

ENVIRONMENTAL IMPACT STATEMENT FOR THE DONKIN EXPORT COKING COAL PROJECT
ENVIRONMENTAL EFFECTS ASSESSMENT

In summary, Project and cumulative residual environmental effects on the Marine Environment from a change in marine habitat or a change in mortality risk are predicted to be not significant.

5.7.7 Follow-up and Monitoring

The following monitoring programs will be designed and implemented according to applicable permitting, regulations and scientific methods with input from local regulators, notably DFO and EC.

- A Marine Sediment Sampling Program to monitor the sediment chemistry within the PDA during the initial stages of operation. This would confirm EA prediction of spillage of coal and coal dust. Continuation of this monitoring would be based on the initial monitoring results.
- A Marine Benthic Habitat Monitoring Program to monitor the colonization by marine benthic organisms of the intertidal and subtidal marine infrastructure, and specifically the breakwater, during initial stages of operation.
- A Marine Benthic Habitat Monitoring Program to monitor the biological activity surrounding the HADD fish habitat compensation project to document viability of artificial habitats. This program will likely be run concurrently with the program to monitor the colonization of the subtidal marine infrastructure.

5.8 COMMERCIAL AND RECREATIONAL FISHERIES

Commercial fisheries are important to the local and regional economy and traditions. The marine components of the Project will interact with local inshore fisheries around the Donkin Peninsula and into Mira Bay. Commercial and recreational fisheries is considered a VEC due to interactions with the Project, regulatory protection of fish and fish habitat, the importance of the fishery to the region, and stakeholder concerns. The EIS Guidelines require the EIS to address potential Project interactions with inshore commercial fisheries and aquaculture.

The assessment of Commercial and Recreational Fisheries considers potential routine Project interactions with local commercial and recreational fisheries, with a focus on interactions of marine construction and operations with local inshore commercial fisheries. Due to limited interaction with recreational fisheries (according to stakeholder accounts, there is no organized recreational fishery in the marine environment, some angling occurs in freshwater systems in the community), the VEC will focus on marine commercial fisheries.

This VEC is closely linked to the assessment of Marine Environment (Section 5.7) and Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq of Nova Scotia (Section 5.10). Potential biological effects on marine commercial fish species and freshwater fish species are addressed in Marine Environment (Section 5.7) and Freshwater Fish and Fish Habitat (Section 5.6), respectively.

