and Human Rights
- International Standards for Risk Management, Environmental Management, and Occupational Health and Safety Assessment Series (ie. ISO 31000, ISO 14001 and OHSAS 18001, respectively)

Further information can be found on the Xstrata website:
http://www.xstrata.com/sustainability/our-approach/sustainable-development-framework/.

Xstrata introduced its current SD Policy in 2008. It draws on Xstrata's previous Health, Safety, Environment and Community (HSEC) and Corporate Social Involvement (CSI) Policies and includes Xstrata's commitments to employees.

The revised Policy introduces more specific and challenging environmental, health and safety commitments that reflect Xstrata's global leadership position. It also further integrates Xstrata's commitment to communities and the broader societies within which Xstrata businesses operate and sets these within a context of sustainable communities.

Xstrata is committed to giving its stakeholders a clear and transparent picture of our performance, including challenges as well as successes.

Information about Xstrata's approach to sustainability issues and performance are published on its website and annual sustainability reports. Xstrata focuses on the issues that might affect the long-term success of our business or the sustainability of the economies, environments and communities in which we operate. Further information can be found on the Xstrata website: http://www.xstrata.com/sustainability/how-were-doing/

As part of the overarching Sustainable Development Policy, XCDM intends to collaborate with the Province to consider strategies to ensure the sustainability of the Province's natural capital in the mining sector as set out in section 4(2)(u) of the *Environmental Goals and Sustainable Prosperity Act.* The Donkin Resource Block is an important component of the region's natural capital. The Project will ensure that, if economically viable and approved, it is developed in a manner that brings maximum benefit to the local area and to the Province not only with minimum impact on the receiving environment, but in a manner that leaves a positive legacy.

In the context of resource exploitation, inter-generational equity means sustainable of resource use. If resources are exploited at a sustainable rate, then this preserves the equity between generations because current use does not compromise future use. If resources are exploited at an unsustainable rate, then the current generation gains at the expense of those in the future, resulting in an inter-generational inequity.

The concept of inter-generational equity applies primarily to renewable resources or endowments (spending should not exceed income). Donkin coal is a depleting or non-renewable resource. The main sustainability concern is to exploit the resource at a rate that optimizes reserve recovery.

In addition to these commitments, XCDM is taking the initiative not only to pursue goals with respect to climate change, sustainability, and a commitment to biodiversity, but also to execute and support pertinent research in these fields, to lead by example and to embrace these objectives throughout their operations including the work that will be undertaken at Donkin.

2.12 ENVIRONMENTAL DESIGN AND MANAGEMENT PLANNING

Pre-feasibility work has focused on preliminary assessment of environmental effects which has resulted in a number of key environmental design elements and Project plans. The primary objective is to prevent adverse environmental effects from occurring where technically and economically feasible to do so through Project design and planning. Where adverse effects cannot be prevent, mitigation programs are proposed to reduce the potential for significant adverse environmental effects. Monitoring and adaptive management is recommended to confirm the validity of effects predictions and effectiveness of mitigation including habitat compensation measures.

2.12.1 Design Mitigation Features

XCDM has considered integrated various mitigation measures will be incorporated in detailed design of the Project to minimize adverse environmental effects. The following is a brief summary of key environmental design features:

- Where feasible, use of mine water to supply process water, and dust suppression and fire suppression systems;
- Deployment of equipment (*e.g.*, ventilation fans) that have been shown to operate efficiently and quietly;
- Enhanced resource recovery including by-products (*e.g.*, pre-drainage of methane for power generation);
- Construction layout and phasing of Project components to minimise disturbance to surrounding areas from its footprint (*e.g.*, coal waste disposal piles progressively developed and reclaimed to limit exploitation and disturbance of land from disposal);
- Use of existing RoWs for 138 kV transmission line;
- Site lighting designed to minimize light pollution; and
- Use of larger coal scows (increased to 4,000 dwt from 3,000 dwt) to minimize number of trips required to load bulk vessels, thereby reducing fuel consumption.

Additional mitigation to minimize adverse environmental effects is provided in Section 5.

2.12.2 Environmental Management Plans

Compliance to Xstrata's Sustainable Development Framework assures performance to international sustainability standards, beyond regulatory compliance. The following is an outline of XCDM's commitment to health, safety, and environmental management for this Project.

These plans will be developed and revised as necessary as the Project evolves through design, construction, operations and decommissioning and reclamation. Inherent in this management system is the provision for continual environmental improvement and adaptive management based on monitoring results and/or stakeholder input. The following plans will be developed for the Project and will include commitments made in this EIS as well as measures stipulated by government as conditions of approval:

- **Environmental Management Plan (EMP)** – The EMP will be an umbrella document that will summarize corporate commitments to environmental management. The EMP could take the form of an environmental management system document and may also include specific environmental protection plans such as those listed below to identify and implement specific mitigative measures. The EMP would also likely include a Stakeholder Engagement Plan, Greenhouse Gas Management Plan, Site Water Management Plan, and Salt Management Plan.

- **Environmental Protection Plan (EPP)** – The EPP will contain specific mitigation measures and best management practices to manage Project construction, operation, and maintenance activities including but not limited to erosion and sediment control measures.

- **Solid Waste Management Plan (SWMP)** – The SWMP will address waste minimization and management procedures. A draft SWMP for the Project is included in Appendix F.

- **Emergency Response and Contingency Plan** – This Plan will outline contingency and response plans to address malfunctions and accidental events. An Emergency Response and Contingency Plan was prepared for the Underground Exploration Mining Project in 2009; this will be updated to be applicable for the Export Coking Coal Project.

- **Spill Prevention and Response Plan** – This Plan will address spill prevention and response with regard to small and medium spills of potentially hazardous materials on site.

- **Habitat Compensation Plan** – These Plans will outline the habitat compensation to be implemented to achieve no net loss of habitat (HADD for freshwater and marine habitat and a wetland compensation. Draft conceptual Habitat Compensation Plans are included in Appendix G of the EIS and will be updated based on detailed Project design and regulatory and stakeholder consultation.

- **Environmental Monitoring Plan** – This Plan will outline the follow-up and monitoring programs required to verify regulatory compliance and/or effectiveness of mitigation measures. Section 9 of the EIS provides additional information on the proposed follow-up program for the Project.

- **Mine Closure and Reclamation Plan** – This Plan will describe specific actions to be implemented to decrease the potential for environmental degradation in the long-term during decommissioning and abandonment of temporary and permanent facilities. A preliminary

MCRP is included in Appendix D). This will be updated in consultation with the appropriate authorities prior to decommissioning of the temporary components of the Project.

3.0 Consultation and Engagement

Consultation with and engagement of public, stakeholders, and Aboriginal persons is an essential component of any environmental assessment. Xstrata Coal Donkin Management Ltd. (XCDM) and consultants on its behalf have been engaging stakeholders and the Mi'kmaq regarding their activities at the Donkin Mine, Cape Breton since 2005.

The purpose of community engagement and consultation is to inform stakeholders, the Mi'kmaq and the community about existing and proposed activities and to identify any issues of concern raised by stakeholders and the Mi'kmaq during the planning and design of the Project and continuing into operation. The public consultation and engagement program conducted as part of the environmental assessment process to date has been an important vehicle for the identification, scoping, and resolution or mitigation of potential issues or concerns, and for the exchange of information in respect of the Project.

To achieve its consultation and engagement goals, XCDM is committed to a public and stakeholder consultation and Aboriginal engagement program based on open, forthright and responsive communication with the public, regulatory agencies, other stakeholders and the Mi'kmaq. The objectives of the consultation and engagement program implemented for Donkin Export Coking Coal Project have been to:

- Provide information about the Project to members of the general public, the Mi'kmaq, stakeholders and interested parties, and seek their input;
- Identify, document, and monitor issues and concerns arising from the consultation process;
- Request information on the current use of lands and resources for traditional purposes by Mi'kmaq persons in the vicinity of the Project activities and how those activities might be affected by the Project; and
- Identify the need for planning, design and management measures that will mitigate or resolve the issues raised through the consultation process.

Issues identified in the course of consultation and engagement activities were tracked and were responded to when appropriate. Issues, questions, concerns or comments raised through consultation and engagement initiatives during the environmental assessment process were documented as they arose so that they could be considered, as appropriate, in the scoping or conduct of the environmental assessment.

