Donkin Export Coking Coal Project

ENVIRONMENTAL IMPACT STATEMENT - SUMMARY

July 2012

Donkin Export Coking Coal Project Environmental Impact Statement - Summary

PREPARED FOR:
Xstrata Coal Donkin Management Limited

PREPARED BY:

Stantec Consulting Ltd.

July 2012

Foreword

This document is intended to be a non-technical (plain language) summary of the Environmental Impact Statement (EIS) for the Donkin Export Coking Coal Project (the Project) proposed by Xstrata Coal Donkin Management (XCDM) located in Cape Breton, Nova Scotia. The purpose of this document is to provide an overview of key findings of the EIS with respect to potential Project-related environmental effects as well as XCDM's commitments to managing those effects to acceptable and sustainable levels over the life of the Project. This document is intended to support public and Mi'kmaq (the First Nations of Nova Scotia) participation and review of the EIS toward finalizing the environmental assessment process and has been prepared according to EIS Guidelines provided by responsible federal and provincial authorities with public input. Readers are encouraged to review the full EIS document for additional details of the assessment.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDIX A Residual Effects Summary Matrices

1.0 Introduction

1.1 PROJECT OVERVIEW

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 an underground mining operation producing approximately 3.6 million tonnes per year (approximately 9,972 tonnes per day) of raw coal that will be washed to provide approximately 2.75 million tonnes per year (approximately 7,620 tonnes per day) of product coal that is primarily suitable for coking coal markets – the most likely markets being Europe and Brazil. Coking coal, also commonly referred to as metallurgical coal, is used to produce coke, which is used in the manufacturing of iron and steel. To a lesser extent, coke is also used in the casting and smelting of base metals. The Project may also supply thermal coal to power plants to generate electricity. A coal processing plant will be constructed to prepare the coal for shipping. Waste coal and rock will be disposed onsite in surface containment systems engineered to manage runoff.

Product coal will be loaded onto barges, each approximately 4,000 tonne in capacity, at a new wharf to be constructed on the Donkin Peninsula. The barges will be moved by tug boats approximately 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 (refer to Figure 1). While marine shipping is the primary method of product coal transportation for the Project, trucking of coal to domestic customers and the Port of Sydney may occur should marine transportation prove impractical at any time.

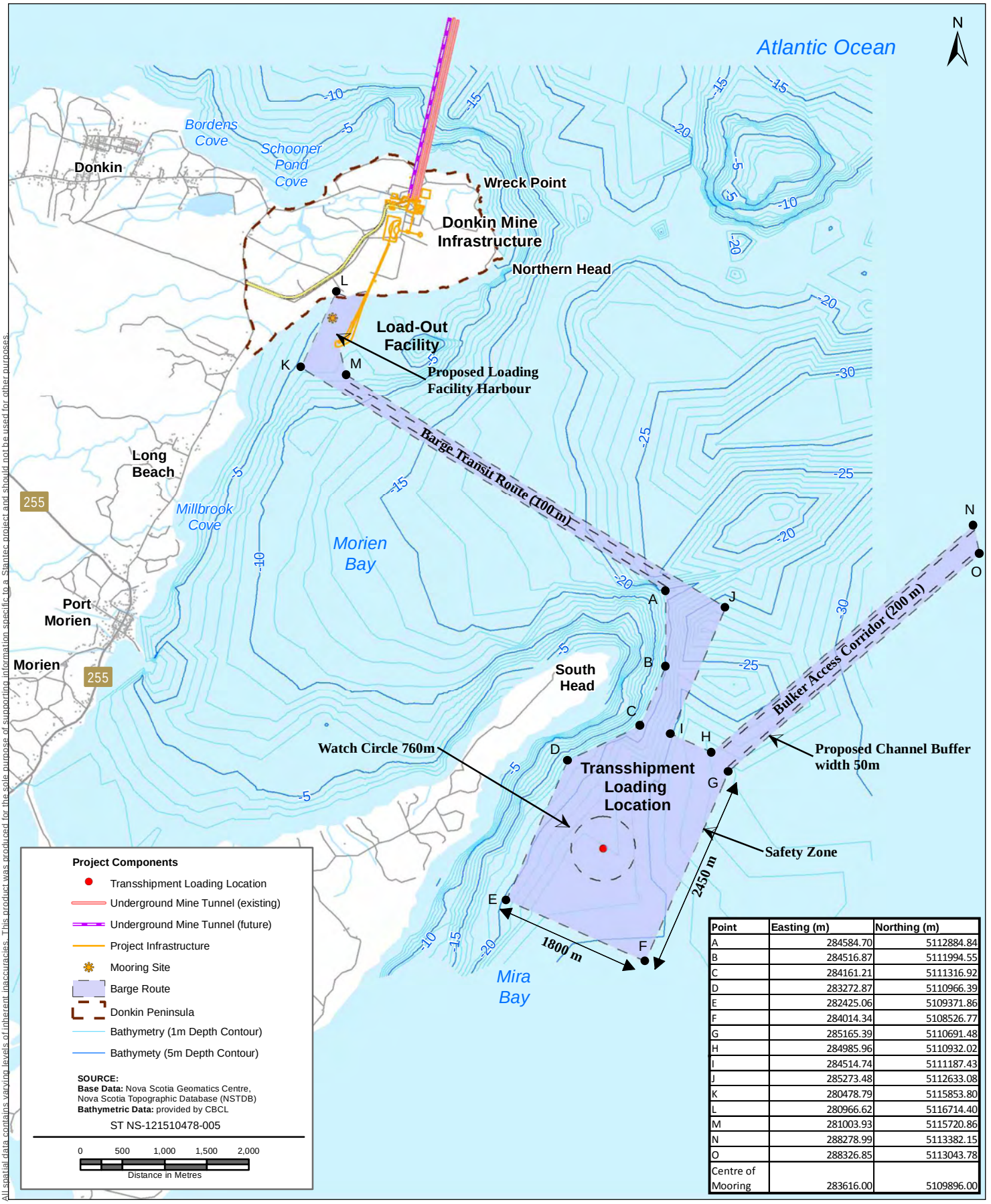
Xstrata Coal Donkin Management (XCDM) is the proponent for the Project. XCDM is committed to a high standard of environmental management for the planned activities to meet or exceed regulatory and corporate requirements. Protection of the health and safety of workers and the public and the sustainability and economic prosperity of Cape Breton communities along with environmental protection and planning are the foundations for XCDM's business and will be integrated into all phases of the Project.

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.

There are very few single prospects in Nova Scotia with the potential to provide economic benefits of this Project's 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. Nova Scotia can expect a total of approximately 1699 direct and indirect jobs per year during development (8,497 person- years of employment for 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 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. Federal tax revenue from the Project is estimated at $68 million during development and $49 million annually during operations; provincial tax revenue is estimated at $52 million in development and $54 million annually during operations.

1.2 ENVIRONMENTAL ASSESSMENT PROCESS

An 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.



Project Components

- Transshipment Loading Location
- Underground Mine Tunnel (existing)
- Underground Mine Tunnel (future)
- Project Infrastructure
- Mooring Site
- Barge Route
- Donkin Peninsula
- Bathymetry (1m Depth Contour)
- Bathymety (5m Depth Contour)

SOURCE:
Base Data: Nova Scotia Geomatics Centre, Nova Scotia Topographic Database (NSTDB)
Bathymetric Data: provided by CBCL

ST NS-121510478-005

0 500 1,000 1,500 2,000
Distance in Metres

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
DATE: Jul 03, 2012

Stantec

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1.2.1 Federal Environmental Assessment Process

Federal authorizations will be required for marine construction from Fisheries and Oceans Canada (DFO) (*Fisheries Act*) and from Transport Canada (*Navigable Waters Protection Act*). These authorizations trigger the requirement for a federal environmental assessment process, under CEAA. Other Federal Authorities providing expertise or knowledge to the EA process include Natural Resources Canada, Environment Canada and Health Canada.

Under CEAA, there are specific projects and classes of projects for which a comprehensive study is required, as specified by the Comprehensive Study List Regulations. Projects requiring a comprehensive study are generally those with a relatively greater potential to cause adverse environmental effects. Under these Regulations "a coal mine with a coal production capacity of 3,000 t/d or more" will be subject to a comprehensive study. A comprehensive study under CEAA generally requires a higher level of public and First Nation engagement and review than screening-level assessments.

1.2.2 Provincial EA Process

The Project will also require environmental assessment registration under the provincial *Environment Act* and Environmental Assessment Regulations as a "facility that extracts or processes […] coal" (Class I undertaking).

To reduce duplication and promote intergovernmental cooperation, the Government of Canada and the Province of Nova Scotia have signed a Federal-Provincial Environmental Assessment Agreement to coordinate their respective EA processes. The EIS prepared by the Proponent will be used to satisfy both processes and there will be a joint federal and provincial public comment period.

2.0 Project Description

2.1 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 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.

2.2 PROJECT DESCRIPTION

2.2.1 Location

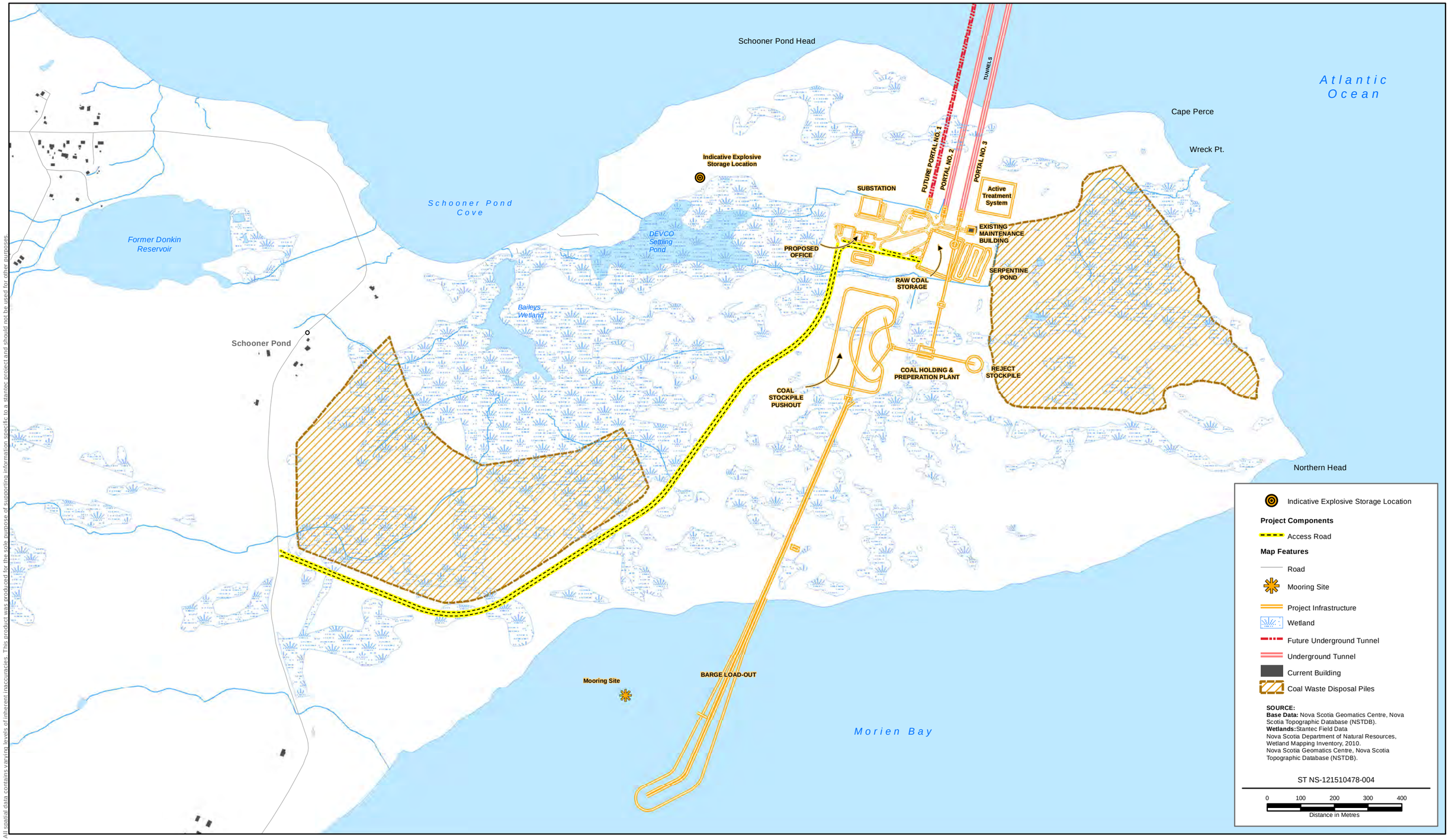
The Project is located at the site of the existing Donkin Mine (currently not in production) (refer to Figure 1). The Donkin Peninsula is situated in Nova Scotia on the Atlantic coast of Canada. Xstrata Coal currently owns approximately 99 percent of the land on Donkin Peninsula. Current land uses include maintenance of the existing mine facilities and local, informal recreation.

The barge load-out facility, which will consist of a breakwater, wharf and 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.