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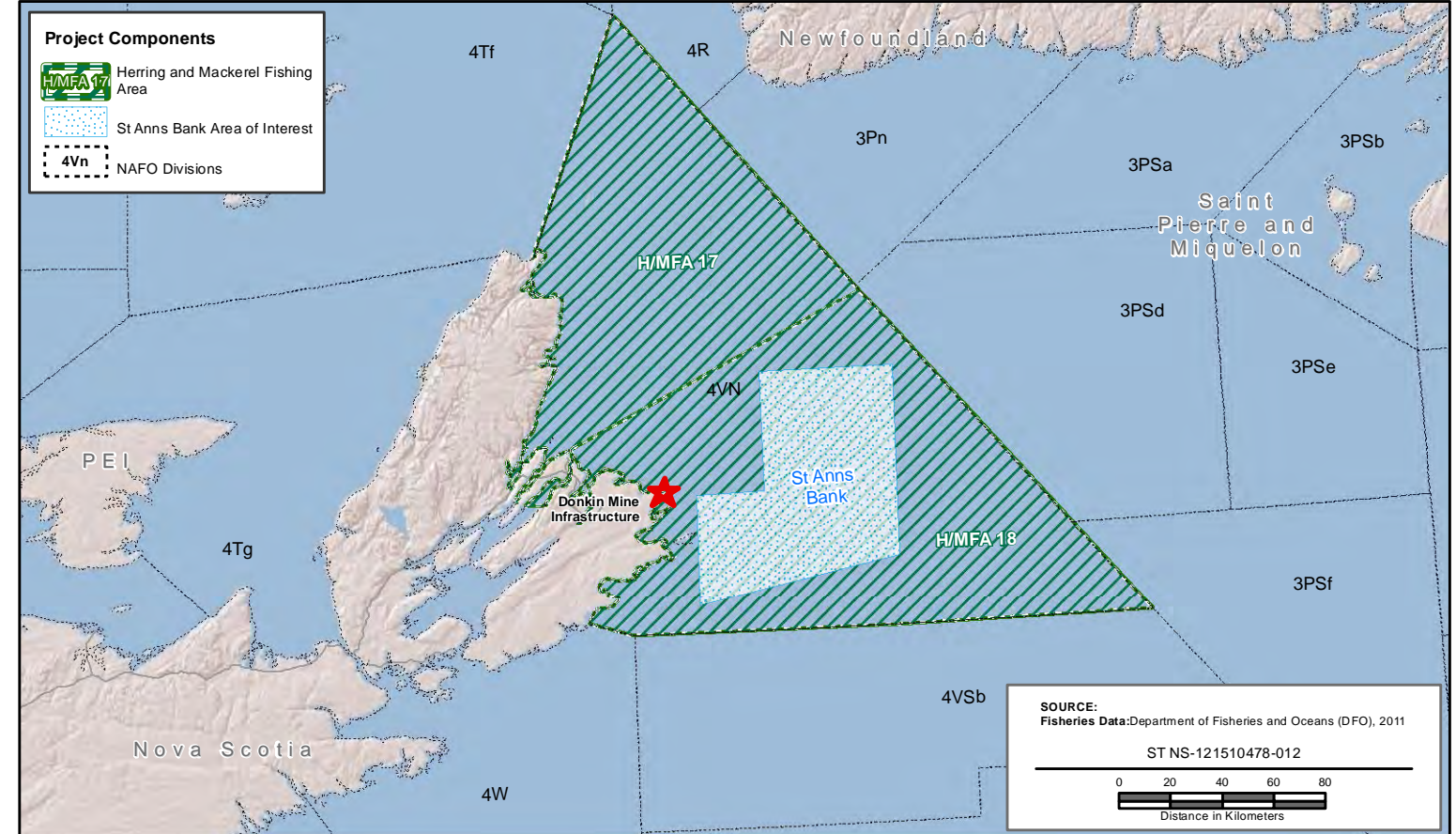
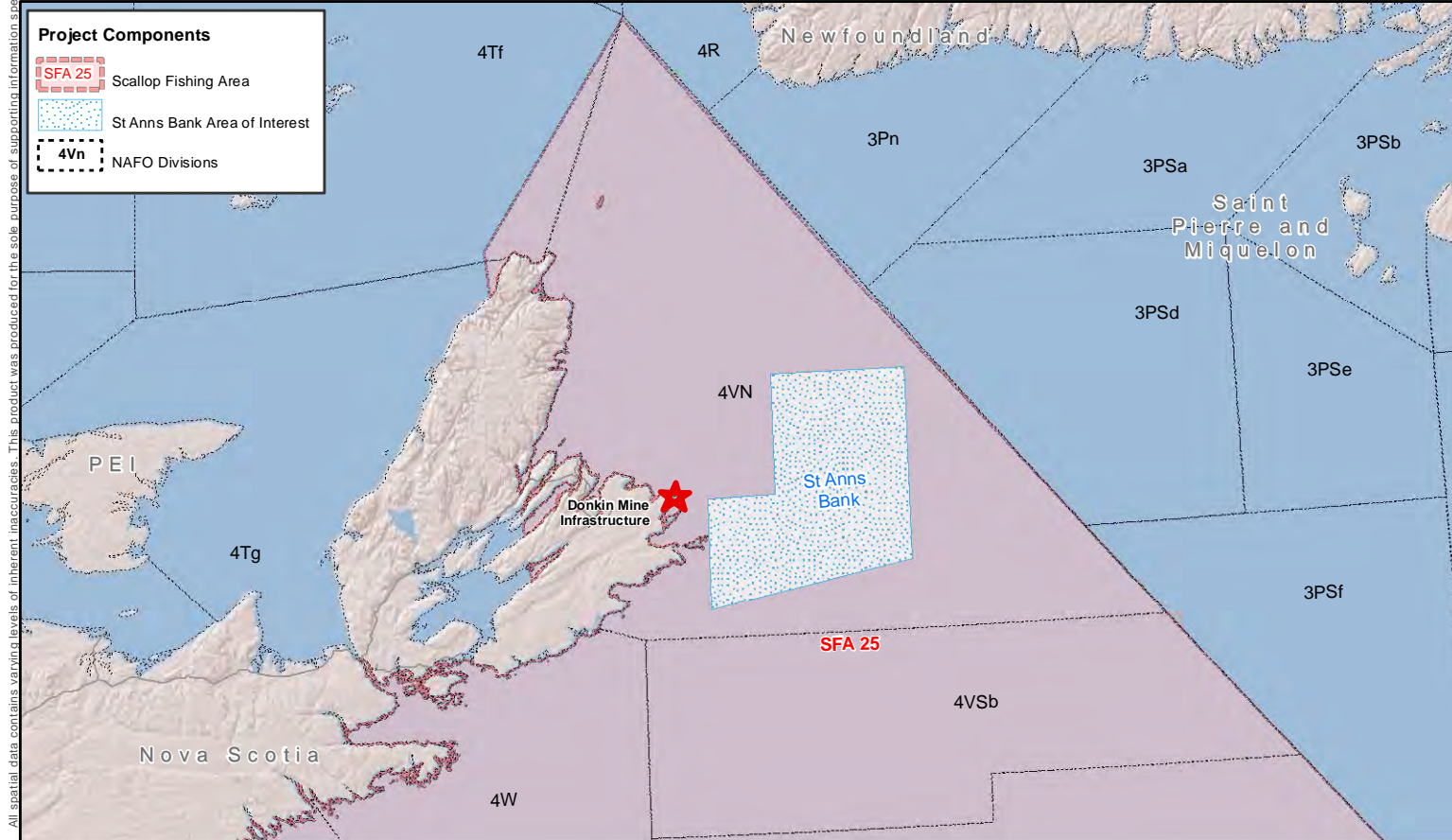
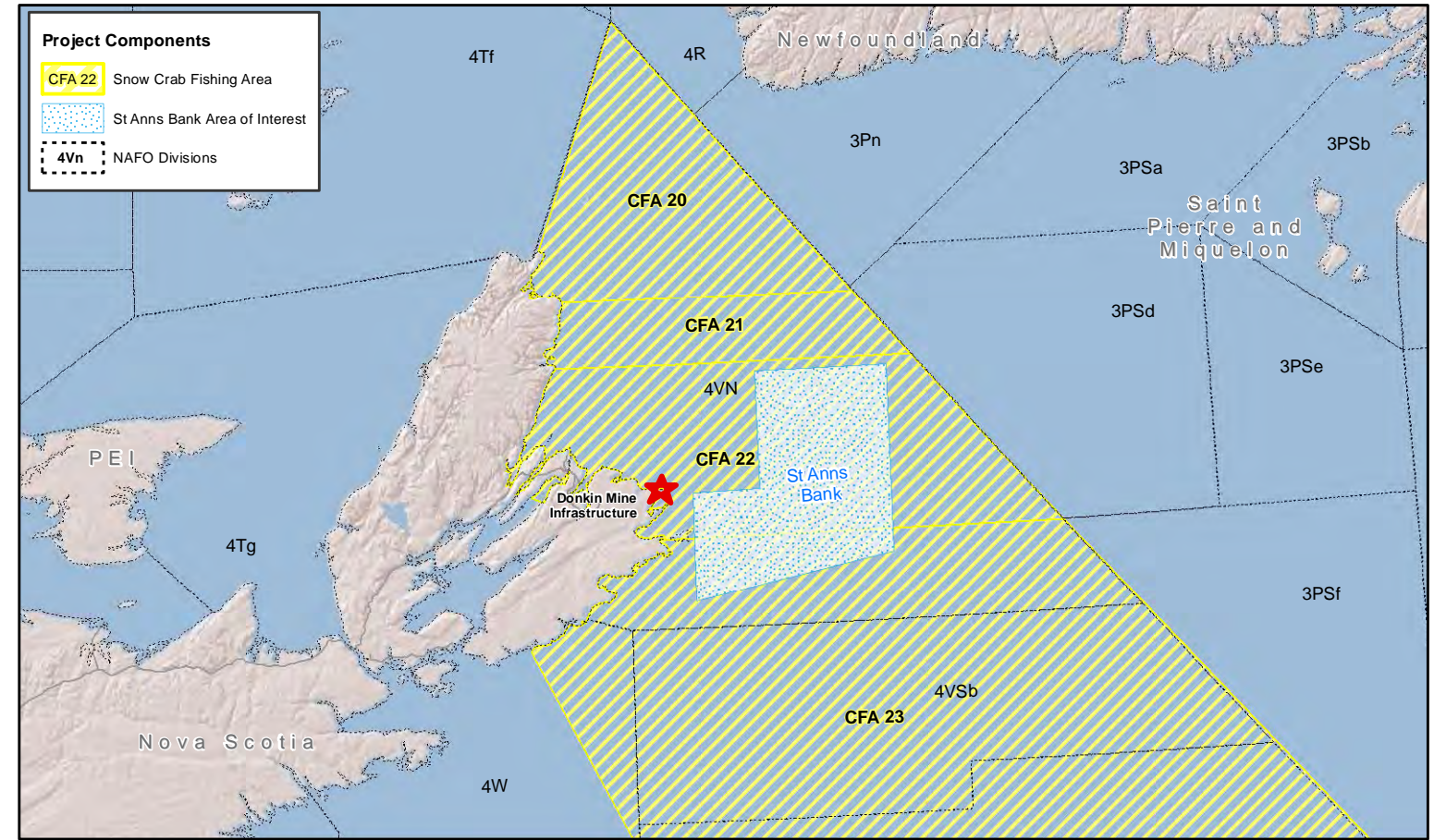
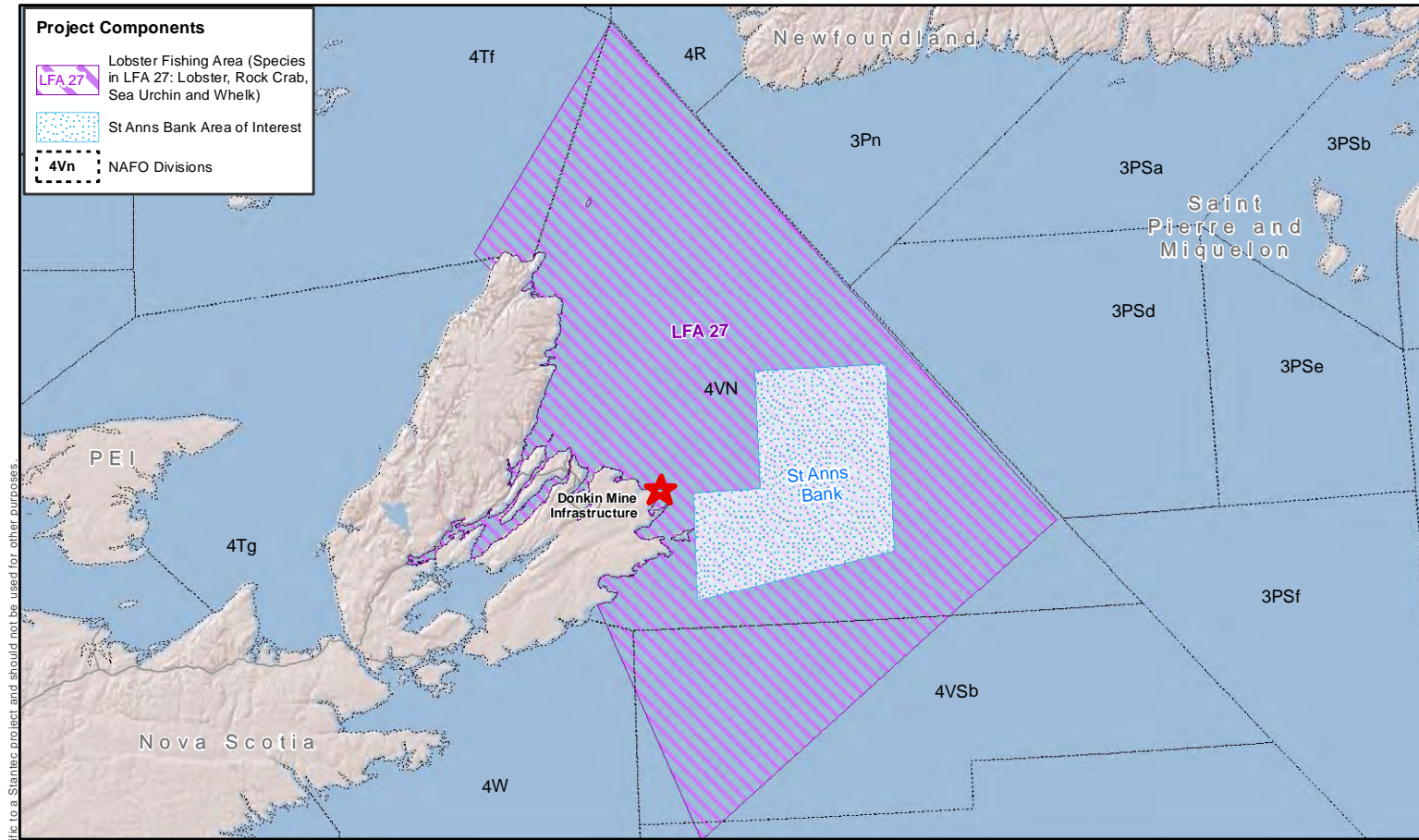
5.8.1 Scope of Assessment**5.8.1.1 Regulatory Setting**