3.1 HISTORICAL STAKEHOLDER CONSULTATION AND MI'KMAQ ENGAGEMENT

XCDM developed a formal consultation and engagement strategy in 2007 as part of the Donkin Underground Exploration Project EA process (CBCL 2008). The original strategy achieved the desired outcome of allowing XCDM to better understand key community issues and respond in a positive way to those concerns.

Since 2005 XCDM has undertaken a public consultation program to:

- Ensure that those living in the vicinity of the proposed Project are fully aware and kept updated on Project progress;
- Provide opportunities for those in that Project's defined "community", *i.e.*, Donkin, Port Morien, Port Caledonia as well as the Cape Breton Regional Municipality (CBRM) to have input into key decisions with respect to both the development of the Project and the anticipated economic, environmental and social implications; and
- Obtain environmental and socio-economic information from those most familiar with the Project area.

Community response to the Donkin Underground Exploration Project was positive with the majority of those participating in the community meetings and open house sessions focusing on the economic opportunities that the Project would generate in the area in both the short and long term. At the same time, people wanted the Project to be executed in a manner that would protect the environment and promote human safety. The feedback received helped to shape the planning and engineering of the various aspects of the Project's design (*i.e.*, design of the tunnel dewatering program). This consultation and engagement is understood to be an ongoing process.

3.2 PUBLIC AND STAKEHOLDER CONSULTATION AND MIKMAQ ENGAGEMENT RELATED TO THE DONKIN EXPORT COKING COAL PROJECT

With the commencement of the environmental assessment process for the Donkin Export Coking Coal Project, XCDM continued their public and stakeholder consultation and Mi'kmaq engagement program. The objectives of the program have remained the same. Consultation and engagement activities conducted as part of this Project are outlined in the following sections.

3.2.1 Identification of Parties Engaged

XCDM is committed to gaining the trust of stakeholders and the Mi'kmaq representing different sectors of society by embracing all those who have in interest or concern in their business.

Xstrata identifies parties based on the consideration of factors including the predicted level of mining impact and the perceived level of interest in site activities or the outcome of site decisions. This assists XCDM and the study team with targeting engagement strategies to individual groups.

XCDM defines stakeholders as individuals, communities, non-governmental organizations, private organizations, government agencies and others having an interest or a "stake" in the Project and its' outcome. Stakeholders may be impacted by or may influence the planning and operations of the Project to varying degrees through the different phases of the study, project execution and beyond.

For this Project, parties have been identified based on the anticipated level of impact that the anticipated works may have on them and their expected level of interest in the Project. These groupings are:

First Tier: High/frequent level of impact, interest in site activities and decisions. These would include mine employees, residents within 3 km of the site, residents of Donkin, Port Morien, Main-A-Dieu, and Port Caledonia, commercial fishers, government organizations and the Mi'kmaq of Nova Scotia;

Second Tier: Medium/semi-frequent level of impact, interest in site activities and decisions. These would include business interests, labour unions, academics, environmental and non-governmental organizations; and

Third Tier: Low/infrequent level of impact, interest in site activities and decisions. These would include residents and non-government organizations in the greater Cape Breton Regional Municipality (CBRM) area, other parts of Cape Breton and Nova Scotia.

3.2.2 Community Liaison Committee (CLC)

The establishment of the Community Liaison Committee (CLC) in 2006 confirmed XCDM's commitment to build a constructive working relationship in the community and to facilitate community engagement. The guiding principle of the CLC is to place the interests of the community and the surrounding environment above any personal interest or gain. The committee will strive to ensure a balance between the interests of the community including the environment and those of the Project is achieved.

The CLC is composed of several community members, nominated by their peers and independently selected based on their history of community involvement and experience working with small groups. The role of the CLC is to provide a forum for discussion between representatives of the proponent, community, government, and other stakeholders on issues relating to mine activities and keep the community informed on work being undertaken.

Through the development of a partnership, CLC members have been helping XCDM define critical issues, shape aspects of the operating mine's design and execution and identify other community engagement opportunities as part of XCDM's corporate social involvement policy. In addition to the CLC meetings the CLC has organized annual community events such as the Schooner Pond Beach Sweeps and a senior's Christmas dinner co-organized with local church representatives.

A meeting of the CLC was held on June 16, 2011. This was the 17th meeting of the CLC and consistent with previous meetings the objective was to provide the CLC with an update on the Project with respect to health and safety, environment, and community involvement as well as an operational review and update. During this meeting members of the CLC were given a presentation on the environmental assessment process including anticipated schedule and stakeholder consultation activities associated with the Export Coking Coal Project. The 18th meeting of the CLC was held on November 28, 2011 with a particular focus on providing an update on the environmental assessment process schedule, the draft Environmental Impact Statement (EIS) Guidelines issued by the Canadian Environmental Assessment Agency, the story boards to be used for the November open houses, the stakeholder information sheet and the content of XCDM's November, 2011 newsletter. The 19th meeting of the CLC occurred April 26, 2012, primarily to update the CLC on Xstrata Coal seeking an operating coal company to take over its interest in the Project.

3.2.3 Project Community (Local Residents)

A public meeting was held on June 16, 2011 in the Donkin Fire Hall. The community was notified of the public meeting through an advertisement in the Cape Breton Post on June 4 and June 11, 2011, and postings in the local community. Members of the CLC were also advised of this meeting. The public meeting was held directly after a meeting with the CLC. The objective of the public meeting was to provide an update on the Project and environmental assessment process including the anticipated schedule and stakeholder consultation activities. Feedback was provided verbally during the public meeting and was also solicited through an exit questionnaire. Questions asked were focused on the mine in terms of inquiring as to which markets had been identified for the coal, the size of the coal seams, sulphur content of the seams, coal gasification, schedule for full operation, and life of the mine. Response to the information presented and subsequent question and answer period was positive. There were no specific concerns identified with respect to environmental issues.

Open houses were held on November 29 and 30, 2011. One open house was held at the Donkin Fire Hall, Donkin and the second was held at the Membertou Trade and Convention Centre, Sydney. The hours of each open house were 8:00 AM to 8:00 PM. The community was notified of the open houses through an advertisement in the Cape Breton Post posted on November 19 and 26, 2011 and posted in the local community. Members of the CLC were also advised of the open houses. The objective of the open houses was to provide the public with information on the Project, the environmental regulatory process, status of field studies,

assessment schedule and the draft EIS guidelines. Storyboards, a Project information sheet, community newsletter, and the CEA Agency's federal environmental assessment fact sheet were made available at the open houses. Another meeting occurred April 26, 2012, primarily to update the community on Xstrata Coal seeking an operating coal company to take over its interest in the Project.

Overall, community reaction was very positive, recognizing the potential socio-economic benefits the Project would bring to the region. Some comments were made expressing frustration with the lengthy regulatory approval process.

3.2.4 Commercial Fishers

Representatives of the federal Department of Fisheries and Oceans (DFO) were consulted to confirm information on key commercial fisheries stakeholders, commercial fishing locations, catch data, and XCDM's proposed methodology for continued consultation with commercial fishers. Consultations were conducted with Paul Gentile and Lorne Penny, Area Director Eastern Nova Scotia Area Maritimes Region and Chief, Resource Management, Eastern Nova Scotia Region respectively for Fisheries and Oceans Canada, Sydney office. Others consulted included Dr. Jay Walmsley, Senior Environmental Analyst Environmental Assessment and Major Projects, Fisheries and Oceans Canada (Maritimes Region), Jennifer Ford, Areas of Interest Program, Glen Herbert, Oceans & Coastal Management Division, Julia McQuaig, Oceans & Coastal Management Division at the Bedford Institute of Oceanography and Ted Currie, Senior Environmental Analyst Environmental Assessment and Major Projects, Fisheries and Oceans Canada (Maritimes Region).

In February 2010 XCDM met with 28 fishers and provided a presentation on the Project. The objective was to provide local fishermen with an opportunity to meet with representatives of XCDM and have an opportunity to discuss the Donkin Export Coking Coal Project.

In March 2011 XCDM met with three fishers. The objective of this meeting was to gain an understanding of the lobster and other fisheries in the region and their relationship to the Project. XCDM representatives also responded to general Project inquiries and provided an update on the Project.