2.2.2 Components

The Project will consist of land-based and marine-based components including:

- existing and planned underground and surface infrastructure at the site on the Donkin Peninsula (including the coal processing plant, and product stockpiles and coal waste disposal piles) (refer to Figure 2);
- 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 (refer to Figure 3); and
- the trucking haul route (to be used for domestic customers and when marine transportation is considered impractical).



PREPARED BY: M Huskins-Shupe	Donkin Export Coking Coal Project
REVIEWED BY: K Keizer	**Conceptual Project Development Area**
CLIENT: xstrata coal	FIGURE NO.: 2
	DATE: Apr 24, 2012
	Stantec

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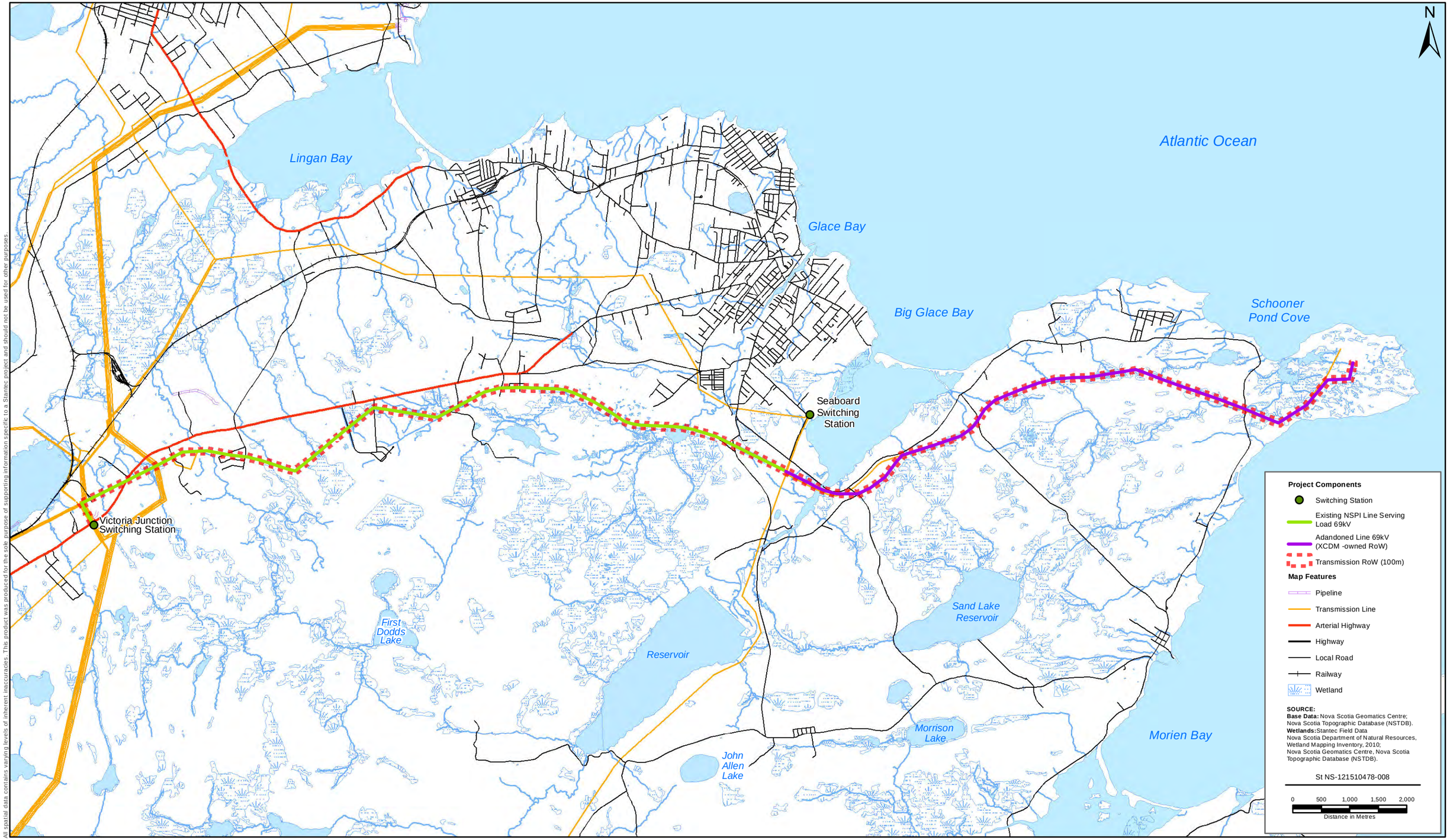

PREPARED BY: M. Huskins-Shupe	Donkin Export Coking Coal Project
REVIEWED BY: C. Shupe	**Proposed 138 kV Transmission Line Route**
CLIENT: xstrata coal	FIGURE NO.: 3
	DATE: Apr 24, 2012
	Stantec

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2.2.3 Activities

Table 1 lists the key Project activities associated with construction, operation and maintenance, and decommissioning and reclamation.

Table 1 Project Activities and Physical Works

Project Activities and Physical Works	Details
Site Preparation	• 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	• Installation of underground mining equipment Installation of enclosed gantries for coal transfer • 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 coal processing plant and conveyors
Construction of 138 kV Transmission Line	• Right of Way (RoW) clearing • Pole and transmission line installation • Temporary watercourse crossing
Construction of Barge Load-out Facility (incl. dredging, infilling and habitat compensation)	• Dredging of sea floor (if required) • Infilling and wharf construction • Marine habitat compensation
Installation of Transshipment Mooring	• Installation of foundation and/or anchoring system
Underground Mining	• Underground operation of mining machinery, plant and equipment • Mine ventilation (including methane management**)** • Blasting (if required) • Conveyance of raw coal from underground to surface stockpile
Coal Processing Plant (incl. coal washing and conveyance)	• Crushing of raw coal • Conveyance of crushed coal for processing • Washing and dewatering of coal in closed loop process • Conveyance of coal product to product stockpile • Building ventilation and dust control
Water Treatment (incl. mine water and surface runoff)	• Operation and maintenance of site ditching, culverts and settling systems (serpentine pond) for sediment control • Progressive development of water controls and acid rock drainage management systems as required. waste disposal piles
Coal and Waste Rock Disposal	• Conveyance of dry coal waste from processing plant rejects stockpile and on to designated coal waste disposal piles • Progressive development of coal waste disposal piles (including clearing, grading, water controls and reclamation)
Coal Trucking	• Trucking of product coal to domestic customers and the Port of Sydney should marine transportation prove impractical at any time
Marine Loading and Transportation	• 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.

Table 1 Project Activities and Physical Works

Project Activities and Physical Works	Details
Site Decommissioning	• 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	• Contouring and re-vegetation of site • Ongoing water treatment

2.2.4 Schedule

Pending regulatory approval, mine development is planned to begin in 2013. Construction and commissioning of the coal processing plant is expected to last approximately 17 months. Construction of the barge load-out facility is planned for the start of Q4 2014 with completion by Q2 2016. Production for this Project will be staged progressively with full production expected to be reached by the end of 2017. This life of the Project is expected to be approximately 30 years.

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 as well as weather will determine the schedule for loading and barging operations.

3.0 Scope of the Assessment

3.1 SCOPE OF THE PROJECT

The scope of the Project for the purpose of the environmental assessment includes all activities and physical works associated with the construction, operations and decommissioning of the proposed Project including those items listed in the Project Description (Section 2) and Table 1 above.

3.2 FACTORS TO BE CONSIDERED

As indicated in the EIS Guidelines, 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.

3.3 SCOPE OF THE FACTORS

The EIS focusses on those components of the environment that could be most affected by the Project and/or are a concern for the government, the Mi'kmaq, stakeholders and the general public. These components are known as Valued Environmental Components (VECs) and have been provided in the EIS Guidelines. The EIS considers potential environmental effects that the Project may have on these VECs.

3.3.1 Identification of VECs

VECs assessed in the EIS include:

- **Atmospheric Resources** (ambient air quality; acoustic environment; greenhouse gas);
- **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; rare mammals and rare herpetiles (amphibians and reptiles) and their habitat; 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 rare and sensitive species and fish habitat);
- **Marine Environment** (finfish, shellfish, marine benthos, and rare species and fish habitat; marine and coastal mammals; marine turtles; water quality and quality of marine sediments 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);
- **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 decommissioning;

- **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 by the Mi'kmaq for traditional purposes); and

- **Archaeological and Heritage Resources** (marine and terrestrial archaeological and heritage resources and sites providing evidence of past use and occupation).

3.3.2 Spatial and Temporal Boundaries

Spatial and temporal boundaries (*i.e.*, study areas and time frames) have been developed to investigate potential Project-related environmental effects. The spatial boundaries reflect the geographic range over which the Project's environmental effects may occur, recognizing that some effects will extend beyond the Project Development Area (*i.e.*, Project footprint). Spatial and temporal boundaries were 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.

In general, temporal boundaries for assessment include the construction, operation and maintenance, and decommissioning and reclamation phases of the Project. Spatial boundaries include a Local Assessment Area (LAA), which is the predicted area within which direct and indirect Project effects are realized. A Regional Assessment Area (RAA) considers the wider area within which cumulative effects may occur. LAAs and RAAs differ by VEC depending on the nature of predicted effects.

4.0 Project Alternatives

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

4.1 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.

The primary purpose of the Project is for the development and operation of a commercial underground coal mine on the Donkin Peninsula in a manner that is socially, environmentally and technically feasible and will provide a reasonable return on investment to Company shareholders. There is essentially no alternative to the Project which meets the Project's stated purpose. 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. The Project has the potential to access most if not all of the global markets, and these potential markets exceed its projected production capacity for its operating life. Medium and long term price forecasts are dynamic with an increasing trend due to strong demand forecasts, strengthening the Project's viability.

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. XCDM considers alternatives to the Project as not meeting basic Project objectives and are therefore not feasible.

4.2 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative means for carrying out the Project were identified in the EIS Guidelines and are listed in Table 2. Specific criteria were applied to the evaluation of these alternative means including technical and economic feasibility. Technical feasibility was evaluated during engineering feasibility studies commissioned by XCDM. XCDM also evaluated economic

feasibility of alternatives including capital, operating and lifecycle costs. Potential environmental effects of alternatives that were both technically and economically feasible were also evaluated along with an indication of the preferred alternative (refer to Table 2).

Table 2 Summary 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 substantial difference 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 substantial difference 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. Thermal coal has a lower market price although local markets (if available) potentially provide lower transportation costs.	Donkin coal does not necessarily require washing before use to meet thermal coal market specifications, 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 greater potential for environmental effects due to increased Project footprint (for coal plant and coal waste). Water consumption will be limited as the coal plant will use a closed loop system.	✓

Table 2 Summary 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 transported from the Donkin Peninsula 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 transported 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 truck 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 once road upgrades are made.	✓ (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 contractors outside region.	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.	
	• Timber Crib Design.	Technically feasible.	Economically feasible with added benefit of local labour skills	Timber Crib breakwater design will result in fish habitat loss and loss of fishing access. Negligible difference in	✓

Table 2 Summary 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
			availability.	environmental effects between concrete caisson design and timber crib design.	
Rejects (coal waste) 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 acid rock drainage (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 in mine water and site runoff)
	• 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	✓ (for treatment of acid rock drainage runoff from coal waste piles)

Table 2 Summary 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
				pH lowering, affecting surface water and groundwater resources, terrestrial habitats including wetlands, and freshwater fish and fish habitat.	
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.	✓

5.0 Consultation and Engagement

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 the Mi'kmaq 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, questions, concerns or comments raised through consultation and engagement initiatives during the environmental assessment process were documented so that they could be considered, as appropriate, in the scoping or conduct of the Environmental Impact Statement report.

5.1 PUBLIC CONSULTATION ACTIVITIES TO DATE

Since 2005, XCDM has undertaken public consultation activities to inform and engage local stakeholders and the Mi'kmaq with respect to Donkin Mine activities. Ongoing consultation has also facilitated exchange of environmental and socio-economic information from those most familiar with the Project area. In 2007, XCDM developed a formal stakeholder engagement strategy as part of the Donkin Underground Exploration Project EA process. Community response was positive, with the majority of those participating in community meetings focusing on economic opportunities that the Project would generate in the area. Local stakeholders also wanted the Project to be executed in a manner that would protect the environment and promote human safety.

With the commencement of the EA process for the Donkin Export Coking Coal Project, XCDM has continued their public and stakeholder consultation program. Specific consultation activities initiated by XCDM and provincial and federal authorities related to the Donkin Export Coking Coal Project are described below.

5.1.1 Cooperative and Provincial Consultation Activities

Federal and provincial planning for public consultation during the EA process has included coordination of key public consultation steps such as those required for provincial EA registration and comprehensive study process to promote efficiency of public engagement.

5.1.2 Public Participation in the Comprehensive Study Process

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.

5.1.3 Public Participation Activities by the Proponent

XCDM established a Community Liaison Committee (CLC) in 2006 to build a constructive working relationship and facilitate community engagement. The role of the CLC is to provide a forum for discussion between XCDM representatives, community, government, and other stakeholders on issues relating to mine activities, and to keep the community informed on work undertaken. The CLC remains in operation today and has facilitated community engagement on the Donkin Export Coking Coal Project. Table 3 lists specific public and community stakeholder meetings, including recent CLC meetings that have occurred with respect to the Donkin Export Coking Coal Project.