The marine environment within the assessment area is located within Northwest Atlantic Fisheries Organization (NAFO) Division 4Vn. Within the boundaries of 4Vn, lie Lobster Fishing Area (LFA) 27 and Snow Crab Fishing Areas (CFA) 21 and 22 (refer to Figure 5.8.1). Provisions under the *Fisheries Act* protect fish and fish habitat including fisheries resources. Specific regulations under the *Fisheries Act* provide for specific regulation of fishery resources. The Maritime Provinces Fishery Regulations govern fishing activity in inland and adjacent tidal waters of the provinces of Nova Scotia, New Brunswick and Prince Edward Island. The Atlantic Fishery Regulations, 1985 provide for the management and allocation of fishery resources off the Atlantic coast of Canada. The administration of aquaculture, sea plant harvesting, seafood processing and recreational fisheries in the province is provided by the *Fisheries and Coastal Resources Act*.

Fish resources are protected by area closures, fishing quotas, fishing seasons and gear and vessel restrictions including, in the case of the lobster fishery, a maximum number of traps permitted per licensed fisher (275). Other broad mechanisms for the protection of marine resources are provided in the federal *Oceans Act*.

5.8.1.2 Influence of Consultation and Engagement on the Assessment

As the Donkin Export Coking Coal Project has evolved to include a marine component, there has been ongoing consultation with local fishers and DFO officials. Key issues of concern raised during these consultations include potential gear damage and displacement of fishers as a result of Project activities. These issues may result in a change in net income of local fishers which is the focus of this VEC analysis. Other issues raised included effects associated with accidental events (e.g., spill) and effects of construction on lobster and lobster habitat. These issues are addressed in Sections 6 and 5.7, respectively. Ongoing liaison with local fishers will be an integral part of the Project moving forward through Project planning, regulatory approvals and throughout the life of the Project.



SOURCE:
Fisheries Data: Department of Fisheries and Oceans (DFO), 2011

ST NS-121510478-012

0 20 40 60 80
Distance in Kilometers

PREPARED BY:
M Huskins-Shupe

REVIEWED BY:
H. Giddens

CLIENT:
xstrata
COAL

Donkin Export Coking Coal Project

Commercial Fisheries Administrative Boundaries

FIGURE NO.:
5.8.1

DATE:
Apr 26, 2012

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5.8.1.3 Selection of Environmental Effects and Measurable Parameters

The environmental assessment of Commercial and Recreational Fisheries is focused on a Change in Net Income of Local Commercial Fishers. Project interactions with the local fishery could potentially result in a change in net catch (e.g., due to change in resource availability) or change in operating costs, both of which could affect net income of local fishers. As noted above and described in Section 5.2.2, there is limited recreational fisheries in the LAA, therefore the emphasis for this assessment is the effect on commercial fisheries.

The measurable parameters used for the assessment and rationale for selection is provided in Table 5.8.1.

Table 5.8.1 Measurable Parameters for Commercial and Recreational Fisheries

Environmental Effect	Measurable Parameter	Rationale for Selection of the Measurable Parameter
Change to Net Income of Local Commercial Fishers	<ul style="list-style-type: none"> • Change in resource availability (e.g., fish mortality and/or dispersion of stocks) • Increased operating costs as a result of the Project • Change in available fishing area where currently fished • Potential conflict with fishing activities 	<p>The placement of marine infrastructure may change the current fishing area that is available. This may result in a change in catch (e.g., through less fishable area) or a change in operating costs (e.g., increase in fuel costs and opportunity cost of labour to travel to other fishing areas) and displace fishers potentially putting pressure on other areas for exploitation. Interference with fishing gear, navigation restrictions and constricted vessel movements can also increase operating costs.</p> <p>A change in resource availability may also be related to dispersion of fish stocks as a result of construction noise and vibration and/or fish mortality.</p>

5.8.1.4 Temporal and Spatial Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on commercial and recreational fisheries include the periods of construction, operation and maintenance, and decommissioning and reclamation.