Two meetings were held on October 19, 2011: one with local fishermen and another with a representative of the Sydney Harbour Fisherman's Association. Representatives of XCDM and Stantec attended the meetings to provide an overview of Xstrata's proposed Export Coking Coal Project, obtain information on commercial fishing activity in the area of the proposed Project and answer any questions regarding the proposed Project. It was suggested that an open meeting be held specifically with the fishermen in January or February, 2012.

On February 22, 2012 XCDM invited local fishers to attend a Project information meeting. The meeting was held at 7:00 PM at the Donkin Fire Hall, Donkin. The meeting was chaired by Hugh

Kennedy, Chair of the Community Liaison Committee.The objective of this meeting was to provide local fishers with an update on the proposed Project, focusing primarily on the marine components. The meeting was also an opportunity for fishers to ask questions and note any concerns regarding the Project. Approximately 80 people attended the meeting. XCDM made a commitment at this meeting to meet again with the fishers in April, 2012 to provide additional Project information and provide responses to the specific questions asked during the February meeting.

Key issues of concern raised during the various fisheries consultations include loss of access to fishing areas, effects on lobster larvae and habitat, and gear loss and damage. Overall the fishers appear supportive of the Project proceeding but have expressed a strong preference for the rail transportation option over the selected marine transportation option. These concerns and preference for rail transportation were also expressed at meetings held on April 19 and 25, 2012 with local fishers. XCDM will continue to liaise with local fishers and has developed a Fisheries Advisory Group to cooperatively develop effective mitigation to deal with key issues of concern.

The Commercial Fisheries Liaison Officer for the Unama'ki Institute of Natural Resources was contacted as a resource to provide information on Mi'kmaq commercial fisheries. This request was directed to the Consultation Liaison Officer for the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO or Mi'kmaq Rights Initiative). As of the writing of this report (July 2012) the KMKNO have advised that pending the findings of the updated MEKS and information provided by DFO, a Mi'kmaq commercial fisheries study for the Project would be beneficial. In consideration of the MEKS and DFO information, XCDM will review this suggestion with KMKNO.

3.2.5 Additional Public Stakeholders

The public will have the opportunity to provide formal comment to the CEA Agency three times during the EA process. The first was during the release of the draft Guidelines (August, 2011) at which time the public had 45 days to provide comment. Upon completion of the EIS there will be a 60 day public comment period and upon release of the Comprehensive Study Report the public will have 30 days to make comment.

3.2.6 Government Stakeholders

During the course of the EIS planning and preparation there has been contact with various government officials which are members of the One-Window Committee. These include representatives of the CEA Agency, NSE, NSDNR, DFO, Environment Canada, Transport Canada among others. Project information has been provided to individuals at both formal (*e.g.,* One-Window Committee) and informal meetings.

3.3 ENGAGEMENT OF THE MI'KMAQ OF NOVA SCOTIA

There are 13 Mi'kmaq communities of Nova Scotia; five of which reside in Cape Breton: Membertou, Eskasoni, Chapel Island, Wagmatcook, and Waycobah. The Mi'kmaq of Nova Scotia (the Mi'kmaq) in Nova Scotia have special interests with respect to the Project and special requirements for engagement from the Proponent and government decision makers through the environmental assessment process. XCDM is aware that the Nova Scotia Provincial Government (the Province) is developing a new relationship with the Mi'kmaq that includes greater opportunities for Mi'kmaq participation in social and economic development, and meaningful consultation with the Mi'kmaq on decisions that affect natural resources. As part of this the Province of Nova Scotia, the Government of Canada and the Mi'kmaq signed a historic agreement in August 2010, 2010 Terms of Reference for a Mi'kmaq-Nova Scotia-Canada Consultation Process, which formalizes a process for consultation with the Mi'kmaq in Nova Scotia (http://www.gov.ns.ca/abor/docs/MK_NS_CAN_Consultation_TOR_Sept2010_English.pdf).

Only the Crown is legally obligated to consult with Aboriginal groups concerning the possible effects of Crown actions with respect to proposed projects on established or potential Aboriginal rights. XCDM is aware that both federal and provincial governments are committed to meeting their legal obligations as those bodies responsible for consulting with the Mi'kmaq. The Canadian Environmental Assessment Agency is the Crown Consultation Coordinator for the federal government. However, within that process, both governments believe there is an important role for proponents in engaging the Mi'kmaq. XCDM is committed to building relationships with the communities, in which they operate, working to improve the understanding by the Mi'kmaq of the proposed Project and its objectives as well as assisting XCDM to understand the interests and concerns of those living in the Project area. Through consultation XCDM seeks to strengthen relationships and partnerships with the Mi'kmaq.

On June 27, 2011 representatives of XCDM and Stantec met with provincial and federal government representatives to discuss stakeholder and Aboriginal consultation specific to the Donkin Export Coking Coal Project environmental assessment and permitting. The objective of this meeting was to discuss the provincial and federal governments' planned approach with respect to stakeholder and Mi'kmaq consultation as well as related consultation guidance for the proponent.

On July 8, 2011 the Nova Scotia Department of Natural Resources (NSDNR), the lead agency for Crown consultation at the provincial level, provided direction with respect to their expectations regarding XCDM's engagement with the Mi'kmaq of Nova Scotia on the proposed Project. As noted in the expectations outlined by the Crown, the Assembly of Nova Scotia Mi'kmaq Chiefs is the primary organization that the province of Nova Scotia consults with, as described in the 2010 Terms of Reference. The Assembly of Nova Scotia Mi'kmaq Chiefs comprises the 13 Nova Scotia Mi'kmaq Chiefs and 2 ex-officio members. The Assembly is co-chaired by Chief Terrance Paul, Membertou and Chief Gerard Julian, Paqtnkek (Afton). The ex-

officio members of the Mi'kmaq Grand Council are Grand Chief Ben Sylliboy and Grand Captain, Andrew Denny.

Through consultation with the Assembly of Nova Scotia Mi'kmaq Chiefs in July 2011, XCDM was given direction to meet with the Consultation Liaison of the Kwilmu'kw Maw-klusaqn Negotiation Office (KMKNO), to discuss and plan engagement with the Mi'kmaq of Nova Scotia. Representatives of XCDM met with the Consultation Liaison and other members of the KMKNO on September 8, 2011. During this meeting with the KMKNO, the Mi'kmaq expressed their preference to be considered co-owners or share owners, rather than stakeholders. Representatives from the KMKNO identified their role as identifying Mi'kmaq title and environmental impacts associated with the Project including effects on archaeology, traditional use, harvesting of medicinal plants, water quality, fishing, hunting, and gathering and to have those effects accommodated or avoided. It was recommended that the Unama'ki Institute of Natural Resources be engaged regarding fisheries studies as there may be concern regarding ceremonial lobster fishing around Donkin. Another issue raised by the Mi'kmaq was the potential introduction of invasive species through shipping (*e.g.*, ballast water).

Representatives of XCDM were invited by the NSOAA and the NSDNR to present an overview of the Project to the Mi'kmaq and Mineral Resources Branch on September 21, 2011. Xstrata presented an overview of the Project including the environmental regulatory approval process, and plans for stakeholder and Mi'kmaq engagement. Specific issues raised in this meeting included consideration of wastewater treatment and water quality monitoring, tailings piles management, coal dust, and management of methane. Answers to specific questions were provided during discussion. Each of these issues is addressed also in this EIS.

XCDM met with representatives of the Assembly of Nova Scotia Chiefs Benefits Committee on October 12, 2011. XCDM presented an overview of the Project. A question and answer session followed. It was determined at this meeting that a Memorandum of Understanding (MOU) would be developed between the two parties. XCDM will work with the Mi'kmaq to develop mutually beneficial solutions and consider how the Mi'kmaq could make a contribution to the Project. Meaningful contributions will be determined based on discussions with the Mi'kmaq community to be undertaken in parallel with the environmental assessment process. XCDM has engaged three of the umbrella groups in Nova Scotia that represent on-reserve and off-reserve Aboriginals in the Province (*i.e.*, Confederacy of Mainland Mi'kmaq and the Native Council of Nova Scotia).

In 2006 a Mi'kmaq Ecological Knowledge Study (MEKS) was carried out for XCDM by Membertou Geomatics Solutions (MGS). The Membertou First Nation, located in Sydney, is the Mi'kmaq community closest to the Donkin Mine. The MEKS, which covered the Project area and also the surrounding 10 km buffer zone, involved both interviews with Mi'kmaq people and a literature search, and was used to determine past and present Mi'kmaq use of the lands and waters in the general vicinity of the proposed mine site.