Table 3 Summary of Public Stakeholder Activities (2010-2012)

Date	Stakeholder Group	Meeting Objectives/Issues Discussed
February 10, 2010	Public Meeting	XCDM introduced Export Coking Coal Project to the local community and other interested stakeholders.
February 12, 2010	Fishers (28 representatives)	XCDM introduced Export Coking Coal Project to fishers.
June 16, 2011	CLC	XCDM provided update to CLC on the Project regarding health, safety, environment, and community involvement and operational review and update including presentation on EA process and schedule.
June 16, 2011	Public Meeting	XCDM provided an update on Project and EA process including anticipated schedule and consultation activities; no specific environmental concerns were raised by the public.
October 19, 2011	Fisheries Advisory Group	XCDM provided an overview of the Project, obtained information regarding commercial fishing in the area and answered questions regarding the Project.
November 28, 2011	CLC	Meeting focused on EA process including updated EA schedule and draft EIS Guidelines; XCDM discussed planned presentation material for November 2011 public open house.

Table 3 Summary of Public Stakeholder Activities (2010-2012)

Date	Stakeholder Group	Meeting Objectives/Issues Discussed
November 29, 2011	Open House (Donkin)	Objective was to provide information on Project, regulatory approval process, status of field studies, EA schedule and draft EIS Guidelines; overall reaction was positive recognizing potential socio-economic benefits.
November 30, 2011	Open House (Sydney)	Objective was to provide information on Project, regulatory approval process, status of field studies, EA schedule and draft EIS Guidelines; overall reaction was positive recognizing potential socio-economic benefits.
December 16, 2011	Local communities (*e.g.*, Glace Bay, Donkin, Port Morien)	Local mailout of Project's community newsletters to homes in the region through Canada Post's Donkin and Port Morien offices. Copies were also hand delivered to post offices, local businesses in the Sydney, Glace Bay, Donkin and Port Morien areas.
February 22, 2012	Local Fisheries Open Meeting	XCDM provided update on Project focusing primarily on marine components. XCDM made a commitment to meet with fishers in April 2012. Key issues of concern raised included loss of access, effects on lobster larvae and habitat and gear loss and damage.
April 19, 2012	Fisheries Advisory Group (6 representatives)	XCDM provided Project update and spoke with fishers to gain further understanding of fisheries impacts in lead up to open meeting the following week.
April 25, 2012	Local Fisheries Open Meeting	XCDM provided update on Project focusing on answering the key issues of concern raised by fisheries during the February 22nd meeting.
April 26, 2012	CLC	XCDM provided update to CLC on the Project regarding health, safety, environment, and community involvement and operational review and update including presentation on EA process and schedule.
April 26, 2012	Public Meeting	XCDM provided an update on the Project and EA process including anticipated schedule and consultation activities.

As noted in the table above, approximately 1,500 newsletters (Donkin Coal Link November 2011 Issue No. 5) were distributed to homes and post office mail boxes from Donkin and Port Morien post offices. XCDM also provided information packages, comprising the Newsletter and fact sheets on the Project and the federal EA process, to commercial fishing organizations, representatives of 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.

In addition to the structured meetings listed in Table 3, there have been numerous individual meetings with stakeholders to discuss specific issues and/or to obtain local information to support the EA process. Overall, support for the Project has been positive, provided the Project is developed in a safe and environmentally sustainable manner.

5.2 MI'KMAQ ENGAGEMENT ACTIVITIES TO DATE

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 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.

5.2.1 Cooperative and Provincial Engagement Activities

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 that formalizes a process for consultation with the Mi'kmaq in Nova Scotia.

On June 27, 2011 representatives of XCDM 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.

5.2.2 Mi'kmaq Consultation in the Comprehensive Study Process

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. On July 8, 2011 the Nova Scotia Department of Natural Resources (NSDNR), the lead agency for Crown consultation for the provincial government, 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, on behalf of the 13 Mi'kmaq communities of Nova Scotia.

5.2.3 Mi'kmaq Consultation/Engagement Activities by the Proponent

XCDM is committed to building relationships with the communities in which they operate. Through engagement activities with the Mi'kmaq of Nova Scotia, XCDM seeks to strengthen relationships and partnerships with the Mi'kmaq.

Through engagement 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. Interest was expressed with respect to potential 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 Nova Scotia Office of Aboriginal Affairs (NSOAA) and the NSDNR to present an overview of the Project to the Mi'kmaq and Mineral Resources Branch on September 21, 2011. XCDM 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 also addressed in the 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. XCDM has engaged three of the umbrella groups in Nova Scotia that represent on-reserve and off-reserve Aboriginals in the Province (*i.e.*, the Union of Nova Scotia Indians, the 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) with respect to the Donkin Underground Exploration Project EA process. In 2011 Membertou Geomatics Solutions was contracted again by XCDM to prepare an MEKS based on the new Project description (*i.e.*, for the Export Coking Coal Project). This MEKS identifies Mi'kmaq traditional use activities that have taken place or currently are taking place on the Donkin Peninsula and surrounding waters as well as any Mi'kmaq traditional ecological knowledge that presently exists with respect to those areas. The findings of this MEKS have been integrated in the EIS.

6.0 Existing Environment

This section provides a brief overview of the environmental and socio-economic setting in the Project area.

6.1 BIOPHYSICAL SETTING

Cape Breton is located at latitude 46°N and is temperate by Canadian standards because of its location on the Atlantic Ocean. Winter minimum temperatures rarely drop below -20°C however strong winds and the associated wind chill factor can make it seem much colder.

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 structure of the resources within the Sydney coalfield mines.

The coastal areas throughout the coalfield consist of poorly drained soils, shallow sandstone bedrock protruding at the surface and stony and sandy loam overlying glacial till. Morien bedrock underlies the Donkin Peninsula consisting of altering beds of sandstone, silt stone, mudstone and coal seams.

The terrestrial habitats of the Donkin Peninsula are predominantly comprised of coniferous forests of white, black, and red spruce (*Picea glauca*, *P. mariana*, and *P. rubens* respectively), balsam fir (*Abies balsamea*) and intolerant hardwoods. Hardwood species, particularly paper birch (*Betula papyrifera*) and red maple (*Acer rubrum*), provide some mixed wood stands on the property whereas white spruce is particularly prominent in close proximity to the coastline. Towards the edges of the peninsula (which are represented by coastal cliffs with a relief of up to 30 m), the coniferous forest becomes very stunted and windswept and transitions into coastal heathland, the extent of which is particularly extensive in the northern part of the property.

Wetlands comprise an important component of Donkin Peninsula. Swamps are abundant throughout the area and are predominantly comprised of treed and tall shrub vegetation types. Marshes are found along the freshwater water bodies of the peninsula and other wetland classes, including bog, are also present within the property. In addition to the relatively “natural” habitats which are present on site, the centre of the peninsula is currently comprised of disturbed habitat associated with the historic mining activities.

The Donkin Peninsula encompasses important habitat for many bird species, including those which are identified by provincial and federal authorities as being of conservation interest, and is a popular destination for recreational birders. The Donkin Peninsula is part of the Northern Head/South Head Important Bird Area (IBA) Three species listed under the federal *Species at Risk Act* (SARA) and/or the Nova Scotia *Endangered Species Act* (NS ESA) have been recorded in or near the study area, including American Peregrine Falcon (*Falco peregrinus* subsp. anatum), Olive-sided Flycatcher (*Contopus cooperi*), and Canada Warbler (*Wilsonia canadensis*). The coastal cliffs of the peninsula provide nesting habitat for large numbers of Black-legged Kittiwakes (*Rissa tridactyla*), Cormorants (*Phalacrocorax* spp.) and Razorbills (*Alca torda*). The terrestrial habitats of the peninsula are known to provide habitat for a number of species presently considered to be “sensitive” within the province by NSDNR, including Boreal Chickadee (*Poecile hudsonica*), Golden-Crowned Kinglet (*Regulus satrapa*), and Ruby-Crowned Kinglet (*Regulus calendula*).

A number of rare plants are known to be found within Donkin Peninsula and its surrounding lands. Various plant surveys and habitat assessments have been conducted on the Donkin Peninsula and the proposed transmission line corridor between 2006 and 2011. One SARA listed species, Eastern white cedar (*Thuja occidentalis*), was encountered along the transmission corridor. Thirteen additional Species of Conservation Concern were recorded on the Donkin Peninsula and/or along the transmission line corridor.

Freshwater habitats on the Donkin Peninsula are a mix of two lentic (still waters; Schooner Pond and DEVCO settling pond) and six lotic (actively moving water) systems. Both lentic and lotic watercourses drain from the core of the peninsula into Baileys Wetland then to Schooner Pond Cove and the Atlantic Ocean. The pond situated within Baileys Wetland (Schooner Pond) can be considered good habitat for brook trout (*Salvelinus fontinalis*). In the past, Baileys Wetland and the DEVCO settling pond have been stocked with brook trout by the local wildlife association to support recreational fishing. Fish identified as potentially inhabiting the waters in and around Donkin Peninsula include: ninespine stickleback (*Pungitius pungitius*), banded killifish (*Fundulus diaphanus*), Atlantic salmon (*Salmo salar*), American eel (*Anguilla rostrata*), and brook trout.

The waters around the peninsula also provide a rich habitat for a diversity of marine invertebrates, some of which are commercially important to the surrounding communities. Marine fish species found around Donkin Peninsula are those that are common to the nearshore waters of coastal Nova Scotia. At least 45 different fish species have been identified in the waters of Sydney Bight (Scatarie Island, Donkin Peninsula and the northern portion of Cape Breton).

The major commercially-fished invertebrate species in the area are lobster (*Homarus americanus*), snow crab (*Chionoecetes opili*) and rock crab (*Cancer irroratus*). Sea urchins (*Strongylocentrotus droebachiensis*) are found in shallow, rocky bottom subtidal areas along the

coast of eastern Cape Breton, including habitat surrounding Donkin Peninsula and the transshipment mooring location in Mira Bay.

6.2 SOCIO-ECONOMIC SETTING

The Donkin mine site is located within Cape Breton Regional Municipality (CBRM). CBRM covers an area of 2,473 km^2 and has approximately 835 km of coastline on the Atlantic Ocean.

The history of Cape Breton is closely associated with coal mining activities. It is generally accepted that the first coal mine in North America was established at Port Morien in the 1700s. With approximately 24 percent of the workforce employed in the steel and coal sectors in 1961, the elimination of these industries over the past 50 years has severely affected the regional economy. In 2006, Donkin's population of 445 people represented 0.4 percent of CBRM's total population of 102,250. Unemployment levels in 2006 in Donkin were approximately 11 percent higher than in the remainder of CBRM and about 18 percent higher than in the rest of Nova Scotia. Average incomes for households in Donkin was $37,548 a year, slightly lower than the CBRM average of $40,451, but significantly lower than the Nova Scotia average of $46,605 (Statistics Canada 2006).

Although once settled and some of the lands grazed, since DEVCO closed the mine tunnels in 1992, the primary use of the Donkin Peninsula has been related to the care and maintenance of the existing mine facilities and treatment of mine water. Much of the area has been left to revegetate and public use has included mainly informal hiking and bird watching.

The Mi'kmaq Ecological Knowledge Study (MEKS) conducted in association with the EIS found that the Mi'kmaq have historically undertaken traditional use activities on or near the Donkin Peninsula, and that these practices continue to occur in varying locations and at varying times of year. The primary Mi'kmaq traditional use activity that currently takes place near the Donkin Peninsula is fishing in the coastal waters of the region, with lobster being the most fished species by far.

Archaeological resource impact assessments (ARIAs) undertaken on the peninsula in 2006 and 2009 identified two archaeological sites (Bailey Cemetery and McDonald Farm). An ARIA of the proposed marine barge load-out facility in Morien Bay concluded that the potential for First Nations and historic submerged resources was low.

Marine waters surrounding the Donkin Peninsula, known as Sydney Bight, lie within the Northwest Atlantic Fisheries Organization (NAFO) Division 4Vn. Within the boundaries of 4Vn, are Lobster Fishing Area (LFA) 27 and Snow Crab Fishing Areas (CFA) 21 and 22. Key commercial finfish species fished in the nearshore waters of Sydney Bight include herring and mackerel. Other fisheries that occur further offshore in 4Vn include swordfish, shark, alewife and tuna. Invertebrate fisheries contribute most substantially to the overall commercial fishery in 4Vn, with lobster, snow crab, rock crab, sea urchin, and scallop being the most commercially important to the nearshore fishery.