Within a given year, effects on fisheries are most likely to occur within the regulated fishing seasons. Table 5.8.2 lists the key commercial fisheries and regulated seasons.

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Table 5.8.2 Licensed Seasons for Commercial Fisheries in the Regional Assessment Area

Species	Area Location	License Season
Lobster	LFA 27	May 15 – July 15
Rock Crab	LFA 27,29,30	August 15 – December 31
Herring	Herring Fishing Areas 17-21	January 1 – December 31
Mackerel	Mackerel Fishing Areas 17-21	January 1 – December 31
Snow Crab	CFA 20-22	April 16-May 14 July 23-September 30
Scallops	SFA 29	September 15 – end of December
Whelk	LFA 27, 29, 30	September 15 – December 30
Sea Urchin	LFA 27	September – January

L. Penny, DFO, pers. comm. 2011

The spatial boundaries for the environmental effects assessment of Commercial and Recreational Fisheries are defined below.

Project Development Area (PDA): The PDA includes the area of physical disturbance (*i.e.*, “footprint” for the Project including the barge load-out facility and transshipment mooring and vessel route between the two.

Local Assessment Area (LAA): For Commercial and Recreational Fisheries, the LAA is defined as the nearshore waters around the Donkin Peninsula from Morien Bay to the transshipment area in Mira Bay.

Regional Assessment Area (RAA): The RAA includes the marine waters within administrative boundaries of 4Vn and LFA 27.

5.8.1.5 Residual Environmental Effects Description Criteria

CEAA has presented a series of characteristics that can be used to describe environmental effects. Terms that will be used to characterize residual environmental effects for Commercial and Recreational Fisheries are presented in Table 5.8.3.

Table 5.8.3 Characterization Criteria for Residual Environmental Effects on Commercial and Recreational Fisheries

Criterion	Description
Direction	<p>Positive: condition is improving compared to net income of commercial fishers operating within the LAA</p> <p>Neutral: no change compared to net income of commercial fishers operating within the LAA</p> <p>Adverse: negative change compared to net income of commercial fishers operating within the LAA</p>

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Table 5.8.3 Characterization Criteria for Residual Environmental Effects on Commercial and Recreational Fisheries

Criterion	Description
Magnitude	<p>Negligible: no measurable adverse effects anticipated</p> <p>Low: 10% or less change in net income of commercial fishers operation within the LAA</p> <p>Moderate: from 10-50% change in net income of commercial fishers operating within the LAA</p> <p>High: greater than 50% change in net income of commercial fishers operating within the LAA</p>
Geographical Extent	<p>Site-specific: effects restricted to habitat within the Project Development Area (PDA)</p> <p>Local: effects extend beyond PDA but remain within the LAA</p> <p>Regional: effects extend into the RAA</p>
Frequency	<p>Once: effect occurs once</p> <p>Sporadic: effect occurs more than once at irregular intervals</p> <p>Regular: effect occurs on a regular basis and at regular intervals</p> <p>Continuous: effect occurs continuously</p>
Duration	<p>Short-term: effects are measurable for days to a few months</p> <p>Medium-term: effects are measurable for many months to two years</p> <p>Long-term: effects are measurable for multiple years but are not permanent</p> <p>Permanent: effects are permanent</p>
Reversibility	<p>Reversible: effects will cease during or after the Project is complete</p> <p>Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation works</p>
Ecological Context	<p>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</p> <p>Undisturbed: effect takes place in an area that has not been adversely affected by human development</p>

5.8.1.6 Threshold for Determining the Significance of Residual Environmental Effects

A **significant adverse residual environmental effect** on Commercial and Recreational Fisheries is defined as a Project-related environmental effect that results in an unmitigated or non-accommodated net financial loss to commercial fisheries as a result of the Project. This may consist of a residual environmental effect that alters commercial fishing activities to an extent that results in the following and cannot be mitigated or reasonably accommodated:

- Fisheries license holders being displaced or unable to use the areas traditionally or currently fished for all or most of a fishing season (or more); and/or
- Fisheries license holders experiencing a demonstrated net income loss from fishing activities due to Project-related environmental effects for one year or more.

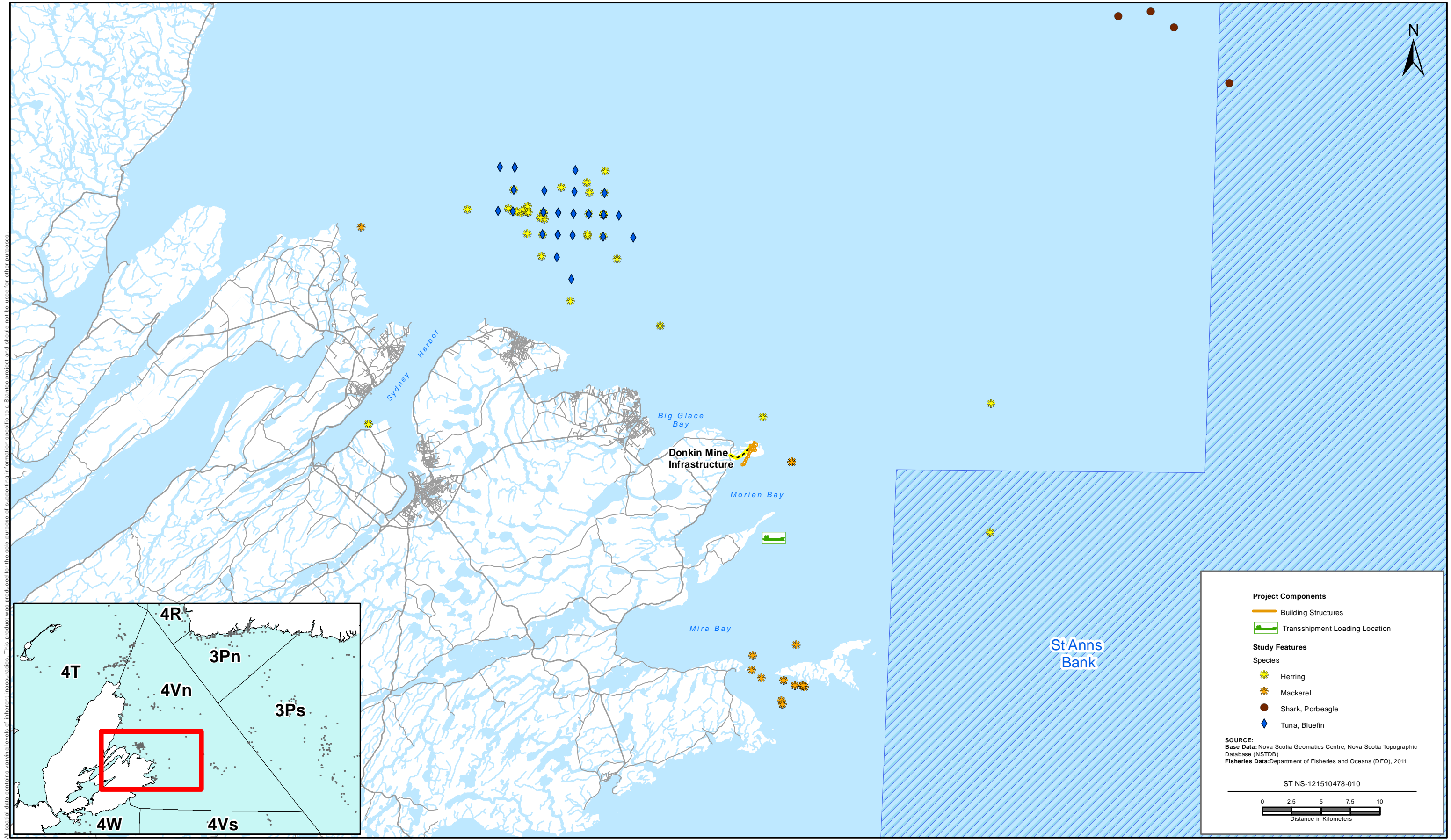
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Mitigation can include provision of compensatory habitat for the commercial species and fishing activities affected by the Project. Reasonable accommodation for loss of access to fishing grounds would be negotiated in good faith between the Project and demonstrably affected fishers.