In 2011 MGS was contracted to prepare an MEKS based on the new Project description. The Project-specific MEKS carried out by MGS (2011) identifies Mi'kmaq traditional use activities that have taken place or currently are taking place within the LAA (referred to as the Project Site in the MEKS) and surrounding MEKS area, as well as any Mi'kmaq traditional ecological knowledge that presently exists with respect to those areas.

Further details about the methods employed for and the results of the MEKS are provided in Section 5.10 of this EIS and the attached MEKS report (Appendix C).

3.4 INFORMATION PROVIDED TO STAKEHOLDERS AND THE MI'KMAQ

In addition to information provided to the public, stakeholders and the Mi'kmaq during meetings and open houses in December 2012 an information package was developed for distribution. Parties included commercial fishing organizations, the Mi'kmaq of Nova Scotia, members of the local community, members of the CLC, non-government organizations, and municipal, provincial and federal government representatives. Information packages were distributed through a combination of electronic and hard copy mailings.

The information package included:

- Donkin Export Coking Coal Project Information Sheet;
- The Donkin Coal Link November 2011 Issue No. 5;
- Canadian Environmental Assessment Agency – Donkin Export Coking Coal Project Federal Environmental Assessment (Fact Sheet); and
- Agence canadienne d'évaluation environnementale – Project d'exploration de charbon cokéfiable Donkin evaluation environnementale fédérale (Fact Sheet).

Stakeholders and the Mi'kmaq were provided with contact information for any questions or issues that they may have related to the Project. In December, 2011 XCDM's newsletter, The Donkin Coal Link November 2011 Issue No. 5, was distributed throughout the local community. Approximately 1,500 newsletters were distributed by Canada Post to homes and post office mail boxes from Donkin and Port Morien post offices.

3.5 KEY ISSUES FROM CONSULTATION AND ENGAGEMENT

Potential issues of concern raised through the engagement and consultation process (meetings, open houses, phone calls, comment sheets) have been tracked by XCDM throughout the Project. Issues raised during the Donkin Underground Exploration Project have been taken into consideration during the environmental assessment for the Donkin Export Coking Coal Project to the extent they remain relevant to the new Project. Issues raised during consultation with the public, other stakeholders and the Mi'kmaq of Nova Scotia have been considered in the scope

of the environmental assessment, documented in the EIS, and included in the Mi'kmaq engagement summary report submitted to the Nova Scotia Department of Natural Resources, Minerals Branch. Throughout the consultations several of the same issues were raised, Table 3.5.1 represents a summary of these issues.

Issues raised by regulatory agencies have been captured in the EIS Guidelines.

Table 3.5.1 Summary of Key Issues Raised During Stakeholder Consultation and Mi'kmaq Engagement

Key Issues Raised	Response and/or Action Taken
• What is the treatment process for the mine water?	Section 2.7.2 describes the current and future treatment processes to treat mine water and runoff.
• Will methane and radon be produced at the mine site? If so, how will they be monitored and controlled?	Sections 2.7.7 and 5.1 describes air emissions predicted for the Project including release and management of methane.
• Will there be a tailings pond on the mine site?	Tailings will be handled through a "dry disposal system" and will not require a tailings pond. Section 2.7.1 provides more information on coal waste disposal.
• Why are Rainbow Trout used as a testing species for effluent testing?	Trout were added to the serpentine pond to demonstrate acceptable conditions. Quarterly toxicity testing is ongoing during the care and maintenance phase as part of the water quality monitoring program.
• How often does monitoring occur on site?	Section 2.7.2.1 provides background on the current monitoring program at the site.
• How is the coal transported on the mine site?	Coal will be transported primarily on covered conveyor belts.
• Will coal dust enter the marine environment while being loaded on barges?	Coal dust will be minimized through implementation of various mitigation measures. Refer to Section 5.1 for more information on coal dust dispersion and mitigation.
• Concern regarding the amount of coal dust from transportation and stockpiling of the coal.	Coal dust will be minimized through implementation of various mitigation measures. Refer to Section 5.1 for more information on coal dust dispersion and mitigation.
• What will be the size of coal stockpiles?	Figure 2.4.1 in Section 2.4 shows the footprint of the coal stockpiles.
• Will there be certain periods when coal will not be loaded and transported?	Approximately 95 operating days a year is required to attain the expected annual export tonnage of 2.75 million tonnes. It is assumed that approximately 20% of available days during the months of February and March will be lost due to excessive sea ice, and 200 days per year available for operating in the worst case weather scenario.
• How is the water used to wash the coal contained and treated?	There is no water effluent discharged from the CHPP as the water is continuously recycled through the process. Water is gradually spent and disposed as moisture on product and reject matter. Section 2.7.2 describes the overall water treatment process employed on site for mine water and site runoff.
• What methods will be used to dispose of the coal waste?	Section 2.7.1 describes coal waste disposal. Additional information, including analysis of the various disposal alternatives is provided in Appendix E, Concept Study on Coal Waste Disposal Options.
• How will accidents on land be addressed?	Refer to Section 6 for a discussion of accidents and malfunctions.

Table 3.5.1 Summary of Key Issues Raised During Stakeholder Consultation and Mi'kmaq Engagement

Key Issues Raised	Response and/or Action Taken
• What measures will be in place to prevent the introduction of invasive species resulting from the ballast water?	Any dumping of ballast water is to be conducted in accordance with the Ballast Water Control and Management Regulations under the Canada Shipping Act, 2001, which includes measures to protect against harmful aquatic organisms and pathogens. All vessels must comply with these regulations as part of normal operations. To prevent the possible introduction of invasive species from ballast water, all vessels going to the transshipment location will be required to follow internationally accepted standards and guidelines, and be subject to audits of the vessel's ballast water by Transport Canada.
• Concern that the construction of the breakwater that a backwash will be created preventing fishing in the near shore.	Several marine engineering studies have been conducted to determine the most suitable design and location of the breakwater from a technical and environmental perspective. Presence of the breakwater will result in localized displacement of fishers. Section 5.8 provides more information on the effects of the Project on commercial fisheries.
• Will there be specific studies conducted to determine the impacts on fish health?	Section 5.7 of this EIS assesses Project effects on marine fish and includes a discussion on follow-up and monitoring. In order to justify that a fish health investigation be undertaken, a potential chemical of concern must be released into the marine environment, the pathway for exposure, the frequency and duration of exposure, and potential marine receptor(s) will need to be identified. No marine outfall (*i.e.*, no additional to the existing outfall) is anticipated for the Project and spillage of coal during barge loading and offloading on bulk vessels will be mitigated. Mined coal, which is carbon and one of the source materials used for making activated carbon for uses in spill cleanup, groundwater remediation, drinking water filtration and air purification, is not a chemical of concern in its raw form. Shellfish and fish that could be the receptors for any potential contaminant would need to be resident species within the Project Development Area and not undergo long-distance migrations. Lobsters would not be appropriate species to assess for shellfish health because they migrate inshore during the summer and offshore to deeper water during winter and therefore would not be a good indicator. For this and other reasons noted above, a shellfish health investigation is not warranted. An environmental effects monitoring program on sediment quality is proposed adjacent to the barge load-out facility and at the transshipment site to assess potential cumulative environmental effects during the operations phase of the Project. The study design will be done in consultation with regulators.
What will be the impact on the local commercial fishery?	Section 5.8 contains an assessment of Project-related effects on commercial fisheries including predicted effects and proposed mitigation. Construction of the barge load-out facility will result in a permanent displacement of fishing activity within the barge load-out facility footprint. Commercial fishing activities and practices may be slightly altered but not hindered in Morien Bay and mainly along the barge transportation route.