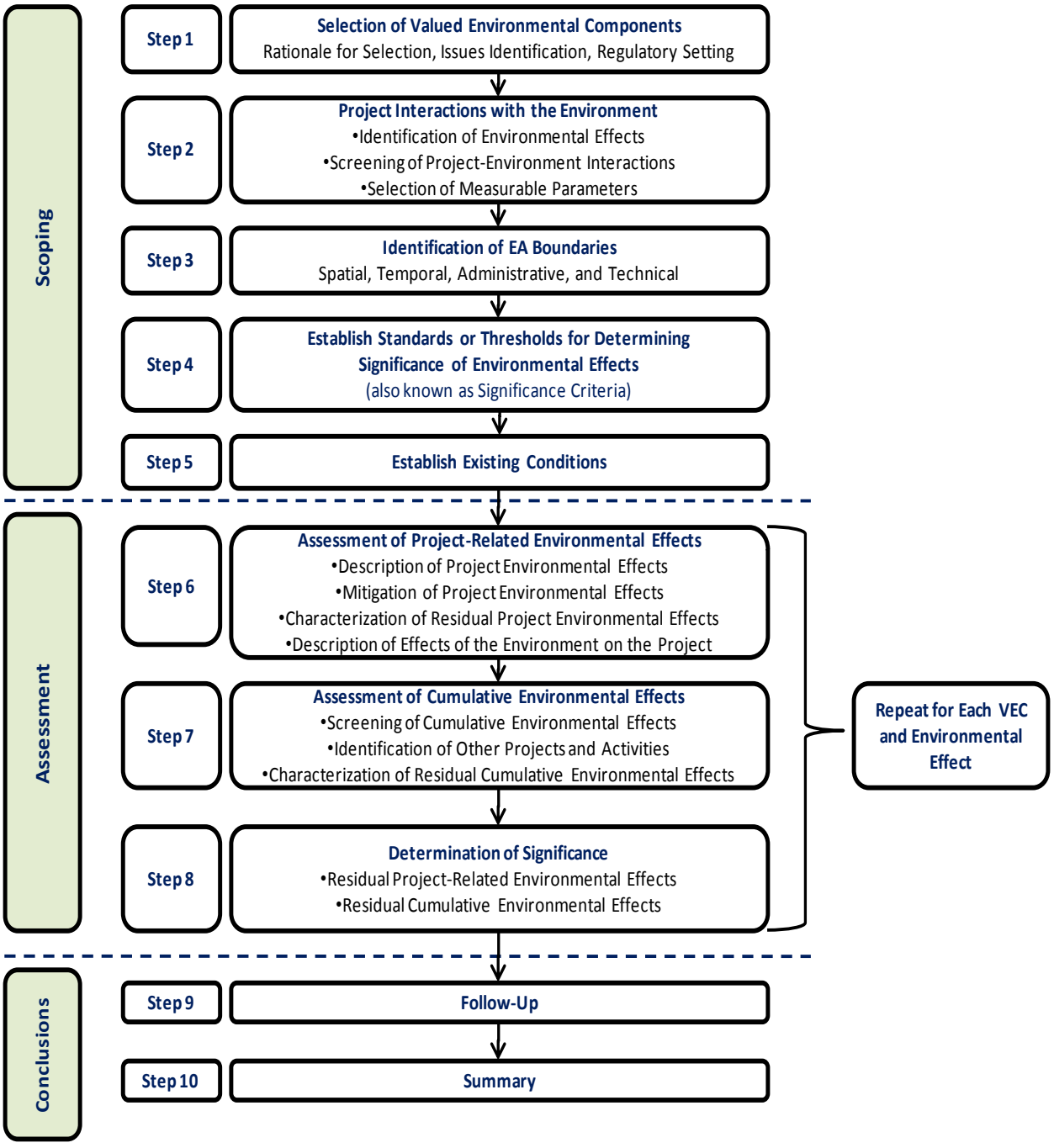
7.0 Environmental Effects Assessment

7.1 APPROACH

The EIS has employed a standard framework to evaluate environmental effects for each VEC. The residual Project-related environmental effects (*i.e.*, effects remaining after mitigation has been applied) are characterized using specific criteria (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 residual environmental effects (also called significance criteria) which is often based on regulatory standards. 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. The environmental effects assessment approach used in this EA is shown graphically in Figure 4.

Section 3.3 discusses the scope of the factors to be considered in the EIS including the VECs to be assessed. A summary of the effects assessment for each VEC is provided below. Residual Effects Assessment Summary Matrices are provided in Appendix A.

Figure 4 Environmental Assessment Method Overview



7.2 ATMOSPHERIC RESOURCES

Atmospheric Resources considers effects of the Project on ambient air quality and the acoustic environment. It also takes into consideration Project-related greenhouse gases (GHGs). Key issues of concern raised during stakeholder and Mi'kmaq engagement were related to effects and management of coal dust, and noise generated during trucking. Public response to the draft EIS Guidelines also included concern with GHG emissions and effect on climate change.

Project construction and operation activities will result in emissions of air contaminants (*e.g.*, sulphur dioxide, nitrogen oxides, particulate matter (dust)). Noise emissions will result in increased sound levels at the nearest residences (*i.e.*, within 1.5 km from the source). While both air and noise emission levels will increase above baseline conditions, they are expected to be within federal and provincial regulatory limits and guidelines. Key mitigation involves a dust suppression and monitoring program and scheduling of noisy activities during daytime hours. The GHG emissions resulting from the operation and maintenance phase of the Project will represent approximately 0.07 to 0.2 percent of national total (2010) reported emissions (depending on methane recovery options). The Project continues to investigate opportunities for methane recovery and commits to developing a GHG Management Plan. The GHG Management Plan will lay out the plan to minimize GHG emissions by optimizing energy efficiency, adopting best proven methane recovery options, and continuing to examine advances in methane management in ventilation air. With proposed mitigation and environmental protection measures including, but not limited to, those discussed above, the potential Change in Air Quality, and Change in Acoustic Environment, and Change in GHG Emissions on Atmospheric Resources as a result of the Project during all phases, are rated as not significant.

7.3 WATER RESOURCES

Water Resources as a VEC considers quality and quantity of surface water and groundwater resources that could potentially be affected by the Project. No specific issues or concerns were raised regarding water resources during stakeholder engagement activities.

Approximately 20 watercourse crossings are present along the proposed power transmission line. On the peninsula, water from site operations largely drains to the DEVCO settling pond and discharges to Schooner Pond Cove through an overflow channel, while natural drainage water on the peninsula largely drains to Baileys Wetland and overflows to Schooner Pond Cove via a weir. During operations, there will be two primary sources of site generated waste water: site runoff and mine discharge. Site runoff will be collected through a series of ditches and culverts and the runoff directed toward the existing serpentine-shaped sedimentation pond (serpentine pond, Figure 2). Underground mine discharge will be directly pumped to the serpentine pond. The serpentine pond will serve as the treatment process for both mine water and site runoff and will be supplemented with a backup chemical feed system as needed. The coal waste disposal will generate a third wastewater stream which is expected to be acid generating, although

covering the piles with impermeable liners will minimize the rate of acid generation and minimize seepage. Flow collected from lined coal waste piles will be directed to an active chemical treatment plant. In order to mitigate the effect of reduction of direct surface water flow to Baileys Wetland (as a result of the location of the Phase III western coal waste pile, Figure 2), watercourses will be rerouted around the coal waste pile and collected water will be redirected after treatment to areas upgradient of Baileys Wetland to maintain current water levels within the wetland.

Groundwater quality will not be affected by the presence of coal waste disposal piles because all water infiltration through the pile will be directed to a treatment system. There is potential for a lowering of the shallow groundwater table in the area of the Phase III coal waste disposal pile potentially affecting domestic wells along Long Beach Road; the extent of the effect would be determined by the relative proximity of the well and the type of well (drilled versus dug). A domestic well survey and shallow groundwater monitoring program will be conducted two years prior to the construction of the Phase III coal waste disposal pile (around Year 13 of Project operation). If monitoring identifies significant changes in groundwater levels which could affect domestic wells, mitigation will be implemented including well replacement and redirection of flows to recharge the shallow groundwater table.

In consideration of proposed mitigation, the environmental effects on Water Resources are rated as not significant.

7.4 BIRDS AND WILDLIFE

Birds and Wildlife is selected as a VEC due to potential interactions between wildlife (particularly species of conservation interest) and Project activities. The Donkin Peninsula provides important bird habitat and is part of the Northern Head/South Head Important Bird Area (IBA) primarily due to the presence of a large seabird colony at the eastern end of the peninsula. The Donkin Peninsula is a popular area for birding. With respect to this VEC, the main issue raised by stakeholders and community members was the continued use of the peninsula as a public recreational birding area.

Thirty-seven bird species of conservation interest have been recorded during bird breeding season on the Donkin Peninsula, including three species at risk protected by federal and/or provincial legislation (*i.e.*, American Peregrine Falcon (*anatum* subspecies), Olive-sided Flycatcher and Canada Warbler).

The assessment of this VEC focuses on two main environmental effects: Change in Wildlife Habitat (*e.g.*, habitat loss or alteration, sensory disturbance), and Change in Mortality Risk (focusing primarily on loss of species of conservation interest). The largest amount of habitat loss will occur as a result of the progressive development of coal waste disposal piles over the life of the Project. Risks to mortality include loss of habitat through clearing, attraction of migrants to site lighting and attraction of generalist predators to the peninsula. Adverse effects

of the Project on birds and wildlife will be avoided or minimized through: timing restrictions on clearing (*i.e.*, avoidance of breeding season); use of setbacks (*i.e.*, buffer zones) around the Northern Head seabird colony and an undisturbed corridor around the margin of the Donkin Peninsula; and site lighting design.

Follow-up and monitoring will be conducted to determine presence of species at risk in the vicinity of the Phase III coal waste disposal pile and to monitor effectiveness of proposed mitigation. In consideration of proposed mitigation, the environmental effects on Birds and Wildlife are rated as not significant.

7.5 WETLANDS

Wetlands are an important feature of the landscape performing many biological, hydrological, social/cultural, and economic functions. The definition of this VEC includes marshes, swamps, fens, bogs, and shallow water areas that are saturated with water long enough to promote wetland or aquatic processes and includes coastal wetlands. Wetlands are protected through federal policy and provincial legislation and policy. The Federal Policy on Wetland Conservation sets a conservation goal of no net loss of wetland function. The Nova Scotia Wetland Conservation Policy establishes a goal of no loss of Wetlands of Special Significance and no net loss in area and function for other wetlands. During the stakeholder and public engagement process, the main issue raised by stakeholders and local community members was potential Project-related effects on Baileys Wetland which has been used for recreational fishing (Schooner Pond) and bird watching. Given regulatory objectives and stakeholder concerns, the assessment of this VEC focuses on a Change in Wetland Area or Function.

The Project is predicted to result in the alteration of approximately 42.2 ha of wetland habitat (approximately 35 percent of wetland area on the Donkin Peninsula) over the life of the Project. The large majority of this alteration is associated with the development of the coal waste disposal piles. Wetland types to be affected are primarily swamps with lesser amounts of fen habitat. Disturbances to marsh and shallow water wetland types are expected to be minor. Loss of wetland area and function will be compensated through the enhancement, restoration or creation of wetland habitat at an area ratio commensurate with the loss. In addition to wetland habitat compensation, other key mitigation includes avoidance of wetland habitat where possible, erosion and sediment control and management of wastewater, maintenance of hydrological connectivity to Baileys Wetland, and clearing of vegetation outside the breeding bird season.

Follow-up and monitoring activities will include functional assessments and regulatory approval (Water Approval for Wetland Alteration) for wetlands proposed to be altered as a result of Project activities and a corresponding wetland compensation plan and monitoring program to ensure no net loss of wetland area or function as a result of Project activities on the Donkin Peninsula. In consideration of the proposed mitigation (including wetland compensation), the environmental effects on Wetlands are rated as not significant.

7.6 RARE PLANTS

The assessment of Rare Plants evaluates potential interactions between Project activities and vegetation, focusing on species or communities that are of conservation interest. No specific concerns have been raised by stakeholders with regard to effects of the Project on Rare Plants. Various plant surveys and habitat assessments have been conducted on the Donkin Peninsula and the proposed transmission line corridor between 2006 and 2011. One protected species (Eastern White Cedar (*Thuja occidentalis*)) was encountered along the transmission corridor. Thirteen additional species of conservation concern were recorded on the Donkin Peninsula and/or along the transmission line corridor. The analysis of this VEC focused on the potential Change in Rare Species and Uncommon Communities.

Project activities may directly disturb two species of conservation concern (Kalm's hawkweed (*Hieracium kalmii*) and Loesel's twayblade (*Liparis loeselii*)) but both are known to be associated with human-modified habitats and their long-term persistence is unlikely to be at risk from the Project. Furthermore, indirect effects to vegetation will be avoided through a number of mitigative measures including maintenance of hydrological conditions, treatment of wastewater from the mine discharge and surface runoff and implementation of erosion and sediment control plans.

Additional pre-disturbance surveys for rare plant species and uncommon communities on the Donkin Peninsula will be conducted prior to construction activities including focussed surveys in wetlands and surveys dedicated to species of conservation interest. In consideration of the proposed mitigation, the environmental effects on Rare Plants are rated as not significant.

7.7 FRESHWATER FISH AND FISH HABITAT

Freshwater Fish and Fish Habitat is assessed as a VEC because of potential interactions of the Project with freshwater systems and in recognition of the regulatory protection afforded by the *Fisheries Act*. With respect to stakeholder concerns, the main issue raised was potential effect on waterbodies and streams which are used for recreational fishing.

The environmental assessment of Freshwater Fish and Fish Habitat focused on two environmental effects: Change in Fish Habitat; and Change in Mortality Risk. Site preparation and construction activities have the potential to affect both of these although with the implementation of best management practices and industry standard mitigation, including erosion and sediment control, effects will be managed to acceptable levels. During operation and maintenance of the Project, coal waste disposal and water treatment activities will require mitigation to avoid sedimentation, coal waste deposition and acidification of fish and fish habitat. Coal waste disposal in the vicinity of Schooner Pond (Phase III coal waste pile) will result in the permanent alteration of fish habitat through the diversion of one stream and infilling of another. These effects will be mitigated through DFO-approved HADD compensation planning and implementation.