5.8.2 Existing Conditions

Marine waters surrounding the Donkin Peninsula are known as Sydney Bight which extends from Cape North to Gabarus/Forchu (near Scatarie Island). Sydney Bight lies within the Northwest Atlantic Fisheries Organization (NAFO) Division 4Vn. Within the boundaries of 4Vn, lie Lobster Fishing Area (LFA) 27 and Snow Crab Fishing Areas (CFA) 21 and 22 (refer to Figure 5.8.1). Lobster is the predominant fishery in the area; however snow and rock crab, groundfish, mackerel and herring are also fished. A description of the habitat in the LAA, including suitability for commercial species is provided in Section 5.7.2.

Catch data for Unit Area 4Vn obtained from DFO's Statistical Services in Ottawa lists multi-year landings (in weight) from 2005 to 2010 (Table 5.8.4). These data are based on landings reported to DFO by license holders. Landed values are also included for the 2010 catch data (the most recent year available at the time of writing). Figures 5.8.2-5.8.4 show the distribution of catches by location for pelagic (Figure 5.8.2), groundfish (Figure 5.8.3) and invertebrates (Figure 5.8.4) in the Local Assessment Area (LAA) between 2005 and 2010. These figures are based on data obtained from DFO for all of Unit 4Vn, although as shown on the mapping, only a portion of 4Vn nearest to the PDA is depicted (whereas the data tables and mapping insets contain the data in its entirety). The figures indicate that the majority of fishing effort for most species is outside the LAA. However, geographical coordinates are not recorded for lobster catches; therefore lobster fishing locations are not depicted on Figure 5.8.4. Based on consultations with local fishers and DFO and the results of an aerial survey (Figure 5.7.7), it is assumed that all coastal areas in the LAA are exploited for lobster.



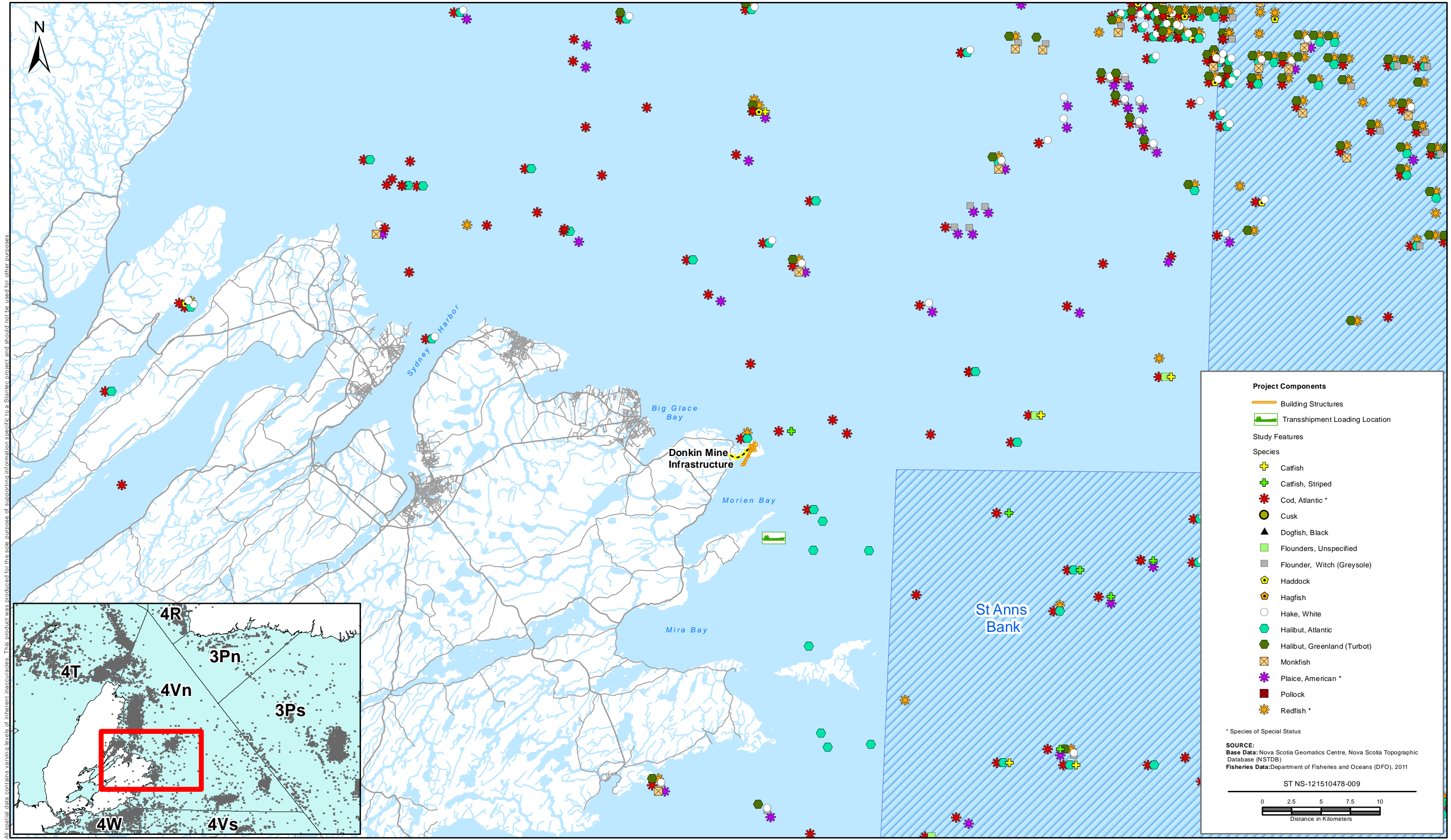
All spatial data contains varying levels of inherent inaccuracies. This product was produced for the sole purpose of supporting information specific to a Stantec project and should not be used for other purposes.