Table 3.5.1 Summary of Key Issues Raised During Stakeholder Consultation and Mi'kmaq Engagement

Key Issues Raised	Response and/or Action Taken
• Will a buffer zone be required to prevent fishing in certain areas?	Project infrastructure locations and construction activity will be communicated via Notices to Mariners and Notices to Shipping. XCDM will continue to liaise with the fishers to understand implications of these interactions and mitigate the situation (refer to Section 5.8).
• Concern that gear will be damaged when the transshipment vessels enter Morien Bay.	XCDM will maintain ongoing consultation with local fishers during all Project phases and will develop a policy to address gear loss and/or damage attributable to Project activities (refer to Section 5.8).
• Concern expressed that fishers will be displaced from current fishing grounds, leading to pressure in other regions.	Section 5.8 assesses effects of the Project on commercial fisheries including potential displacement.
• How does XCDM intend to deal with effects on marine wildlife (particularly whales and sea turtles)?	Section 5.7 provides a discussion of Project effects on the marine environment (including marine mammals and sea turtles).
• How will accidents in the marine environment be prevented? • Will an emergency response plan be developed prior to construction and operations?	Section 6 contains an analysis of potential accidental events including marine incidents. The Emergency Response and Contingency Plan will be updated prior to construction and operations to include prevention and response measures for marine accidental events.
• Concern expressed with respect to ceremonial lobster fishing that takes place around Donkin.	Mi'kmaq fishery representatives from relevant Mi'kmaq fishing associations will be engaged in Project-related consultation efforts with the local fishing community, as well as additional focused consultation efforts.
• Concern expressed about trucking volume and schedule.	In response to concerns raised about the anticipated level of trucking activity during the exploration phase, XCDM has decided to stockpile product until the marine facilities are constructed. Section 2.5.2.3 provides information on trucking activity.
• Could the coal be transported to Sydney instead of constructing a transshipment loading facility?	Section 2.9.2.3 describes the analysis of coal transportation options.
• Was rail considered as a transportation option?	Section 2.9.2.3 describes the analysis of coal transportation options (including rail).
• Will the peninsula still be accessible to the public for hiking and bird watching?	Effects on land use (including public access to XCDM property) are addressed in Section 5.9.
• Will the original MEKS be updated?	The original MEKS has been updated and is included in Appendix C.
• Interest in developing training, employment and procurement opportunities for First Nations people and firms as a result of the Project	XCDM will develop a Memorandum of Understanding and Benefits Agreement with the Mi'kmaq of Nova Scotia.
• Consideration should be given to involving the Unama'ki Institute of Natural Resources (UNIR) in the fisheries studies.	The Commercial Fisheries Liaison Officer for the Unama'ki Institute of Natural Resources was contacted as a resource to provide information on Mi'kmaq commercial fisheries. This request was directed to the Consultation Liaison Officer for the KMKNO. As of the writing of this report (July 2012) the KMKNO have advised that pending the findings of the updated MEKS and information provided by DFO, a Mi'kmaq commercial fisheries study for the Project would be beneficial. In consideration of the MEKS and DFO information, XCDM will review this suggestion with KMKNO.
• Will employment be available to First Nations people and firms?	The goal is to include as much First Nations employment as possible.

Table 3.5.1 Summary of Key Issues Raised During Stakeholder Consultation and Mi'kmaq Engagement

Key Issues Raised	Response and/or Action Taken
• Will an agreement be developed with local unions to employ miners from the region?	Xstrata will deal with individuals. All positions for Donkin Mine will be advertised, the company will be looking for the best people. Not everyone can be new, there must be some experienced people on site, but Xstrata has their own training courses and development plans for employees. Miners are getting older making training plans extremely important.

4.0 Environmental Assessment Methods and Scope of Assessment

4.1 ENVIRONMENTAL ASSESSMENT METHODS

An overview of the methods used to conduct the EA of the Project is provided in this section. The EIS has been completed using the methodological framework developed by Stantec to meet the requirements of CEAA and the Nova Scotia *Environment Act*. These methods are based on a structured approach that:

- focuses on issues of greatest concern;
- considers the issues raised by the public and stakeholders; and
- integrates engineering design and programs for mitigation and follow-up into a comprehensive environmental planning process.

The EIS focuses on specific environmental components called Valued Environmental Components or VECs. Although sometimes referred to as “Valued Ecosystem Component”, the broader term “Valued Environmental Component” is preferred and used in this EIS as it allows for considerations of social and economic components in addition to ecosystem considerations. VECs are broad components of the biophysical and human environments that, if altered by the Project, may be of concern to regulatory agencies, the Mi’kmaq of Nova Scotia, resource managers, scientists, and/or the general public.

It is noted that “environment” is defined to include not only biological systems but also human, social, and economic conditions that are affected by changes in the biological environment, VECs can relate to ecological, social, or economic systems that comprise the environment.

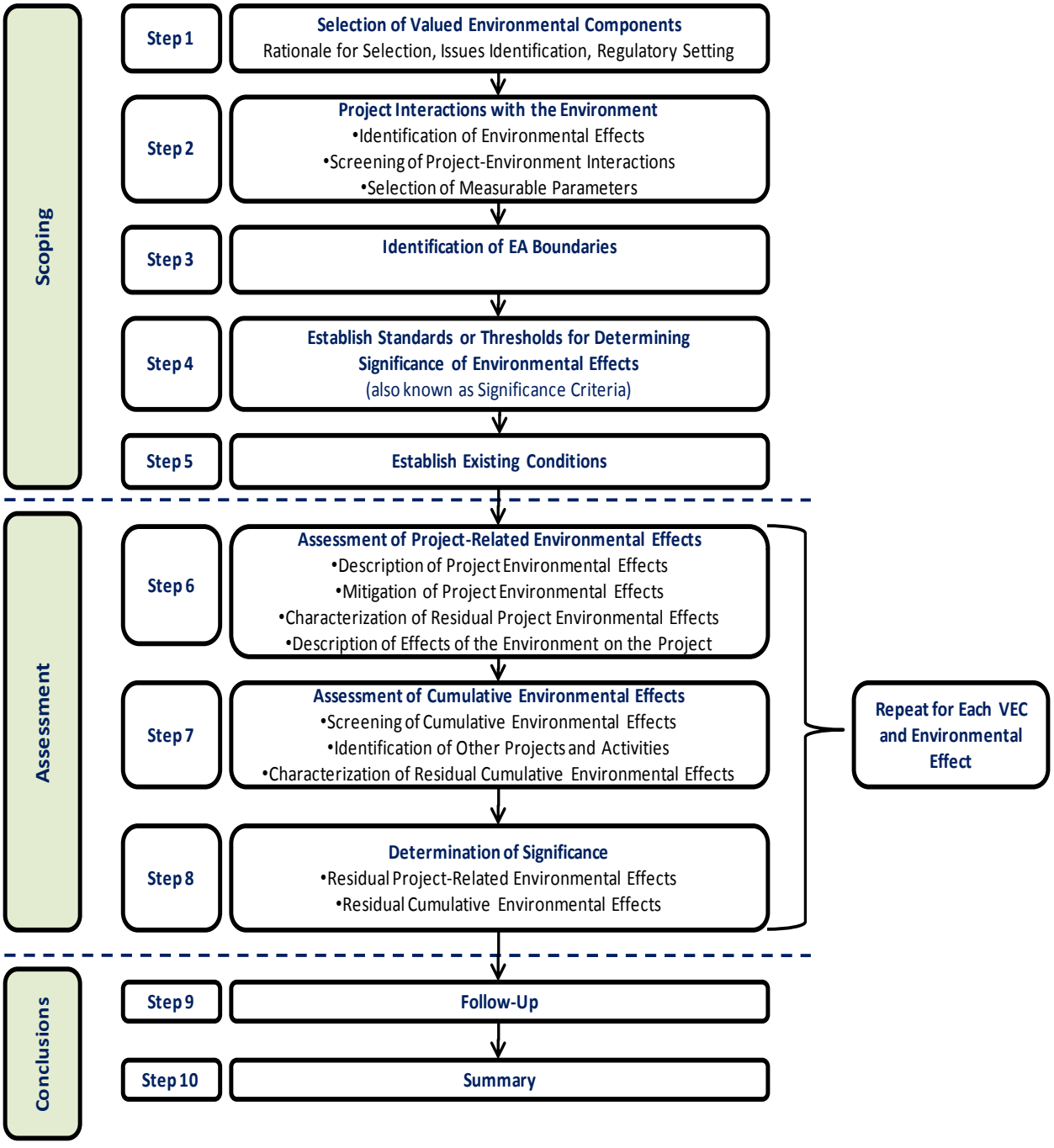
4.1.1 Overview of Approach

Project-related environmental effects are assessed using a standardized methodological framework for each VEC, with tables and matrices used to facilitate and support the evaluation. The residual Project-related environmental effects (*i.e.*, after mitigation has been applied) are characterized using specific criteria (*e.g.*, direction, magnitude, geographic extent, duration, frequency, and reversibility) that are defined for each VEC. The significance of the Project-related environmental effects is then determined based on pre-defined criteria or thresholds for determining the significance of the environmental effects (also called significance criteria). If applicable, cumulative environmental effects of the Project in combination with other identified projects or activities are assessed to determine if those cumulative environmental effects could be significant, and to consider the contribution of the Project to those cumulative effects.