Follow-up and monitoring programs will be implemented in accordance with applicable permitting and will include benthic invertebrate, fish community, fish habitat, and water quality monitoring programs. In consideration of the proposed mitigation, the environmental effects on Freshwater Fish and Fish Habitat are rated as not significant.

7.8 MARINE ENVIRONMENT

The Marine Environment has been selected as a VEC based on interactions of the Project with marine fish and fish habitat, marine species at risk, regulatory protection of fish and fish habitat and species at risk, and the intrinsic connection to the local commercial fisheries and local communities. The Marine Environment VEC focuses on marine fish and fish habitat likely found within the waters surrounding the Donkin Peninsula. Consideration is also given to marine species at risk, and habitats of high productivity/ecological sensitivity.

During the stakeholder and public engagement process, the main issues raised by stakeholders related to the Marine Environment were potential effects on water quality, loss of habitat and effects of dust on the marine environment. Potential effects on the Marine Environment assessed in the EIS include a change in marine habitat and change in mortality risk as a result of the construction and ongoing operation of the barge load-out facility and transshipment mooring. Approximately 3.3 ha of marine habitat will be permanently lost during marine construction. This loss of fish habitat will require regulatory authorization and compensation under the *Fisheries Act*. The Project will prepare a Habitat Compensation Plan in consultation with DFO and local fishers to offset net loss of fish habitat. Habitat compensation concepts have been included in the EIS including a conceptual habitat compensation project whereby artificial rock reefs are constructed on sandy bottom habitats in Morien or Mira Bay to offset the rocky habitat lost from infilling for the barge load-out facility in Morien Bay. Additional options being considered include shoreline improvements, ghost trap and net retrieval, and restoration of abandoned sites.

During operation of the barge load-out facility an undetermined amount of product coal may be spilled and deposited in the Marine Environment through the loading and unloading processes at both the barge load-out facility and the transshipment mooring. It is not anticipated that any coal or coal dust deposited in the Marine Environment from the Project will have a direct environmental effect and increase the mortality risk or health of fish and invertebrates. Specific design and material handling procedures will be used to minimize loss of coal in the marine environment during handling and transport activities.

There will be localized mortality of benthic sessile organisms (*e.g.*, sea urchins, starfish, periwinkles) during construction of the barge load-out facility and the installation of the transshipment mooring. These types of species were noted to be abundant in the Project area, and the loss of these individuals is not expected to be a significant effect on local populations. Nevertheless, this loss of fish species will take place only after approval by DFO. No changes in mortality risk are anticipated during operation or reclamation and decommissioning. Vessels will

operate in accordance with applicable regulations to avoid marine pollution and will reduce speeds to reduce potential for strikes on marine mammals and sea turtles.

Follow-up and monitoring programs will be implemented in accordance with applicable permitting and will include a Fish Habitat Compensation Program, and marine sediment sampling and benthic habitat monitoring programs. In consideration of the proposed mitigation (including compensation), the environmental effects on the Marine Environment are rated as not significant.

7.9 COMMERCIAL AND RECREATIONAL FISHERIES

Commercial fisheries are important to the local and regional economy and traditions. This VEC includes assessment of commercial and recreational fisheries, with an emphasis on marine commercial fisheries. Ongoing consultation with local fishers, the Mi'kmaq of Nova Scotia, and DFO officials has identified concerns related to potential gear damage, and displacement of fishers as a result of marine-related Project activities. These issues could result in a Change in Net Income of Local Fishers which is the primary environmental effect for evaluation of this VEC. Other issues raised by these stakeholders include effects of Project construction on lobster and lobster habitat and marine deposition of coal dust.

Lobster is the predominant fishery in the area, although snow and rock crab, groundfish, mackerel and herring are also fished. Local fishers estimate that approximately 100 lobster fishing licenses are concentrated within the Glace Bay – Morien Bay – Mira Bay area, with approximately 38 fishers fishing out of Port Morien Harbour. The construction of the barge load-out facility will result in a loss of benthic habitat and suspension of sediments. Construction traffic could potentially interfere with fishing gear and restrict fishing vessel navigation and fishing in the vicinity of the barge load-out facility. The installation of the transshipment mooring will result in limited benthic disturbance and will pose a localized constraint to navigation.

Loss of fishing access during construction and operations will result in localized displacement of fishing activity, potentially resulting in increased pressure on other fishing locations to replace displaced activity. Increased vessel traffic during operations (*e.g.*, operation of barges, tugs, barge and bulk carrier vessels) will potentially create interference with fishing gear and fishing vessel navigation in the waters between the barge load-out facility and transshipment mooring.

Various mitigation measures will be implemented to reduce or eliminate potential adverse environmental effects on Commercial and Recreational Fisheries including ongoing consultation with local fishers and the establishment of a Fisheries Advisory Group. The Project will develop a compensation policy to appropriately address impacts attributable to Project activities with demonstrably affected fishers. Notices to Mariners and Notices to Shipping will be issued to inform other vessel operators of marine construction activities and navigational hazards. Loss of fish habitat will be authorized under the *Fisheries Act* and will involve a Habitat Compensation

Agreement which will create new habitat or improve existing habitat to ensure no net loss of fish habitat.

Formal follow-up and monitoring is yet to be proposed. The Project will continue to engage local fisheries in consultation as the Project progresses. In consideration of the proposed mitigation and ongoing planned consultation with fisheries, the environmental effects on Commercial and Recreational Fisheries are rated as not significant.

7.10 LAND USE

Land Use was selected as a VEC in consideration of potential Project-related interactions with current and anticipated land uses in the vicinity of the Project. Coal mining is an activity of historical and cultural importance to the region. There is a considerable amount of positive community interest in the development of the Donkin Mine with respect to employment and other economic benefits that would accrue.

XCDM currently owns approximately 99 percent of the land on the Donkin Peninsula. There are five residential properties located on Long Beach Road with the nearest residential receptor located approximately 150 m from the nearest future Project component (Phase III coal waste disposal pile). In addition to these residential properties, current land uses include mining and associated activities (associated with the current care and maintenance of the existing mine facilities), and recreational use. The peninsula is used regularly by locals for birdwatching, hiking, and recreational fishing. Public interest has been expressed with respect to the continued access to the Donkin Peninsula for informal recreational land use by community members.

Change in Land Use was assessed including consideration of use and enjoyment of adjacent residential properties, recreational land use, exclusion or promotion of development, and additional housing or community infrastructure that may be required to accommodate Project activities and worker requirements. The Project will directly enhance industrial land use on the Donkin Peninsula by improving and expanding existing infrastructure as well as indirectly enhance commercial, industrial and institutional land uses within CBRM from spin-off opportunities. Therefore there is predicted to be a positive effect on commercial, industrial and institutional land use. Adverse effects on residential and recreational land use due to noise and dust emissions, increased traffic and altered viewscape will be mitigated through noise and dust control, progressive development and reclamation of coal waste piles to minimize visual effects, and upgrades as necessary to the road transportation network. Public access to the peninsula for informal recreational purposes will be maintained along the coastal perimeter and terms of access will be developed by the Project in consultation with local users in consideration of safety and security requirements.

In consideration of the proposed mitigation, the environmental effects on Land Use are rated as not significant. A positive effect will occur with respect to enhanced industrial land use and

associated economic benefits from development of the coal resource. No formal follow-up and monitoring is proposed.

7.11 CURRENT USE OF LANDS AND RESOURCES FOR TRADITIONAL PURPOSES BY THE MI'KMAQ

The Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq is defined as lands and resources of specific social, cultural or spiritual value to the Mi'kmaq of Nova Scotia with a focus on current use of land and resources (including terrestrial, freshwater and marine resources) for traditional purposes. The Mi'kmaq of Nova Scotia are the holders of information about traditional and current hunting, trapping, fishing, gathering and other land and resource uses. During the Mi'kmaq engagement process the main issues raised included preparing a new MEKS, and developing training, employment procurement opportunities for Mi'kmaq people and firms. Other environmental issues raised during Mi'kmaq engagement, including wastewater treatment, tailings management, methane monitoring, and coal dust, have been addressed in the relevant VECs.

The analysis of this VEC focuses on a Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq and is based primarily on the results of the MEKS conducted by Membertou Geomatics Solutions (2012). The MEKS identified marine fishing as the primary traditional use activity that takes place in the local assessment area, followed by "brush picking".

A change in traditional Mi'kmaq land and resource use is attributable to direct and indirect disturbance/loss of terrestrial and marine land/water and resources, interference with Mi'kmaq fishing activity and access restrictions. However, with the implementation of proposed mitigation to protect biophysical resources and consideration of Mi'kmaq interests and traditional use activities throughout the planning process as well as during all Project activities, and reasonable accommodation for a demonstrable loss of access to traditional fishing grounds, the environmental effect of a Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq is rated as not significant. Ongoing engagement activities with local Mi'kmaq will provide feedback on the effectiveness of this mitigation and confirm effects prediction.

7.12 ARCHAEOLOGICAL AND HERITAGE RESOURCES

Archaeological and Heritage Resources are included as a VEC in this assessment in recognition of the interest of potentially affected First Nations, the general public and regulatory agencies ensuring the effective management of these resources. For the purpose of this assessment, archaeological and heritage resources are defined as any physical remnants found on top of and/or below the surface of the ground that inform us of past human use of and interaction with the physical environment.

During stakeholder consultations there were no specific issues raised with respect to archaeological and heritage resources, although the KMKNO requested to review the archaeological survey methods. XCDM has advised the KMKNO of the approach taken for the archaeological review and invited comment.

The analysis of this VEC involved review of previous archaeological resource impact assessments (ARIAs) undertaken on the peninsula and in the vicinity of the proposed transmission line corridor. A new ARIA, comprising archival review and review of marine benthic survey videos, was undertaken to address potential submerged archaeological resources at the location of the barge load-out facility and transshipment mooring. The ARIA concluded the potential for First Nations and historic submerged resources was low. Of greatest relevance is the presence of McDonald Farm (CbBw-01) (historic period) in the vicinity of the on-land conveyor system to the barge load-out facility. Proposed mitigation involves another ARIA to inventory and delineate the archaeological site at CbBw-01 relative to the conveyor infrastructure. The ARIA would also involve subsurface testing to determine the nature and extent of the archaeological resources. An ARIA is also proposed to update previous ARIAs conducted on the peninsula with emphasis on recording of evidence and limited shovel testing to confirm previous determination of low potential for archaeological resources. If during Project construction, operation and maintenance, or decommissioning and reclamation activities a suspected archaeological or heritage resource is encountered, an Archaeological Contingency Plan will be implemented which will specify that work will be stopped in the area of the discovery and the Heritage Division of Nova Scotia Department of Communities, Culture and Heritage and other relevant authorities will be contacted.

With the proposed mitigation, the residual environmental effect on Archaeological and Heritage Resources is rated as not significant.

8.0 Effects of the Environment on the Project

Environmental factors which could potentially affect the Project, resulting in an interruption of service or damage to infrastructure, or adverse effects to VECs include: climate effects (*e.g.*, extreme weather), tidal conditions, sea ice, climate change (*e.g.*, sea level rise), seismic events, and forest fire. All facility components and operations will be designed to relevant engineering codes and standards with the knowledge of potential environmental conditions on the site including extreme weather events as well as predicted parameters due to changing global climate. In particular it is understood that marine transportation operations are vulnerable to severe weather conditions, and operational schedules have been calculated to account for this. Therefore, it is concluded that the effects of the environment on the Project during any phase of the Project are not significant and will be managed primarily through engineering design and equipment selection (including marine vessels), operational planning (including contingency plans), facility maintenance and employee training.

9.0 Effects of Accidents or Malfunctions

Identification of worst probable case Project-related accident and malfunction scenarios were determined based on the EIS Guidelines and professional judgment of XCDM and the Stantec Study Team. The accidents/malfunctions with potential environmental effects considered in this assessment include:

- Land-based hazardous material spill (*e.g.*, fuel, oil, hydraulic fluid);
- Coal spill;
- Hydrocarbon spill in the marine environment;
- Marine vessel accident (no spill);
- Trucking accident;
- Failure of water controls; and
- Premature mine shutdown.

A preliminary screening was conducted on each VEC to determine if any of the potential accident scenarios as described in Section 6.1.1 of the EIS were likely to affect the VEC. Table 4 summarizes potential interactions of Project-related accidents and malfunctions with VECs.

Table 4 Potential Interactions of Project Related Accidents and Malfunctions with Valued Environmental Components

Accidents/Malfunctions	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	Archaeological and Heritage Resources
Land-based Hazardous Material Spill (*e.g.*, fuel, oil, hydraulic fluid)		✓	✓	✓	✓	✓					
Coal Spill			✓	✓	✓	✓	✓	✓		✓	
Hydrocarbon Spill in the Marine Environment	✓		✓				✓	✓		✓	
Marine Vessel Accident (no spill scenario)			✓				✓	✓		✓	
Trucking Accident									✓		

Table 4 Potential Interactions of Project Related Accidents and Malfunctions with Valued Environmental Components

Accidents/Malfunctions	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	Archaeological and Heritage Resources
Failure of Water Controls		✓	✓	✓	✓	✓	✓	✓		✓	
Premature Mine Shutdown									✓		

Stakeholder consultation identified general concerns about the management of accidental events on land and in the marine environment, with more emphasis on potential effects to fish habitat and commercial fisheries. XCDM's Emergency Response and Contingency Plan will be updated to address potential accident and malfunction scenarios associated with the Export Coking Coal Project and will address prevention, preparedness, response and recovery for the scenarios identified in Table 4.