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

Donkin Export Coking Coal Project

Pelagic Fisheries Effort in 4Vn, 2005-2010

FIGURE NO.: 5.8.2
DATE: Apr 24, 2012



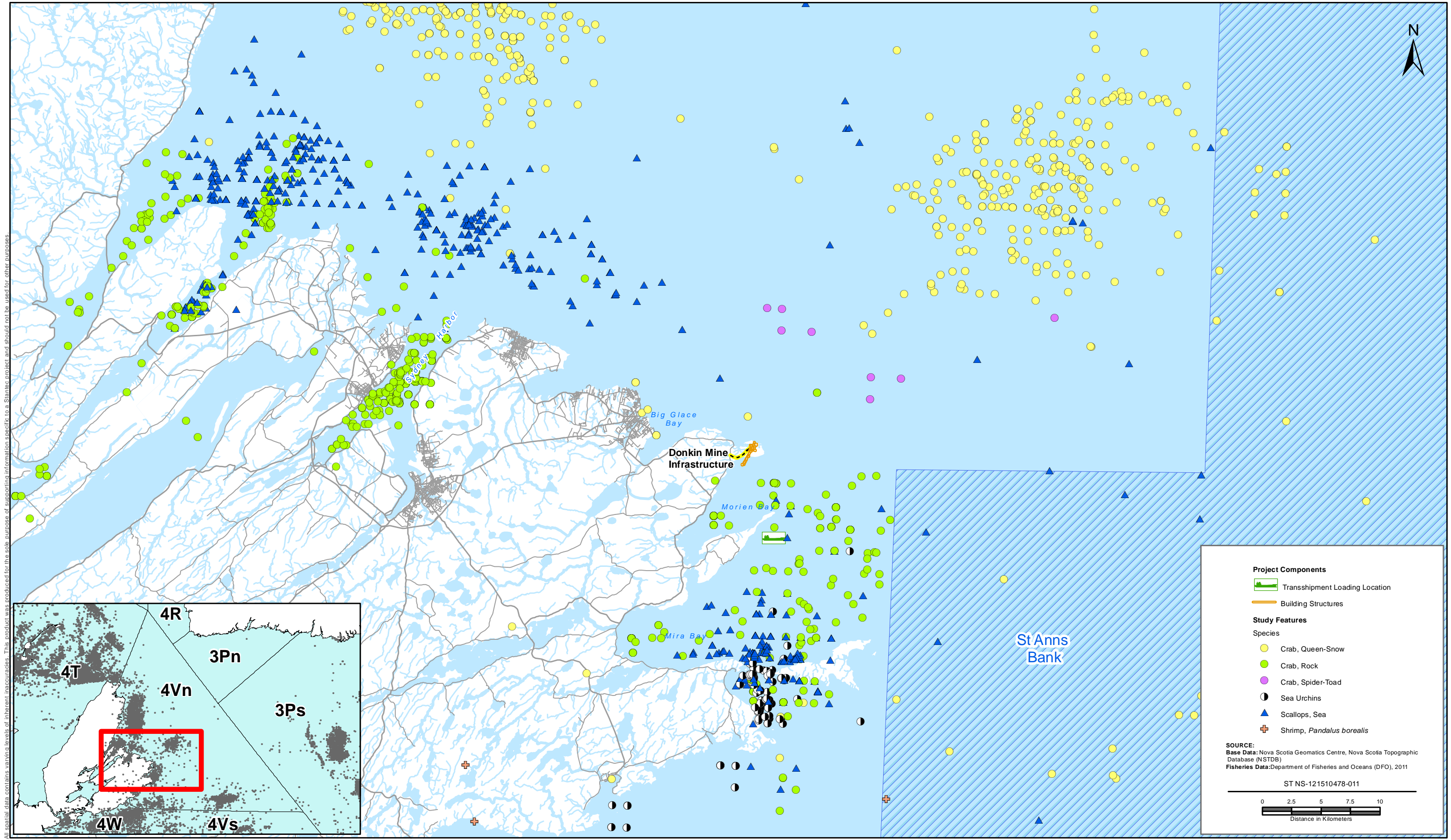
All spatial data contains varying levels of inherent inaccuracies. This product was produced for the sole purpose of supporting information specific to a Stantec project and should not be used for other purposes.

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

Donkin Export Coking Coal Project

Groundfish Fisheries Effort in 4Vn, 2005-2010

FIGURE NO: 5.8.3
DATE: Apr 24, 2012



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

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

Donkin Export Coking Coal Project
Invertebrate Fisheries Effort in 4Vn, 2005-2010
 (excluding Lobster Fishing Effort)

FIGURE NO: 5.8.4
DATE: Apr 24, 2012

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Table 5.8.4 Species Caught in 4Vn, 2005-2010

Species	Year Landed Weight (kg)						2010 Value (\$) (rounded to nearest dollar)
	2005	2006	2007	2008	2009	2010	
Groundfish Landings							
American Plaice	16,356	22,302	15,278	6,448	3,194	1,381	\$1,665
Atlantic Halibut	43,679	40,993	45,601	55,312	78,252	66,903	\$690,390
Catfish	180	94	87				
Cod	243,147	228,637	169,982	129,088	34,513	24,199	\$51,704
Cusk	56	103	16	11	23	496	\$510
Dogfish	7,322				1	183	N/A
Flounder, unspecified	46	775	70		100		
Greysole-Witch Flounder	31,679	262,863	284,452	190,180	74,428	106,538	\$157,041
Groundfish, unspecified			28				
Haddock	1,250	4,099	179	302	508	308	\$440
Hagfish		1,014	590	1,165		1,451	\$473
Monkfish	2,691	2,303	2,796	1,069	931	910	\$1,314
Pollock	141	37	100	47	2096	279	\$246
Redfish	612,389	545,168	523,621	609,087	864,299	648,641	\$442,399
Sculpin		14					
Silver Hake		8					
Skate	92		1,942				
Striped Catfish				176	35	90	\$43
Turbot-Greenland Flounder	43,585	43,707	50,342	31,952	25,451	12,317	\$19,164
White Hake	53,695	75,292	40,403	27,071	26,758	24,042	\$28,000
<i>Groundfish totals</i>	<i>1,338,308</i>	<i>1,227,409</i>	<i>1,135,487</i>	<i>1,051,908</i>	<i>1,110,589</i>	<i>887,738</i>	<i>\$1,393,390</i>
Pelagic Fish Landings							
Alewife		3,346	13,580	4,282	11,164	4,673	\$2,426
Argentine		4					
Blue Shark	74	37	36				
Blue Fin Tuna	737	4,471	2,149	1,994		626	\$9,868
Eel					10,616		
Herring	650,787	218,498	72,238	201,720	4,445	1,037	\$83
Mackerel	125,206	221,539	367,033	110,549	48,649	6,248	\$3,277

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Table 5.8.4 Species Caught in 4Vn, 2005-2010