The environmental effects assessment approach used in this EA is shown graphically in Figure 4.1.1. The environmental effects assessment methodology involves the following general steps.

- **Scope of Assessment** – The scope of the overall assessment is defined, including: selection of VECs; description of measurable parameters; description of temporal and spatial assessment boundaries; definition of the parameters that are used to characterize the Project-related environmental effects; and identification of the standards or thresholds that are used to determine the significance of environmental effects. This step relies upon the scoping undertaken by regulatory authorities (*e.g.*, EIS guidelines); consideration of the input of the public, stakeholders, and Mi'kmaq of Nova Scotia; and the professional judgment of the Study Team.
- **Existing Conditions** – Existing (baseline) environmental conditions for the VEC are established. In many cases existing conditions expressly and/or implicitly include those environmental effects that may be or may have been caused by other past or present projects or activities that have been or are being carried out.
- **Assessment of Project-Related Environmental Effects** – Project-related environmental effects are assessed including: mechanisms for the environmental effect; mitigation and environmental protection measures proposed to reduce or eliminate adverse environmental effects; and the characterization of the residual environmental effects of the Project. The focus of the assessment is on residual environmental effects, *i.e.*, the environmental effects that remain after planned mitigation has been applied. All phases of the Project are assessed (*i.e.*, construction, operations, and decommissioning and reclamation), as are accidents, malfunctions, and unplanned events. The evaluation also considers the effects of the environment on the Project. For each VEC, a determination of significance is then made, based on the identified significance criteria.
- **Assessment of Cumulative Environmental Effects** – Cumulative environmental effects of the Project are identified in consideration of other past, present or future projects or activities, for all phases of the Project. An assessment of potential interactions is completed to determine if an assessment of cumulative environmental effects is required (*i.e.*, there is potential for substantive interaction) for that specific Project-related environmental effect that overlaps with those of other projects or activities that have been or will be carried out. The residual cumulative environmental effects of the Project in combination with other past, present, or future projects or activities that have been or will be carried out are then evaluated, including the contribution of the Project to those cumulative environmental effects.
- **Determination of Significance** – The significance of residual Project-related and cumulative environmental effects is then determined, in consideration of the significance criteria (based on regulatory standards where applicable and/or professional judgement).
- **Recommendations for Follow-up** – Follow-up and monitoring to verify the environmental effects predictions or to assess the effectiveness of the planned mitigation are recommended, where applicable.

Figure 4.1.1 Overview of Environment Assessment Method



4.2 SCOPE OF ASSESSMENT

4.2.1 Scope of the Project

Pursuant to section 15 of the *Act*, the scope of the Project for the purpose of the environmental assessment shall include all activities and physical works associated with the construction, operations and decommissioning of the proposed Project as described in the proponent's Project description dated August 8, 2011, including the following activities and components as listed in the EIS Guidelines (CEA Agency 2012):

- site clearing and preparation;
- underground mining activities, including blasting;
- explosives, handling and storage;
- short- and long-term waste management;
- management of solid and hazardous wastes;
- a Coal Handling and Preparation Plant (includes coal washing);
- coal and mineral rock waste disposal and water treatment infrastructure;
- water supply for domestic, process and fire suppression usage;
- ancillary services to support the underground mine and Coal Handling and Preparation Plant (administration/office buildings, workshop, coal weighing and sampling facilities, dust suppression systems, conveyors, stackers, reclaimers and stockpiles, water treatment infrastructure, truck loading facilities, mobile equipment *etc.*, a 138 kV transmission line from Victoria Junction to the Project site);
- trucking to domestic customers and to the Port of Sydney should marine transportation to these destinations prove impractical at any time;
- a barge load-out facility on the Donkin Peninsula to transport product coal to a transshipment mooring located southwest of Cape Morien;
- disposal of dredged material at sea; (no disposal at sea proposed (see Section 2.7.1.3));
- ancillary services to support the marine transportation component (*e.g.*, tugboat and barge operations), dust suppression systems, conveyors, access road, power from the Project site);
- marine transportation from the barge landing facility to the transshipment mooring;
- mine decommissioning and site reclamation, including long-term management needs; and

- all physical works and undertakings associated with any required fish habitat compensation plan.

Table 4.2.1 below summarizes the key Project activities to be assessed for environmental effects. Details for these activities are provided in Section 2 of this document. As explained in Section 2.6, the Project is being developed in different stages, with construction and operations activities occurring during both Exploration and Production stages. As indicated in Table 4.2.1, Exploration and Production activities overlap in several cases. The list of Project Activities and Physical Works are applied as a standard list for the evaluation of each VEC.

Table 4.2.1 Project Activities and Physical Works

Project Activities and Physical Works	Project Stage (E=Exploration P=Production)	Details
Construction		
Site Preparation	E/P	• Clearing and grubbing of vegetation • Site grading and excavation • Installation of ditching, surface water controls and erosion and sediment protection
Construction of Mine Site Infrastructure and Underground Preparation	E/P	• Installation of underground mining equipment (*e.g.*, Continuous Miners (CM), conveyors) • Installation of enclosed gantries for coal transfer (*e.g.*, conveyors) • Construction of roadways, vehicle parking, laydown and stockpile areas • Installation of surface and underground electrical distribution systems • Construction of buildings and ancillary facilities • Installation of main ventilation fans • Excavation of third tunnel expected to be by tunnel boring machine • Disposal of excavated material • Construction of CHPP and conveyors
Construction of 138 kV Transmission Line	E	• RoW clearing • Pole and transmission line installation • Temporary watercourse crossing
Construction of Barge Load-out Facility (incl. dredging, infilling and habitat compensation)	P	• Dredging of sea floor (if required) • Infilling and wharf construction • Marine habitat compensation
Installation of Transshipment Mooring	P	• Installation of foundation and/or anchoring system
Operations and Maintenance		
Underground Mining	E/P	• Operation of mining machinery, plant and equipment • Mine ventilation (including methane management) • Blasting (if required) • Conveyance of raw coal from underground to stockpile
Coal Handling and Preparation (incl. coal washing and conveyance)	P	• Crushing of raw coal • Conveyance of crushed coal for processing • Washing and dewatering of coal in closed loop process

Table 4.2.1 Project Activities and Physical Works

Project Activities and Physical Works	Project Stage (E=Exploration P=Production)	Details
		• Conveyance of coal product to product stockpile • Building ventilation and dust control
Water Treatment (incl. mine water and surface runoff)	E/P	• Operation and maintenance of site ditching, culverts and settling systems (serpentine pond) for sediment control • Progressive development of water controls and ARD management systems as required for coal waste disposal piles • Piping of underground mine discharge to serpentine pond • Flow of wastewater over weir and into existing onsite DEVCO settling pond • Package wastewater treatment plant onsite for sewerage
Coal and Waste Rock Disposal	E/P	• Conveyance of dry reject matter from CHPP to rejects stockpile • Distribution of stockpiled rejects to designated coal waste disposal piles • Progressive development of coal waste disposal piles (including clearing, grading, water controls and reclamation)
Coal Trucking	P	• Trucking of product coal to domestic customers and the Port of Sydney should marine transportation prove impractical at any time
Marine Loading and Transportation	P	• Conveyance of product coal overland by conveyor to marine loading facility • Loading of material onto barge • Transport of material via tug and barge to transshipment mooring • Maneuvering and mooring of coal transport vessels and coal loading
Decommissioning and Reclamation		
Site Decommissioning	P	• Removal of all mining plant, machinery and equipment • Removal of surface structures and buildings not required for future land use • Removal of topsides of wharf (breakwater left in place) and transshipment mooring (foundation left in place) • Tunnels allowed to flood to groundwater equilibrium
Site Reclamation	P	• Contouring and re-vegetation of site • Ongoing water treatment

4.2.2 Factors to be Considered

All EAs conducted under CEAA require specific factors to be considered. Subsections 16(1) and 16(2) of CEAA establish the mandatory factors to be considered. As indicated in the EIS Guidelines (CEA Agency 2012), the EIS includes consideration of the following factors:

- the environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or shall be carried out;
- the significance of the environmental effects referenced above;
- comments from the public that are received in accordance with the Act and the regulations;
- measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- any other matter relevant to the comprehensive study, including the need for the Project and alternatives to the Project, that the responsible authority or the Minister after consulting with the responsible authority may require to be considered;
- the purpose of the Project;
- alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- the need for, and the requirements of, any follow-up program in respect of the Project; and
- the capacity of renewable resources that is likely to be significantly affected by the Project to meet the needs of the present and those of the future.