Accidents and malfunctions are unplanned, infrequent and generally short-term in nature. 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 except in the extremely unlikely event of a vessel collision or grounding resulting in the release of a large amount of oil or fuel. In this unlikely event, effects to marine birds have the potential to be significant.

10.0 Effects on Capacity of Renewable Resources

CEAA requires that comprehensive study reports “address the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and the future”.

Renewable resources in the LAA that may be used to meet the needs of present and future generations include water resources, freshwater fish, and marine fish and use of other traditional resources by the Mi’kmaq. An adverse effect on these resources could result in a reduced capacity to provide drinking water resources, support sustainable fishing and other traditional uses.

After consideration of the Project’s design and mitigation measures (including habitat compensation), no significant adverse residual effects are considered likely for any of the renewable resource VECs. As there are no predicted significant adverse effects on any renewable resources that may be affected by the Project, the effects of the Project on the capacity of these renewable resources are not significant.

11.0 Cumulative Environmental Effects

11.1 APPROACH

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 the EIS and potential interaction with VECs are provided in Table 5.

Table 5 Scoping of Potential Cumulative Environmental Effects

Name of Project /Activity	Atmospheric Resources	Water Resources	Birds and Wildlife	Wetlands	Vegetation	Freshwater Fish and Fish Habitat	Marine Environment	Commercial and Recreational Fisheries	Land Use	Current Use of Lands by Mi'kmaq for Traditional Purposes	Archaeological and Heritage Resources
Historic Coal Mining and Remediation Activities (including Donkin Underground Exploration Project)		✓	✓	✓	✓	✓			✓	✓	✓
Historic and Ongoing Fishing Activity			✓			✓	✓			✓	✓
Lingan and Point Aconi Power Stations	✓										
Port of Sydney Dredging and Infilling							✓	✓	✓		✓
Maritime Link Project						✓	✓	✓	✓		✓
St. Anns Bank Area of Interest								✓			

11.2 CUMULATIVE EFFECTS SUMMARY

In general, the cumulative effects of other projects and activities with the Donkin Export Coking Coal Project were deemed to be low in magnitude, temporary, and not significant. Current and future activities are subject to regulatory approval processes and standard mitigation measures (including habitat compensation) which would limit adverse environmental effects. Greater potential exists for cumulative effects with past projects and activities which may not have been subject to the same regulatory requirements and have had a long lasting effect on the environment, influencing the baseline conditions for the Donkin Export Coking Coal Project. An example of this would be historic mining in the area (including the Donkin Peninsula) which has affected freshwater fish and fish habitat as well as terrestrial wildlife and habitats (including wetlands). There will be a cumulative environmental effect on the Marine Environment (change in fish habitat and fish mortality) between commercial fishing activity and construction of the marine infrastructure for the barge load-out facility. However the Project contribution to this environmental effect will be authorized under the *Fisheries Act* and loss of habitat will be compensated and the overall Project contribution to cumulative regional fish mortality and habitat change will be small.

In general, given the mitigation proposed for this Project which will prevent or minimize adverse environmental effects, cumulative environmental effects are predicted to be not significant for all VECs.

12.0 Follow-up Program

CEAA requires every comprehensive study of a project to include consideration of a follow-up program. A follow-up program is a program designed to verify the accuracy of the EIS predictions and determine the effectiveness of the measures implemented to mitigate the adverse environmental effects of the Project. Follow-up programs generally include environmental effects monitoring (EEM) but can also include environmental compliance monitoring (ECM) which involves monitoring of activities to confirm compliance with all regulatory requirements and self-imposed environmental commitments.

In addition to verification of environmental effects prediction and effectiveness of mitigation measures, a follow-up program is also used to support the implementation of adaptive management measures to address unanticipated adverse environmental effects and support environmental management systems.

The EIS for the Donkin Export Coking Coal Project proposes follow-up and monitoring programs as summarized in Table 6.

Table 6 Summary of Follow-up and Monitoring Programs

VEC	Follow-up and Monitoring Program
Atmospheric Resources	• Particulate monitoring program • Sound pressure level monitoring program • Annual monitoring of GHG emissions and reporting
Water Resources	• Continuation of existing surface and groundwater monitoring program • Pre-disturbance well survey • Monitoring of shallow groundwater network relative to Phase III coal waste disposal pile development and reclamation
Birds and Wildlife	• Monitoring of Northern Head seabird colony • Post-construction bird monitoring program developed in consultation with the CWS, based on final design details. • Breeding bird surveys in Phase III coal waste disposal area • Bird mortality monitoring at lighted structures
Wetlands	• Wetland compensation plan and monitoring of compensation project • Functional analyses (including plant and wildlife surveys) of wetlands affected by the Project (*e.g.,* Baileys Wetland) • Vegetation monitoring within wetlands on Donkin Peninsula for indirect hydrological effects
Rare Plants	• Rare plant and uncommon community surveys within Baileys Wetland and other wetlands proposed for direct alteration • Vegetation monitoring within wetlands on Donkin Peninsula for indirect hydrological effects • Compensation for loss of wetland habitat
Freshwater Fish and Fish Habitat	• Benthic invertebrate and fish habitat monitoring program • Fish community survey • Water quality monitoring program • Fish habitat compensation project and associated monitoring

Table 6 Summary of Follow-up and Monitoring Programs

VEC	Follow-up and Monitoring Program
Marine Environment	• Marine sediment sampling • Marine benthic habitat monitoring to monitor recolonization • Marine fish habitat compensation plan and associated monitoring
Commercial and Recreational Fisheries	• N/A
Land Use	• N/A
Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq	• See relevant biophysical VECs above
Archaeological and Heritage Resources	• New ARIAs conducted at mine site and CbBW-01 (McDonald Farm)

13.0 Benefits to Canadians

In addition to meeting regulatory requirements, this EA process has resulted in various benefits to Canadians including the local community, interested stakeholders, and the Mi'kmaq of Nova Scotia. XCDM and the Project planning process have also derived benefit from the EA process toward development of a more inclusive and environmentally sustainable project. In particular, the EA process has created opportunities to maximize environmental and social benefits, and has increased scientific knowledge and technological awareness. Table 7 summarises examples of how the EA process has benefitted Canadians through various means.

Table 7 Benefits to Canadians

Factors of EA Process Providing Benefits to Canadians	Specific Examples
Contribution to the concept of sustainable development	Environmental and socio-economic considerations taken into account for Project design to maximize Project return on investment while reducing environmental effects
Maximized environmental benefits	Environmental effects considered in analysis of Project alternatives and future detailed design (*e.g.*, coal waste disposal options)
Public participation	Allowed for identification of issues and mitigation as well as exchange of information Stakeholder consultation has influenced Project design (*e.g.*, due to concerns re: local trucking, product will be stockpiled until marine transportation facilities are operational)
Technological innovation/awareness	Disposal of coal waste and rock, and methane management require technological innovation which could result in knowledge transfer
Increases in scientific knowledge	Improvement in knowledge of biophysical, socio-economic and traditional Mi'kmaq resources on the Donkin Peninsula as a result of EA studies
Community and social benefits	Ongoing involvement with Community Liaison Committee; Continued access to Donkin Peninsula for informal recreation

In summary, the EA process for the Donkin Export Coking Coal Project has and will continue to shape Project planning. This is resulting in a more sustainable Project which will not only create local social and economic benefits but will ultimately benefit other Canadians on a larger scale through technological innovation and advances in scientific knowledge.

14.0 Overall Conclusions of the Proponent

With the implementation of the proposed mitigation measures, adverse residual environmental effects of routine Project activities are predicted to be not significant 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.

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 the scale of the Donkin Export Coking Coal Project. The Project is particularly important for Cape Breton, given the need for high quality opportunities to generate employment and income for communities to prosper. 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 sustainable, and economically beneficial to the Project and society alike.

APPENDIX A
Residual Effects Summary Matrices

Table A1 Summary of Project Residual Environmental Effects: Atmospheric Resources

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Air Quality										
Construction	• Dust suppression program. • Covered conveyor and transfer points. • Equipment maintenance program. • Particulate monitoring plan. • Rain Bird-type dust suppression system at open coal stockpiles. • Dust hoods on radial stackers. • Dust collection system at transfer point from overland conveyor to barge stacker. • Misting sprays at outlet of raw and product coal conveyors. • Stockpile design to minimize risk of spontaneous combustion. • Covered trucks (if coal trucking required). • Use of barges with movable covers or higher coamings around cargo to control dust and protect coal cargo. • Good management practices and sound operator training to reduce operator error and promote careful cargo loading.	A	M	L	ST	S	R	D	N	• Particulate monitoring program for Project construction and operation as per likely conditions of approval.
Operation and Maintenance		A	M	L	LT	C	R	D	N	
Decommissioning and Reclamation		A	M	L	ST	S	R	D	N	

Table A1 Summary of Project Residual Environmental Effects: Atmospheric Resources

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Acoustic Environment										
Construction	• Use of mufflers on all applicable equipment. • Limit construction activities to daytime. • Use of blast mats. • Enclosed conveyor and transfer points. • Enclosure of all coal washing activities in CHPP building. • Adherence to equipment maintenance programs. • Maintaining a vegetation buffer between the Project and the nearest residents. • Limit activity occurring in disposal sites (dozers) to daytime. • If coal trucking required, speed limits applied and truck hauling during daytime hours.	A	L	L	ST	R	R	D	N	• Sound pressure level monitoring during construction and operation and maintenance as per likely conditions of approval.
Operation and Maintenance		A	M	L	LT	C	R	D	N	
Decommissioning and Reclamation		A	L	L	ST	R	R	D	N	
Change in GHG Emissions										
Construction	• Implementation of GHG Management Plan, assuming capture and oxidation of methane gas from mine.	A	L	G	ST	R	R	D	N	• Annual monitoring of GHG emissions and reporting to Environment Canada.
Operation and Maintenance		A	L	G	LT	C	R	D	N	
Decommissioning and Reclamation		A	L	G	ST	R	R	D	N	

Table A1 Summary of Project Residual Environmental Effects: Atmospheric Resources

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Positive: condition of the Atmospheric Resources is improving in comparison to baseline conditions and trends

A Adverse: condition of the Atmospheric Resources is worsening in comparison to baseline conditions and trends

N Neutral: no change in the condition of the Atmospheric Resources compared to baseline conditions and trends

Magnitude:

L Low: effect occurs that is detectable but is within normal variability of baseline conditions (for GHG emissions < 10^5)

M Moderate: effect occurs that would cause an increase with regard to baseline but is within regulatory limits and objectives (for GHG emissions >10^5 <10^6)

H High: effect occurs that would singly or as a substantial contribution in combination with other sources cause exceedances of objectives or standards beyond the Project boundaries (for GHG emissions > 10^6)

N Negligible: no measurable adverse effect anticipated

Geographic Extent:

S Site: effect restricted to the PDA

L Local: effect restricted to the LAA

G Provincial, National and Global (GHG Emissions only)

Duration:

ST Short term: effect occurs for less than three years

MT Medium term: effect occurs for between 3 and 20 years

LT Long term: effect persists beyond 20 years

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs at sporadic intervals

R Rarely: effect occurs on a regular basis and at regular intervals

C Frequently: effect occurs continuously throughout the Project life

Reversibility:

R Reversible: effect ceases when Project operations cease

I Irreversible: effect continues after Project operations cease

Environmental Context:

U Undisturbed: effect takes place within an area that is relatively or not adversely affected by human activity

D Disturbed: effect takes place within an area with human activity. Area has been substantially previously disturbed by human development or human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A2 Summary of Project Residual Environmental Effects: Water Resources

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Surface Water Resources										
Construction	• Erosion and sedimentation controls, and collection of active yard runoff for direction to the passive treatment system. • Collection of all water pumped from the tunnels, with direction to the passive treatment system. • Collection of active yard runoff for direction to the passive treatment system.	N	L	S	MT	R	R	D	N	• Continuation of existing monthly and semi-annual monitoring program.
Operation and Maintenance	• Truck wash system in the active yard. • Collection (piles are lined) of precipitation infiltration through the coal piles and coal waste disposal piles, with direction to the active treatment system. • Re-direction of a portion of the actively treated water, once the west coal waste disposal pile (Phase III) is constructed, in order to replace the volume of surface water flowing into Baileys Wetland.	N	L	L	LT	C	R	D	N	• Continuation of existing monthly and semi-annual monitoring program.
Decommissioning and Reclamation	• Capping of coal waste disposal piles to minimize volumes of water in contact with coal waste.	A	L	L	P	C	R	D	N	

Table A2 Summary of Project Residual Environmental Effects: Water Resources

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Groundwater Resources										
Construction	None required.	N	L	S	MT	S	R	D	N	• Continuation of existing monthly and semi-annual groundwater monitoring program.
Operation and Maintenance	• Replacement of any domestic wells that are affected, *i.e.* caused by a drop in the groundwater level available.	A	H	L	LT	C	R	D	N	• Continuation of existing monthly and semi-annual monitoring program. • Pre-disturbance well survey will be conducted to identify all domestic wells within the RAA, that might be affected. • Installation of a shallow groundwater monitoring network between the west coal waste disposal pile, and monitoring prior to the installation of the pile, to provide pre-disturbance data. • Monitoring of the shallow groundwater network after disposal starts at the west coal waste disposal pile (Phase III), to determine whether there are any effects, particularly with respect to Baileys Wetland.