Species	Year Landed Weight (kg)						2010 Value (\$) (rounded to nearest dollar)
	2005	2006	2007	2008	2009	2010	
Mako Shark	42	242			256	283	\$710
Porbeagle Shark	349	682	1,219		414	184	\$188
Shark, unspecified		204					
Smelt			41				
Swordfish				100		147	\$830
<i>Pelagic Fish Totals</i>	<i>777,195</i>	<i>449,023</i>	<i>456,296</i>	<i>318,645</i>	<i>75,544</i>	<i>13,198</i>	<i>\$17,382</i>
Invertebrate Landings							
American Oyster	28,291	14,187	3254	640		1,661	\$1,395
Cockles		737					
Jonah Crab		1247	182	375	269	634	\$35
Lobster	1,938,029	1,863,195	1,914,372	2,730,483	2,131,303	2,432,263	\$16,295,766
Pandalus Borealis Shrimp	1,141,662	613,701	89,370	220,794	10,741	132,739	\$140,228
Propellor Clam		1738					
Queen Snow Crab	868,676	665,882	342,448	426,109	786,400	848,805	\$3,380,478
Rock Crab	232,415	245,966	20,0762	164,221	174,598	166,901	\$128,399
Sea Scallop	18,595	26,435	33,832	42,553	33,567	46,060	\$73,128
Sea Urchin	63,658	63,057	64,149	56,851	71,314	85,266	\$228,667
Softshell Clam	58					2,044	\$3,592
Spider-Toad Crab		2,802	12,768				
Stimpsons Surf Clam		27,143					
Whelk				10			
<i>Invertebrate Totals</i>	<i>4,291,384</i>	<i>3,526,090</i>	<i>2,661,137</i>	<i>3,642,036</i>	<i>3,208,192</i>	<i>3,716,373</i>	<i>\$20,251,688</i>
Totals	6,406,887	5,202,522	4,252,920	5,012,589	4,394,325	4,617,309	\$21,662,460

*Blank space indicates no data.

DFO Catch and Effort data (2005-2010)

In 2010, the total landed value of fisheries in 4Vn was \$21,662,460; 93 percent of this value was derived from invertebrate fisheries (of which the majority was from lobster – 75 percent of total landed value). The majority of commercial fishers harvesting species in the LAA fish out of Port Morien (approximately 38 boats) and Main-a-Dieu (approximately 60 boats) as their home port. Other ports which support local fishers include Glace Bay, False Bay, Louisburg, Little Lorraine,

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Big Lorraine, and Baleine's Cove. Key commercial fisheries relevant to the LAA and RAA are described below.

Pelagic and Groundfish Fisheries

Key commercial finfish species fished in the nearshore waters of Sydney Bight include herring and mackerel. Pelagic fisheries that occur further offshore in 4Vn include swordfish, shark, alewife and tuna.

Herring fisheries in the RAA include the spring/summer bait fishery and the fall roe fishery. The bait fishery, which is largely to supply bait for the lobster fishery, begins by mid-April and continues until the end of the lobster season (July 15). Set nets, swing nets and trap nets are the gear types used in the bait fishery (Clark *et al.* 1999 cited in Schaefer *et al.* 2004). The roe fishery occurs primarily off Glace Bay in September and October but may also extend into November. The roe fishery usually employs gillnets; trap nets are used less frequently (Collins *et al.* 2001, cited in Schaefer *et al.* 2004).

Mackerel is fished commercially primarily between May and November with the largest commercial mackerel landings in Nova Scotia in May and June. The RAA falls within Statistical District 7, where the largest landings are made in September and October. In this District, landings are made primarily with jiggers, handlines, and purse seines (Schaefer *et al.* 2004). Schaefer *et al.* (2004) indicated that Port Morien is among fishing communities that had the highest mackerel catches in Cape Breton.

Groundfish fisheries that occur further offshore in 4Vn include cod, halibut, flounder (greysole-witch flounder and turbot-Greenland flounder), white hake, and redfish. Redfish comprises approximately 55 percent of the annual groundfish catch since 1996 (DFO 2002, cited in Schaefer *et al.* 2004), making it the most important groundfish species harvested in 4Vn. The directed redfish fishery in 4Vn occurs from July to September (DFO 2002, cited in Schaefer *et al.* 2004). Gear used to catch groundfish includes bottom ottertrawls (stern), Danish seines, longlines, and gillnets (DFO 2002, cited in Schaefer *et al.* 2004).

Invertebrate Fisheries

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. Shrimp, although shown to be a substantial fishery for 4Vn are harvested primarily in offshore waters outside the LAA. Together, lobster and shrimp landings accounted for 97 percent of the landed value of commercial fisheries in 2010 for 4Vn.

The inshore lobster fishery is one of the oldest managed fisheries in Canada (DFO 2011f). The Maritimes Region inshore lobster fishery is comprised of 12 individual LFAs (27-41). Lobster stocks in LFA 27 are historically among the most productive in coastal Nova Scotia (Schaefer *et al.* 2004).

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Commercial access to the lobster fishery is managed as a limited entry, competitive fishery. Three categories of licenses exist to provide access to the resource. Category A licenses were created for those fully dependent on the fishery. Category B licenses were created for those not fully dependent but with a historical attachment to the lobster fishery since 1968 (granted 1/3 the number of traps of a Category A license). Partnership licenses permit 1.5 times the number of traps of a Category A license). First Nation organizations are provided commercial access through communal commercial licenses equivalent to Category A licenses (DFO 2011f).

As of December 2011, there were 526 licenses in LFA 27 (L. Penny, DFO, pers. comm. 2011); this compares to 524 licenses in 2010 (DFO 2011g). Local fishers estimate that approximately 100 licenses are concentrated within the Glace Bay-Morien area due to the abundance of lobster in this location. Of these 100 licenses, approximately 38 fishers fish out of Port Morien Harbour. Fishing activity generally occurs in depths less than 32 m (Schaefer *et al.* 2004) and in some cases, as recounted by local fishers, traps are exposed during low tide. Local lobster fishers noted that approximately 70 percent of the lobster is caught within the first 3 to 4 weeks of the fishing season which spans May 15-July 15. The inshore lobster fishery is conducted almost entirely from vessels less than 13.7 m (45') in overall length and most fishing is conducted within 10 to 15 km of the shore (DFO 2011f).

Table 5.8.5 shows the landings and value of the lobster fishery in LFA 27 from 2005 to 2010. As shown on Figure 5.8.1, the boundaries of LFA 27 extend beyond NAFO Unit 4Vn.

Table 5.8.5 Lobster Landings by License in LFA 27 (2005-2010)

Year	License Subtype ¹	Weight (kgs)	Catch Value (\$)
2005	Category A	1,845,020	25,536,308
	Category B	21,954	304,557
	Partnership A	50,472	698,345
2006	Category A	1,765,451	22,721,584
	Category B	24,849	320,849
	Partnership A	54,091	699,269
2007	Category A	1,835,145	24,196,259
	Category B	24,970	327,040
	Partnership A	53,945	714,514
2008	Category A	2,596,631	27,975,944
	Category B	31,941	338,420
	Partnership A	76,626	819,929
2009	Category A	1,923,097	17,615,345
	Category B	23,800	221,082
	Partnership A	120,844	1,111,015
2010	Category A	2,231,597	20,108,997
	Category B	28,121	255,434
	Partnership A	164,506	1,489,557
Report Total		12,873,059	145,454,446

¹Category A: License holder may use the maximum number of traps in the LFA (275). Category B: License holder may use 30% of the maximum number of traps authorized in the LFA (e.g., 83).Partnerships: Two Category A license holders may fish from the same vessel, with 150% the limit of a single full-time license (e.g., 413).