4.2.3 Scope of Factors to be Considered

The EIS shall consider the factors outlined in subsections 16(1) and 16(2) of CEAA (refer to Section 4.2.2 above). Specifically, the EIS will consider the potential environmental effects of planned activities and mitigation to be carried out during construction, operations and maintenance, and decommissioning and reclamation of the Project, as required under Sections 16(1) (a) and (b) of CEAA, including the potential cumulative environmental effects of other projects or activities that have been or will be carried out. The potential environmental effects of credible Accidents, Malfunctions, and Unplanned Events that could occur during these phases and/or as part of these activities shall also be assessed (refer to Section 6).

The EIS also considers comments received from the public and Mi'kmaq engagement. A summary of the public consultation and Mi'kmaq engagement conducted as part of this EA process is provided in Section 3.

Pursuant to Section 16(3) of CEAA, the scope of the factors to be considered in relation to the Project has been grouped by VECs. The EIS will consider potential environmental effects that the Project may have on these VECs.

VECs are proposed for the Donkin Export Coking Coal Project EIS in order to facilitate a focused and effective EA process that complies with government requirements and supports public review.

VECs to be considered in the EIS include:

- **Atmospheric Resources** (ambient air quality; acoustic environment);
- **Water Resources** (quality and quantity of groundwater and surface water resources potentially affected by the Project);
- **Birds and Wildlife** (migratory and non-migratory birds, including seabirds and shorebirds, with a focus on rare or sensitive species and their habitat, potentially feeding, breeding, migrating through the Project area; rare mammals and rare herpetiles and their habitat, including rare or sensitive species; and critical habitats such as interior forests and deer wintering areas and seabird colonies);
- **Wetlands** (defined as land commonly referred to as marshes, swamps, fens, bogs, and shallow water areas that are saturated with water long enough to promote wetland or aquatic process and including coastal wetlands);
- **Rare Plants** (rare vascular plants and uncommon species assemblages);
- **Freshwater Fish and Fish Habitat** (includes effects on habitat quality and species in freshwater bodies, including SARA listed species and fish habitat, including spawning, nursery, rearing, feeding, and migratory habitat);
- **Marine Environment** (finfish, shellfish, marine benthos and marine and coastal mammals, and marine turtles with a focus on SARA listed species and species of conservation concern; benthics flora and fauna, including SARA listed species; water quality and quality of marine sediments and associated levels of contamination, as components of habitat quality; and ecologically sensitive, protected areas or candidate protected areas (*e.g.*, St. Anns Bank));
- **Commercial and Recreational Fisheries** (commercial fisheries including but not limited to lobster, scallop, snow crab, and herring);
- **Archaeological and Heritage Resources** (marine and terrestrial archaeological and heritage resources and sites providing evidence of past use and occupation);
- **Current Use of Land and Resources by the Mi'kmaq for Traditional Purposes** (lands and resources of specific social, cultural or spiritual value to the Mi'kmaq of Nova Scotia with focus on current use of land and resources (including terrestrial, freshwater and marine) by the Mi'kmaq for traditional purposes); and

- **Land Use** (existing land development, settlement areas, recreation, and areas of special community or social value, land ownership; includes lands along transmission lines and truck routes as well as lands required for water lots; and consideration of land use post decommission.

Approvals under *Navigable Waters Protection Act* subsections 5(2), 5(3), 6(4), 16, and 20 triggers require the need for an environmental assessment under the *Canadian Environmental Assessment Act*. However, environmental effects of the project on navigation are taken into consideration as part of the environmental assessment only when the effects are indirect, *i.e.,* resulting from a change in the environment affecting navigation. Direct effects on navigation are not considered in the environmental assessment, but any measures necessary to mitigate direct effects will be included as conditions of the *Navigable Waters Protection Act* approval. Only direct effects were identified; therefore the effects of the project on navigation are not addressed in this environmental assessment.

These VECs were selected based on information gathered from:

- the Donkin Exploratory Phase EA (CBCL 2008) and ongoing environmental monitoring during the current care and maintenance phase of mine operations;
- previous and ongoing public engagement and issues identification;
- input from the CEA Agency, federal responsible authorities, federal expert authorities, and the Province of Nova Scotia along with associated written government guidance (*e.g.*, EIS Guidelines (CEA Agency 2012); and
- the professional opinion of XCDM and Stantec study team members.

The consideration of the environmental effects in the EIS are conceptually bound in both time and space. This is more commonly known as defining the study areas and time frames, or spatial and temporal boundaries of the assessment. The spatial and temporal boundaries vary among VECs, depending on the nature of the predicted effects. The spatial boundaries must reflect the geographic range over which the Project's environmental effects may occur, recognizing that some effects will extend beyond the Project area. Spatial and temporal boundaries have been developed in consideration of:

- timing/scheduling of Project activities;
- natural variations of each VEC;
- the time required for recovery from an effect; and
- potential for cumulative effects.

Spatial and temporal boundaries for each VEC are presented in the respective VEC analyses (refer to Section 5).

4.2.4 Cumulative Effects Assessment Scoping

The consideration of other projects or activities that have been or will be carried out with potentially overlapping environmental effects is a necessary component of the assessment of cumulative environmental effects to meet the requirements of CEAA. The other projects and activities considered in the cumulative environmental effects assessment in this EIS were identified through discussions with planning staff at CBRM, Enterprise Cape Breton Corporation, Internet research and other public domain, and knowledge of the Study Team. Table 4.2.2 provides an overview of these projects and activities and Figure 4.2.1 displays their location. Each of these projects or activities is considered as relevant in the cumulative effects analysis for each VEC in Section 5.

Table 4.2.2 Other Projects and Activities for Consideration of Cumulative Environmental Effects