Table A2 Summary of Project Residual Environmental Effects: Water Resources

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Decommissioning and Reclamation	• Placement of impermeable caps on the coal waste piles, to reduce or eliminate infiltration.	N	L	L	P	C	R	D	N	• Monitoring of the shallow groundwater network after capping to confirm that conditions return to 'background'.

KEY

Direction:

P Positive: condition is improving compared to baseline water quality and quantity

A Adverse: negative change compared to baseline water quality and quantity

N Neutral: no change compared to baseline water quality and quantity

Magnitude:

L Low: affecting the available quantity or quality of water resources in the shallow or deep aquifer, at levels that are indiscernible from natural variation

M Moderate: limiting the available quantity or quality of water resources, such that these resources are occasionally rendered unusable to current users for periods up to two weeks at a time

H High: limiting the available quantity and quality of water resources, such that these resources are rendered unusable or unavailable for current users during the life of the Project or for future generations beyond the life of the Project

Geographic Extent:

S Site: effects restricted to habitat within the PDA

L Local: effects extend beyond Project footprint but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: measurable for less than one month

MT Medium term: measurable for more than one month but less than two years

LT Long term: measurable for the life of the Project

P Permanent: effects are permanent

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs more than once at irregular intervals

R Regular: effect occurs on a regular basis and at regular intervals

C Continuous: effect occurs continuously

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed: effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A3 Summary of Project Residual Environmental Effects: Birds and Wildlife

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Wildlife Habitat										
Construction	• Establish a corridor of undisturbed habitat at least 150 m wide around the periphery of the Donkin Peninsula. • The corridor for the coal conveyor will be as narrow as safely possible. • Clear coal waste disposal areas only when and as required. • Minimize damage to wetland habitat along the transmission line route. • Establish and maintain a setback on the seaward and landward side of the Northern Head seabird colony along the shoreline. • Noisy or startling activities such as cutting the cliff face will be scheduled outside of the sensitive seabird colony establishment period (early April to late May) to the extent practical.	A	M	L	LT	F	I	D	N	• Monitor the abundance and distribution of seabirds at the Northern Head seabird colony to determine the efficacy of the setbacks around the colony. • A post-construction bird monitoring program will be developed in consultation with the CWS, based on final design details.

Table A3 Summary of Project Residual Environmental Effects: Birds and Wildlife

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Operation and Maintenance	• Site specific mitigation at Phase III coal waste disposal area developed in consultation with CWS and NSDNR if Canada Warbler, Olive-sided Flycatcher or other Species at Risk are confirmed breeding there. • Final design of Phase III coal waste disposal area to reduce loss of interior forest habitat on the Donkin Peninsula if possible. • Maintain connectivity of terrestrial habitats around the margin of the Donkin Peninsula. • Progressive development reclamation of coal waste disposal areas. • Vegetation maintenance on the transmission line RoW scheduled to avoid breeding season for most birds (April 1 to August 15).	A	M	L	LT	F	I	D	N	• Conduct breeding bird surveys in the Phase III waste coal disposal area.
Decommissioning and Reclamation		A	M	L	MT	O	R	D	N	

Table A3 Summary of Project Residual Environmental Effects: Birds and Wildlife

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Mortality Risk										
Construction	• Schedule clearing outside of the breeding season for most birds (April 1 to August 15). • Establish setbacks around ground nesting species if required (mid-April-August). • Store food waste in appropriate receptacles and train employees and contractors regarding wildlife encounters.	A	L	S	MT	R	R	D	N	
Operation and Maintenance	• Train workers to recognize potential ground nesting birds and establish setbacks if required. • Site lighting design to minimize light spill over and attraction to birds.	A	M	L	LT	R	R	D	N	• Monitor structures where light attraction may occur to determine if any mortality events occur.

Table A3 Summary of Project Residual Environmental Effects: Birds and Wildlife

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Decommissioning and Reclamation	• Minimize lag time between retirement of buildings or structures and their disassembly. • Keep retired buildings closed to discourage colonization by wildlife. • Disassemble buildings and structures outside of the breeding season for most birds (April 1 to August 15). Alternatively, inspect buildings or structures just before disassembly to ensure compliance with *Migratory Birds Convention Act*. Also contact relevant authorities prior to site decommissioning (e.g., CWS). • Minimize lag time between completion of coal waste deposition and commencement of reclamation. • Conduct reclamation activities likely to interfere with birds outside of the breeding season for most bird species (April 1 to August 15). Otherwise perform nest surveys and limit activities until nests are no longer occupied.	A	L	S	ST	O	R	D	N	

Table A3 Summary of Project Residual Environmental Effects: Birds and Wildlife

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Positive: condition is improving compared to baseline habitat or population status

N Neutral: no change compared to baseline habitat or population status

A Adverse: negative change compared to baseline habitat or population status

Magnitude:

L Low: effect is detectable but only on a few individuals

M Moderate: effect on many individuals

H High: effect occurs at the population level

N Negligible**:** no measurable adverse effects anticipated

Geographic Extent:

S Site: effects restricted to habitat within the PDA

L Local: effects extend beyond Project footprint but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: measurable for less than one month

MT Medium term: measurable for more than one month but less than two years

LT Long term: measurable for the life of the Project

Frequency:

O Once: effect occurs once

R Rarely: effect occurs monthly

F Frequently: effect occurs daily

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed: effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A4 Summary of Project Residual Environmental Effects: Wetlands

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Wetland Area or Function										
Construction	• Compensation for loss of wetland habitat. • Avoid placing power poles within wetlands along transmission line, where possible. • Avoid operation of machinery in wetlands along transmission line, where possible. • Vegetation clearing to be performed outside the breeding bird season. • Implementation of erosion and sediment control procedures. • Adherence to "Environmental Protection Procedures for Transmission and Distribution Facilities" (NSPI 2009) during construction of the transmission line.	A	M	L	LT	O	I	D	N	• Develop wetland compensation plan in consultation with NSE and NSDNR. • Field surveys to obtain more information on the functional attributes of wetlands which are likely to be disturbed by the Project (*e.g.*, Baileys Wetland), including plant and wildlife surveys • Monitoring to confirm the extent and location of direct effects to wetlands (*i.e.*, infilling) on the Donkin Peninsula for both site infrastructure and waste rock disposal. • Vegetation monitoring within wetlands of the Donkin Peninsula which have potential for indirect hydrological effects. • Communication with NSPI regarding occurrence of wetlands along the transmission line route. • Monitoring of wetland compensation project

Table A4 Summary of Project Residual Environmental Effects: Wetlands

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Operation and Maintenance	• Maintenance of hydrological connectivity to Baileys Wetland through final selection of coal waste pile locations and/or construction of channels. • Treatment of wastewater from mine discharge and surface runoff. • Salt management procedures for site roadways. • Adherence to "Environmental Protection Procedures for Transmission and Distribution Facilities" (NSPI 2009) during maintenance of the transmission line.	A	H	L	LT	R	I/R	D	N	
Decommissioning and Reclamation	• Implementation of the Mine Closure and Reclamation Plan. • Use of seed mixtures free of noxious weeds and use of native species (where available) during site reclamation.	A	L	L	LT	O	I	D	N	

Table A4 Summary of Project Residual Environmental Effects: Wetlands

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Positive: condition is improving compared to baseline habitat or ecosystem quality

A Adverse: negative change compared to baseline habitat or ecosystem quality

N Neutral: no change compared to baseline habitat or ecosystem quality

Magnitude:

L Low: <5% of wetland area within the LAA disturbed or indirectly influenced

M Moderate: 5 - 20% of wetland area within the LAA disturbed or indirectly influenced

H High: >20% of wetland area within the LAA disturbed or indirectly influenced

N Negligible: no direct or indirect loss of wetland area or function

Geographic Extent:

S Site: effects restricted to habitat within the PDA

L Local: effects extend beyond PDA but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: measurable for less than one month

MT Medium term: measurable for more than one month but less than two years

LT Long term: measurable for the life of the Project

Frequency:

O Once: effect occurs once

R Rarely: effect occurs occasionally (*e.g.*, monthly)

F Frequently: effect occurs regularly (*e.g.*, daily)

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project

Environmental Context:

U Undisturbed: effect takes place within an area that is relatively unaffected by human developments or disturbances

D Disturbed: effect takes place within an area that has been substantially influenced by human developments and disturbances

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A5 Summary of Project Residual Environmental Effects: Rare Plants

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Rare Species and Uncommon Communities										
Construction	• Avoidance of direct effects to habitats known to support rare plants on Donkin Peninsula (*i.e.*, coastal barrens). • Compensation for loss of wetland habitat. • Avoidance of rare plants along transmission line. • Implementation of erosion and sediment control procedures.	A	M	S	LT	O	I	D	N	• Rare plant and uncommon community surveys within Baileys Wetland and other wetlands which are proposed for direct effects by the Project (including directed surveys for southern twayblade). • Vegetation monitoring within wetlands which have potential for indirect hydrological effects. • Communication with NSPI regarding occurrence of rare plants along the transmission line route and recommend rare plant survey along the portion of the abandoned transmission RoW which has not yet been surveyed. • Compensation for loss of wetland habitat.

Table A5 Summary of Project Residual Environmental Effects: Rare Plants

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Operation and Maintenance	• Maintenance of hydrological connectivity to Baileys Wetland through final selection of coal waste pile locations and/or construction of channels. • Treatment of wastewater from mine discharge and surface runoff. • Salt management procedures for site roadways. • Avoidance of disturbance to rare plants along transmission line during vegetation management.	A	M	S	LT	R	I/R	D	N	
Decommissioning and Reclamation	• Use of seed mixtures free of noxious weeds and use of native species (where available) during site reclamation.	A	L	S	LT	O	I	D	N	

Table A5 Summary of Project Residual Environmental Effects: Rare Plants

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Improvement compared to baseline status

N No change compared to baseline status

A Negative change compared to baseline status

Magnitude:

L Low: alteration to vegetation within the LAA but no influence on the distribution and abundance of rare plant species or unique communities

M Moderate: alteration to rare plant populations or the distribution of uncommon plant communities, but no loss of rare plant species or unique communities from the LAA

H High: alterations that result in the loss of a rare plant species or uncommon community from the LAA

Geographic Extent:

S Site: effects restricted to habitat within the PDA

L Local: effects extend beyond Project footprint but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short-term: measurable for less than one month

MT Medium-term: measurable for more than one month but less than two years

LT Long-term: measurable for the life of the Project

Frequency:

O Once: effect occurs once

R Rarely: effect occurs occasionally (*e.g.*, monthly)

F Frequently: effect occurs regularly (*e.g.*, daily)

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project

Environmental Context:

U Undisturbed: : effect takes place within an area that is relatively unaffected by human developments or disturbances

D Disturbed: effect takes place within an area that has been substantially influenced by human developments and disturbances

Significance:

S Significant

N Not Significant

Table A6 Summary of Project Residual Environmental Effects: Freshwater Fish and Fish Habitat

Project Phase	Mitigation/ Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Fish Habitat										
Operation and Maintenance (Water treatment (including mine water and surface runoff))	• Avoidance of Streams 1 and A. • No unnecessary unauthorized activities within 30 m buffer around watercourses. • Sediment and erosion control planning. • Impermeable liner under waste rock disposal piles. • Water treatment system to capture and contain site and disposal pile runoff; system will avoid direct interaction with all natural watercourses. • Water treatment system will neutralize acid waters from operations. • HADD compensation.	A	L	S	LT	C	R	U	N	Schooner Pond LAA Watercourses: • Benthic invertebrate monitoring program (quantitative including enumeration and identification of benthic macroinvertebrates). • Fish habitat monitoring program (including *in situ* water quality and detailed physical habitat assessment). • Water quality monitoring program (including TSS). HADD Compensation: • Fish habitat monitoring program testing productivity within the HADD compensation project area against reference site(s).
Operation and Maintenance (Coal waste disposal: stream in-filling and diversion)		A	L	S	P	C	I	U	N	
Operation and Maintenance (Coal waste rock disposal: all activities other than stream in-filling and diversion)		A	L	S	LT	O	R	U	N	
Change in Fish Mortality Risk										
Operation and Maintenance (Water treatment (including mine water and surface runoff))	• Watercourse alterations will be completed in the dry. • Fish salvage will be completed within alteration areas. • Watercourse alterations will	A	L	S	LT	C	R	U	N	Schooner Pond LAA Watercourses: • Fish community survey (qualitative, non-destructive; including *in situ* water quality).
Operation and Maintenance (Coal and waste rock disposal: stream in-filling and diversion)		A	L	S	ST	O	R	U	N	

Table A6 Summary of Project Residual Environmental Effects: Freshwater Fish and Fish Habitat

Project Phase	Mitigation/ Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Operation and Maintenance (Coal and waste rock disposal: all activities other than stream in-filling and diversion)	avoid spawning periods of sensitive freshwater fish groups (*i.e.*, salmonids) unless authorized. Water treatment system will neutralize acid waters from operations. • Sediment and erosion control plan will be implemented. • Dust-control measures will prevent liberation of waste rock disposal pile dust.	A	L	S	LT	C	R	U	N	HADD Compensation: • Fish community study (quantitative, non-destructive; including *in situ* water quality and reference site fish surveys)

Table A6 Summary of Project Residual Environmental Effects: Freshwater Fish and Fish Habitat

Project Phase	Mitigation/ Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Positive: condition is improving compared to baseline habitat quality or population status

A Adverse: negative change compared to baseline habitat quality or population status

N Neutral: no change compared to baseline habitat quality or population status

Magnitude:

L Low: measurable effects to habitat function anticipated in low-sensitivity habitats and no measurable reduction in number of any fish species anticipated

M Moderate: measurable effects to habitat function anticipated in moderately sensitive habitats or anticipated mortality risk to non-listed species

H High: measurable effects to habitat function anticipated in highly sensitive habitat or habitat designated as important for listed species or anticipated mortality risk to listed species

N Negligible: no measurable adverse effects anticipated

Geographic Extent:

S Site: effects restricted to habitat within the PDA

L Local: effects extend beyond Project footprint but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: effects are measurable for days to a few months

MT Medium term: effects are measurable for many months to two years

LT Long term: effects are measurable for multiple years but are not permanent

P Permanent: effects are permanent

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs more than once at irregular intervals

R Regular: effect occur on a regular basis and at regular intervals

C Continuous: effect occurs continuously

Reversibility:

R Reversible: effect will cease during or after the Project is complete

I Irreversible: effect will persist after the life of the Project, even after habitat restoration and compensation works

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed: effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A7 Summary of Project Residual Environmental Effects: Marine Environment

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Marine Habitat										
Construction	• Geotechnical/Engineering investigations for barge load-out facility construction methods to reduce the quantity of materials placed in the marine environment (*i.e.*, marine footprint). • Authorization of HADD and fish habitat compensation project to offset the net loss of productive capacity due to the footprint of the barge load-out facility. • Barges will have appropriate freeboard design and efficient material handling to reduce product losses to the environment (*i.e.*, no barge overloading, avoiding transiting in high sea states). • Project vessels will comply with all applicable legislation, codes and standards of practice for shipping, including the *Ballast Water Control and Management Regulations* under the *Shipping Act* to reduce risk of introduction of marine invasive species. • The contractor will be required to use fill material for the breakwater to be free of fines, debris and any substances that would be deleterious to the marine environment.	A	L	L	P	O	R	U	N	• Marine Sediment Sampling Program to monitor sediment chemistry in the PDA during initial stages of operation. • Marine Benthic Habitat Program to monitor colonization by marine benthic organisms of subtidal marine infrastructure during initial stages of operation, including fish habitat compensation project.

Table A7 Summary of Project Residual Environmental Effects: Marine Environment

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Operation and Maintenance	• Vessels will travel at reduced speeds near the barge load-out facility, the transshipment facility and points between which will reduce underwater noise.	A	L	L	LT	R	R	D	N	
Change in Mortality Risk										
Construction	• Geotechnical/Engineering investigations into barge load-out facility construction methods to reduce the quantity of materials placed in the marine environment (*i.e.*, marine footprint). • The contractor will be required to use fill material for the breakwater to be free of fines, debris and any substances that would be deleterious to the marine environment. • Compliance with stipulations in in the *Fisheries Act* authorizations for HADD and Section 32 approval.	A	M	S	ST	O	I	U	N	
Operation and Maintenance	• Vessels will travel at reduced speeds near the barge load-out facility, the transhipment facility and points between which will reduce potential for strikes on marine mammals and marine reptiles.	A	L	S	LT	R	I	D	N	

Table A7 Summary of Project Residual Environmental Effects: Marine Environment

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Positive: condition is improving compared to baseline habitat quality or population status

N Neutral: no change compared to baseline habitat quality or population status

A Adverse: negative change compared to baseline habitat quality or population status

Magnitude:

L Low: measurable effects to habitat function anticipated in low-sensitivity habitats and no measurable reduction in number of any marine species anticipated

M Moderate: measurable effects to habitat function anticipated in moderately sensitive habitats or anticipated mortality risk to non-listed species

H High: measurable effects to habitat function anticipated in highly sensitive habitat or habitat designated as important for listed species or anticipated mortality risk to listed species

Geographic Extent:

S Site: effects restricted to habitat within the PDA

L Local: effects extend beyond PDA but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: effects are measurable for days to a few months

MT Medium term: effects are measurable for many months to two years

LT Long term: effects are measurable for multiple years but are not permanent

P Permanent: effects are permanent

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs more than once at irregular intervals

R Regular: effect occurs on a regular basis and at regular intervals

C Continuous: effect occurs continuously

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed: effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A8 Summary of Project Residual Environmental Effects: Commercial and Recreational Fisheries

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change to Net Income of Local Commercial Fishers										
Construction	• HADD Authorization and habitat compensation program. • Regulatory compliance for shipping operations including proper navigation markings. • Ongoing liaison with local fishers and Fisheries Advisory Group. • Compensation for loss and/or damage to fishing gear. • Reasonable accommodation for lost access.	A	L	L	MT	R	R	D	N	• Monitoring as required for habitat compensation plan. • The Project will continue to liaise with local fishers and develop reasonable accommodation measures to mitigate gear damage / loss and loss of access.
Operation and Maintenance		A	L	L	LT	R	R	D	N	
Decommissioning and Reclamation		A	L	L	MT/P	O	R	D	N	

Table A8 Summary of Project Residual Environmental Effects: Commercial and Recreational Fisheries

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Positive

A Adverse

Magnitude:

L Low: 10% or less change in net income of commercial fishers operating within the LAA

M Moderate: from 10-50% change in net income of commercial fishers operation within the LAA

H High: greater than 50% change in net income of commercial fishers operating within the LAA

N Negligible: no measurable adverse effects anticipated

Geographic Extent:

S Site : effects restricted to habitat within the PDA

L Local: effects extend beyond Project footprint but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: effects are measurable for days to a few months

MT Medium term: effects are measurable for many months to two years

LT Long term: effects are measurable for multiple years but are not permanent

P Permanent: effects will be permanent

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs more than once at irregular intervals

R Regular: effect occurs on a regular basis and at regular intervals

C Continuous: effect occurs continuously

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation works

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed: effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A9 Summary of Project Residual Environmental Effects: Land Use

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Land Use										
Construction	• Acoustic and dust mitigation measures (refer to Table A1). • Traffic mitigation. • NSPI transmission line standards. • Develop terms for public access to peninsula based on consultation with recreation users. Signage and fencing and public communication as required to protect public safety. • Implementation of MCRP.	A/P	M	L/R	MT	C	R	D	N	• No follow-up or monitoring proposed.
Operation and Maintenance		A/P	M	L/R	LT	C	I	D	N	
Decommissioning and Reclamation		A/P	L	L	P	C	I	D	N	

Table A9 Summary of Project Residual Environmental Effects: Land Use

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		

KEY

Direction:

P Positive

A Adverse

Magnitude:

L Low: specific group, residence or neighbourhood affected such that adjacent land use activities may be disrupted/enhanced for a short period of time

M Moderate: part of a community affected such that adjacent land use activities will be disrupted/enhanced such that current activities cannot continue (or will be enhanced) for extended period of time longer than two years

H High: community affected such that adjacent land use activities will be disrupted/enhanced such that current activities cannot continue(or will be enhanced) for extended periods of time longer than two years and are not compensated for

Geographic Extent:

S Site: effects restricted to within the PDA

L Local: effects extend beyond the Project Development Area but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: effects are measurable for days to a few months

MT Medium term: effects are measurable for many months to two years

LT Long term: effects are measurable for multiple years but are not permanent

P Permanent: effects are permanent

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs more than once at irregular intervals

R Regular: effect occurs on a regular basis and at regular intervals

C Continuous: effect occurs continuously

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation works

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed**:** effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A10 Summary of Project Residual Environmental Effects: Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq										
Construction	• As recommended in the 2012 Project-specific MEKS report, "the traditional use activities of the Mi'kmaq [will] be reflected upon in the overall environmental presentation and any remediation or Project work [will] consider the interest the Mi'kmaq have in the area" (MGS 2012). • As recommended in the previous MEKS for the Donkin underground exploration project, future operations of the Donkin coal mine will be brought to the Mi'kmaq leadership for discussion (MGS 2006). • Mitigation and compensation measures associated with the following VECs will be implemented: – Birds and Wildlife; – Wetlands; – Rare Plants; – Freshwater Fish and Fish Habitat;	A	M	S/L	ST/ LT	O	R/P	U / D	N	• Recommended follow-up and monitoring associated with the following VECs will be implemented: - Birds and Wildlife (EIS Section 5.3); - Wetlands (EIS Section 5.4); - Rare Plants (EIS Section 5.5); - Freshwater Fish and Fish Habitat (EIS Section 5.6); - Marine Environment (EIS Section 5.7); - Commercial and Recreational Fisheries (EIS Section 5.8); - Land Use (EIS Section 5.9); and - Archaeological and Heritage Resources (EIS Section 5.11).
Operation and Maintenance		A	M	S/L	LT	O/C	R	D	N	
Decommissioning and Reclamation		A	N	S	P	O	R	D	N	

Table A10 Summary of Project Residual Environmental Effects: Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Project Phase	Mitigation/Compensation Measures	Direction	Residual Environmental Effects Characteristics						Significance	Recommended Follow-up and Monitoring
			Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context		
	− Marine Environment; − Commercial and Recreational Fisheries; − Land Use; and − Archaeological and Heritage Resources.									

KEY

Direction:

P Positive: condition is improving compared to baseline status

A Adverse: negative change compared to baseline status

N Neutral: no change compared to baseline status

Magnitude:

N Negligible: no measurable adverse effects anticipated

L Low: no net loss in the availability of or access to land and/or resources currently used for traditional purposes by the Mi'kmaq

M Moderate: a nominal loss, or substantive loss that is compensated, in the availability of or access to land and/or resources currently used for traditional purposes by the Mi'kmaq

H High: a non-compensated substantive and permanent loss in the availability of or access to land and/or resources currently used for traditional purposes by the Mi'kmaq

Geographic Extent:

S Site: effects restricted to within the PDA

L Local: effects extend beyond Project footprint but remain within the LAA

R Regional: effects extend into the RAA

Duration:

ST Short term: effects are measurable for days to a few months

MT Medium term: effects are measurable for many months to two years

LT Long term: effects are measurable for multiple years but not permanent

P Permanent: effects are permanent

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs more than once at irregular intervals

R Regular: effect occurs on a regular basis and at regular intervals

C Continuous: effect occurs continuously

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation works

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed: effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant

Table A11 Summary of Project Residual Environmental Effects: Archaeological and Heritage Resources

Project Phase	Mitigation/ Compensation Measures	Residual Environmental Effects Characteristics								Recommended Follow-up and Monitoring
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context	Significance	
Changes to Archaeological and Heritage Resources										
Construction	• ARIA of mine site LAA to confirm low archaeological potential. • ARIA of terrestrial barge load-out facility with the emphasis on CbBw-01 (McDonald Farm). • Archaeological Contingency Plan (including notification of relevant authorities).	A/P	M	S	P	O	I	D	N	• New ARIAs to be conducted at mine site and CbBw-01 (McDonald Farm).
Operation and Maintenance		A	N	S	ST	O	I	D	N	
Decommissioning and Reclamation		A	N	S	ST	O	I	D	N	

Table A11 Summary of Project Residual Environmental Effects: Archaeological and Heritage Resources

Project Phase	Mitigation/ Compensation Measures	Residual Environmental Effects Characteristics							Recommended Follow-up and Monitoring
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Environmental Context	Significance	

KEY

Direction:

P Positive

A Adverse

Magnitude:

L Low: no measurable adverse effects anticipated

M Moderate: mitigated disturbance to, or removal of, an archaeological or heritage resource

H High: unmitigated disturbance to, or destruction of an archaeological or heritage resource considered to be of major importance

N Negligible: no interaction anticipated

Geographic Extent:

S Site: effects restricted to area within the PDA

L Local: effects extend beyond Project footprint but remain within the local assessment area (*e.g.*, 1-10 km^2)

R Regional: effects extend into the regional assessment area (*e.g.*, 11-100 km^2)

Duration:

ST Short term: effects are measurable for days to a few months

MT Medium term: effects are measurable for many months to two years

LT Long term: effects are measurable for multiple years but are not permanent

P Permanent: effects are permanent

Frequency:

O Once: effect occurs once

S Sporadic: effect occurs more than once at irregular intervals

R Regular: effect occurs on a regular basis and at regular intervals

C Continuous: effects are continuous

Reversibility:

R Reversible: effects will cease during or after the Project is complete

I Irreversible: effects will persist after the life of the Project

Environmental Context:

U Undisturbed: effect takes place in an area that has not been adversely affected by human development

D Disturbed: effect takes place in an area that has been previously adversely affected by human development or in an area where human development is still present

N/A Not Applicable

Significance:

S Significant

N Not Significant