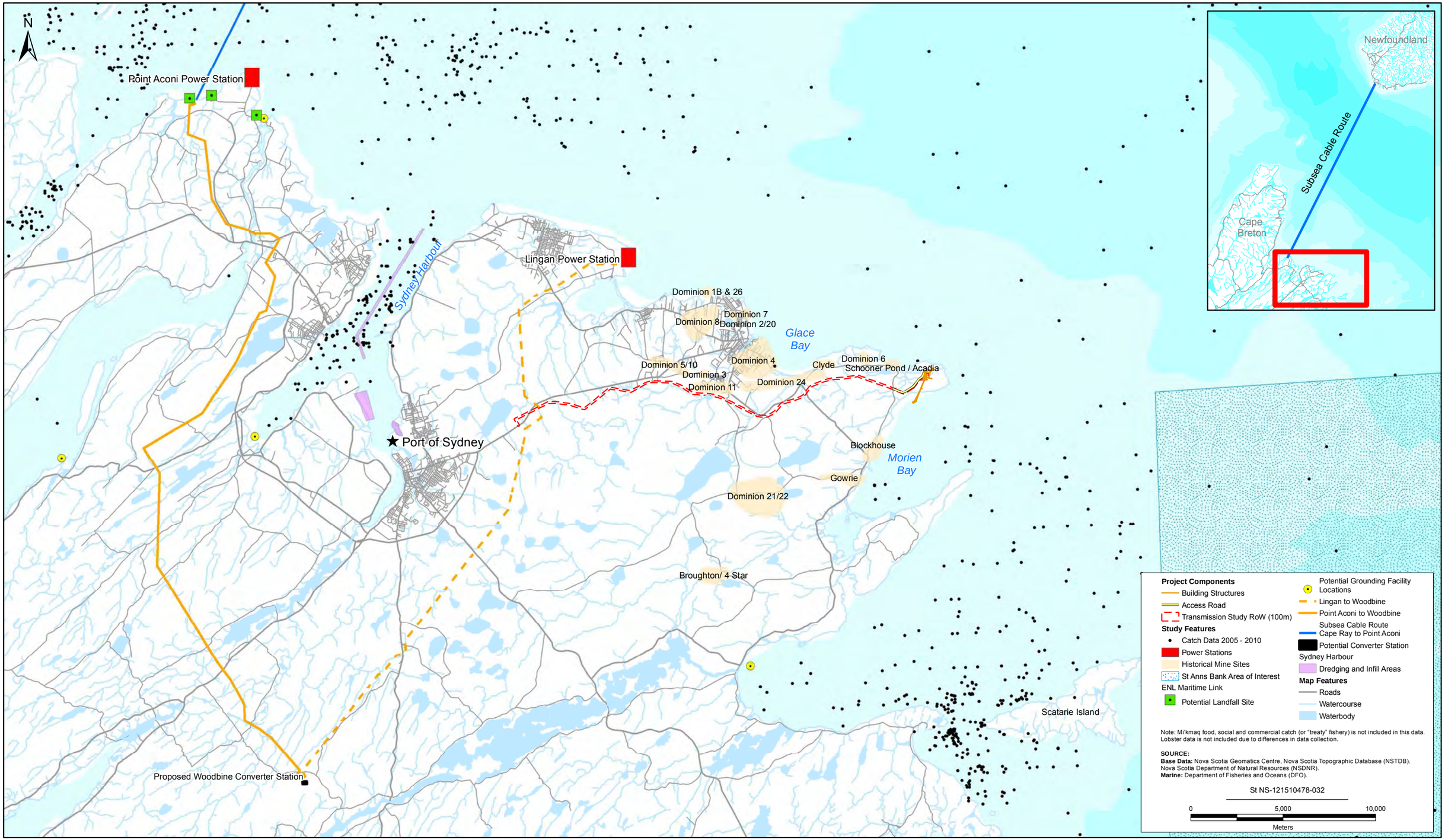
Name of Project or Activity	Brief Description of Project or Activity
Past or Present Projects or Activities That Have Been Carried Out	
Historic Coal Mining and Remediation Activities (including the Donkin Underground Exploration Project)	The first commercial coal mine in North America was located in the village of Port Morien, approximately 6 km from the Project site. Exposed coal was extracted by French settlers in 1720 and now the Port Morien French Mine Site is designed a Special Place under the *Special Places Protection Act* (CBCL 2008). Underground and surface coal mining has historically been an important industry to the region, supplying local power stations with fuel stock and local steel operations. In 1967, the Cape Breton Development Corporation (CBDC) was established with a mandate to acquire and manage many of the local coal mines and explore for new resources including the Donkin Resource Block. Exploration work at Donkin involved construction of two 3.7 km tunnels offshore the Donkin Peninsula to intersect with the Harbour Seam. In 1992, changing market conditions forced closure of the mine. The tunnels were sealed and allowed to fill with water. Partial remediation was undertaken at the site before abandonment (CBCL 2008). The last working underground mine in the Sydney Coal Field, the Prince Colliery Mine ceased operation in 2001 (CBCL 2008). Upon cessation of active mines, CBDC began a comprehensive mine site closure and reclamation program engaging PWGSC. In 2009, CBDC's mandate was transitioned to Enterprise Cape Breton (ECBC), a Federal Crown Corporation. More than 600 individual properties covered more than 3,000 ha have been covered in the ECBC Mine Closure Program. Waste rock and elevated ARD potential as well as soil, surface water and groundwater contamination are potential issues of concern that are being addressed through remediation work (Wilson *et al*. 2011). In 2005, Xstrata Coal was granted exclusive rights to apply for a Special License to conduct exploration activities in the Donkin Block. A Coal Gas Exploration Agreement, authorizing the exploration, was reached in 2007. In 2008, XCDM received regulatory approval for the Donkin Underground Exploration Project. This approval allowed for the construction and operation of an

Table 4.2.2 Other Projects and Activities for Consideration of Cumulative Environmental Effects

Name of Project or Activity	Brief Description of Project or Activity
	underground mine which included surface and underground preparatory works and use of a continuous miner system for a period of up to two years to remove an average of 2,000 tonnes of coal per day. As a result of the lack of sales contract for the raw coal, operation of the Underground Exploration Project has not occurred as proposed. The Proponent has undertaken some exploratory work and care and maintenance of the site, including the dewatering of the two subsea tunnels and construction of new mine access road.
Historic and Ongoing Fishing Activity	The fishery is an important economic activity for the area. Primary species fished include lobster, crab, herring, and groundfish. There are approximately 526 lobster licenses in Lobster Fishing Area 27 (as of December 2011), with about 38 of these being fished out of Morien Bay. It is expected that the commercial fishery will continue at current levels into the future (refer to Section 5.8 for more information on commercial and recreational fisheries).
Lingan and Point Aconi Power Stations	Constructed in the 1970s, Lingan is Nova Scotia Power's largest generating station with a 620 MW generating capacity. Coal is the primary fuel burned but Bunker 'C' and light fuel oil are also burned. It is acknowledged that NSPI has proposed a partial shutdown of the Lingan facility. Point Aconi is Nova Scotia Power's newest and most environmentally progressive coal-fired generating station. The generating capacity of Point Aconi is 171 MW. Coal is the primary fuel source but light fuel oil is also burned. Lingan and Point Aconi Power Stations are located approximately 16 and 40 km from the Project, respectively.
Future Projects or Activities That Will Likely Be Carried Out	
Port of Sydney Dredging and Infilling	Sydney Harbour Channel Deepening and Infill. As of October 2011, Sydney Ports Corporation initiated dredging of a navigation channel in Sydney Harbour for the development of a marine container terminal in the Sydport Industrial Park. Approximately 72 ha of land will be infilled to accommodate the marine container terminal and on dock Intermodal Container Transfer. The schedule for completion of terminal construction and operation is contingent on market conditions and is currently uncertain. Provincial Energy Ventures (PEV) Wharf Approach Deepening Project. PEV is proposing to deepen the approach to the PEV wharf facility at the former Sydney Steel Corporation docks and includes removal of bottom sediments to -16.5 m elevation in a 350,000 m^2 area. All dredged sediment will be disposed within a newly constructed Confined Disposal Facility (CDF) in Blast Furnace Cove on the PEV leased property. This work is scheduled to take place in 2012. The Port of Sydney is approximately 27 km from the Project.
Maritime Link Project	ENL Maritime Link Inc., a wholly owned subsidiary of Emera Newfoundland and Labrador Holdings Inc., is proposing to design, develop and operate the Maritime Link Transmission Project between the Island of Newfoundland and Cape Breton, Nova Scotia. The transmission link is a 500 MW high voltage transmission system that includes: a new transmission line between Bottom Brook and Cape Ray, NL; two subsea cables spanning the Cabot Strait (approximately 180 km) to Point Aconi in Cape Breton, NS; and a new transmission line (approximately 50 km) parallel to the existing transmission corridor centerline between Point Aconi and Woodbine (ENL 2011). Project construction is scheduled to begin in 2014 and first power planned for delivery in late 2016 or early 2017 (ENL 2011).

Table 4.2.2 Other Projects and Activities for Consideration of Cumulative Environmental Effects

Name of Project or Activity	Brief Description of Project or Activity
St. Anns Bank Area of Interest	In June 2011, St. Anns Bank, an area east of Cape Breton on the Eastern Scotian Shelf, was announced as an Area of Interest for establishment as a Marine Protected Area (MPA) under the *Oceans Act*. St Anns Bank area of interest is located east of Scatarie Island off Cape Breton and is approximately 5,100 km^2 in size. The area includes Scatarie Bank, most of St Anns Bank, and portion of the Laurentian Slope and Channel. The St Anns Bank area was selected from three candidate areas following a seven-month public consultation period. This area was chosen because of its natural features and the support it received during the consultation period. DFO is in the process of consulting various stakeholders to initiate the MPA designation process and better understand what activities may be considered compatible with the MPA. Establishing a Marine Protected Area could limit future activities in the St Anns Bank area if the activities have the potential to cause serious damage to the ecosystem. The timeline for such designation is uncertain.



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Donkin Export Coking Coal Project

Other Projects and Activities for the Assessment of Potential Cumulative Effects

FIGURE NO.:	4.2.1
DATE:	Jul 03, 2012

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