L. Penny, DFO, pers. comm. 2011

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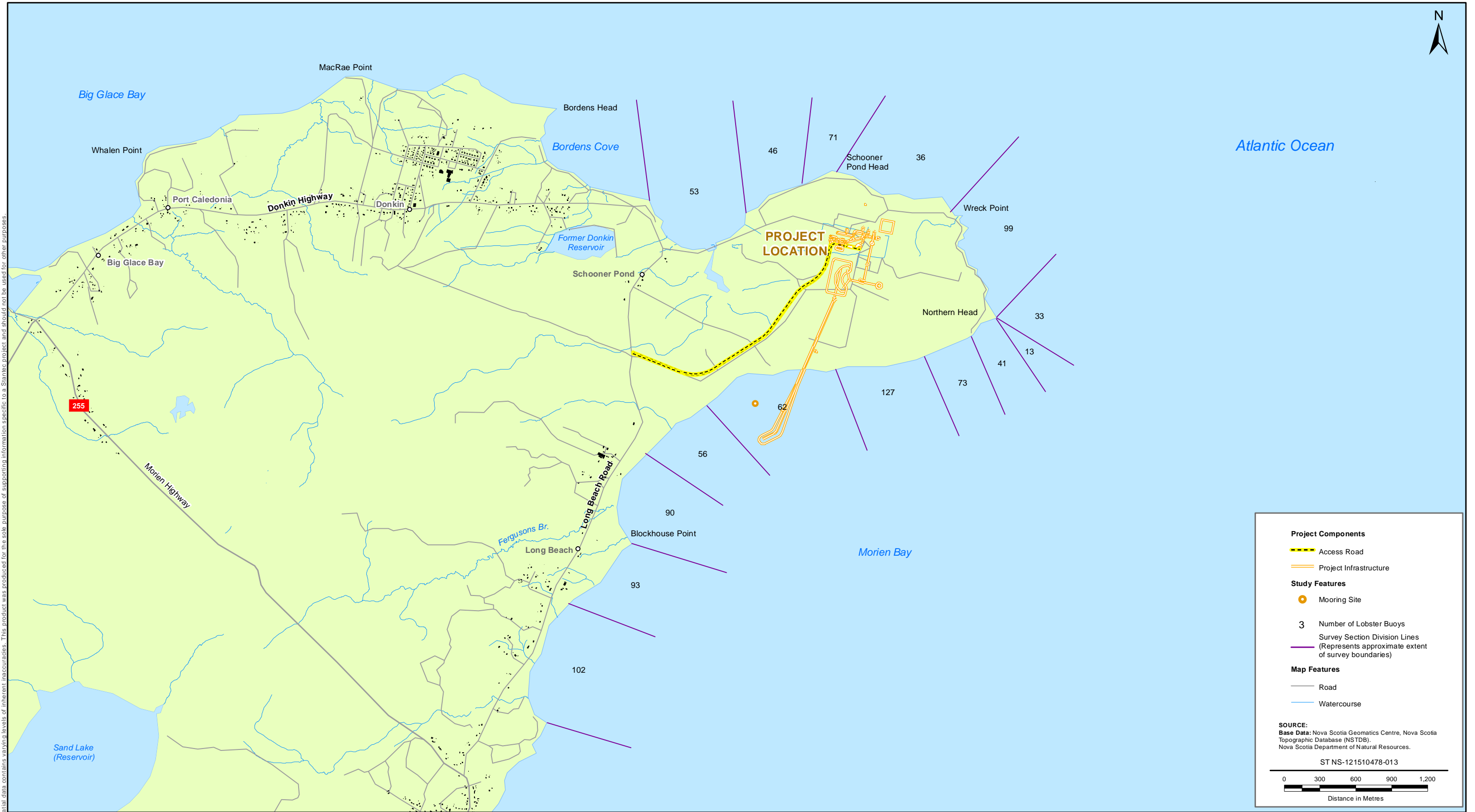
To give some local context to the data in Table 5.8.5, Grid 351 of LFA 27 which includes the ports of Glace Bay and Port Morien reported lobster landings of 356,021 kg in 2008, 252,193 kg in 2009, and 329,834 kg in 2010 (data for 2005-2007 for Grid 351 was not available at time of writing). In 2011, the lobster landings in Grid 351 were 228,826 kg (L. Penney, DFO, pers. comm. 2012).

An assessment of lobster off the Atlantic Coast of Nova Scotia conducted by DFO indicated that LFA 27 effort, as indicated by days fished (2002-2010) and total trap hauls (2004-2010), was stable or without significant trend. Estimated trap hauls from mandatory logs increased from 2004-2008 and then declined in 2009 and 2010 (DFO 2011g).

DFO does not track lobster fishing in the same manner as other species as evidenced by the omission of lobster data shown on the Invertebrate Fisheries Effort mapping (refer to Figure 5.8.4). In an attempt to provide a snapshot estimate of lobster fishing effort around the Donkin Peninsula, an aerial survey was conducted to document the distribution of lobster traps around the peninsula. The survey obtained aerial photographs of the coastline around the Donkin Peninsula from a fixed wing aircraft. Flights were made on July 3, 2010 and July 9, 2010, with different passes made at various elevations (ranging from 396 m to 2,133 m). The lower elevation photos captured an approximate distance of 1 km from the shoreline and was used as a basis for quantification of lobster trap buoys. The July 9, 2010 survey date was used for the analysis because it offered the best weather conditions and highest visibility of the two survey days.

The photos were organized into sections of shoreline and surrounding waters and buoys in each section were counted (one buoy was assumed to represent one lobster trap). A georeferenced figure has been produced to show the buoy counts along each shoreline section (refer to Figure 5.8.5).

A total of 995 traps were recorded in this area within 1 km of the shoreline. However this analysis represents a snapshot in time as lobster trap distribution can vary from season to season and day to day. Recent advice from the Project's Fisheries Advisory Group (April 19th) has indicated that there is limitations in using aerial lobster survey data to obtain an accurate account of fishing effort in the region (due to the time the aerial view was taken, the clarity of gear observed from aerial shots, and the nature of the lobster fishery itself). At the Fisheries Advisory Group's advice and in collaboration, XCDM has engaged the services of the Bras d'Or Institute of Cape Breton University to undertake a study of the fisheries in the area to better understand the nature of lobster and other fisheries. It is clear however, based on the survey, knowledge of the benthic habitat and information provided by DFO and fishers, that the waters around the Donkin Peninsula are actively fished for lobster.



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CLIENT:

Donkin Export Coking Coal Project

Aerial Survey Lobster Buoy Counts (July 9, 2010)

FIGURE NO.: 5.8.5

DATE: Apr 26, 2012

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

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Rock crabs are commonly found in the nearshore and are an important food source for lobster (Schaefer *et al.* 2004). Rock crabs are fished through directed licenses as well as through by catch from the lobster fishery. Within LFA 27, there are 16 license holders (L. Penny, DFO, pers. comm. 2011). The season for directed catch is August 15th to December 31st. As shown on Figure 5.8.4, rock crab fishing efforts in the LAA appear to be concentrated in Morien and Mira Bays.

Snow crabs are found in depths of 45-245 m of water and are distributed mainly in the deep water areas of Sydney Bight (approximately 30-40 km offshore) (Schaefer *et al.* 2004). The snow crab fishing season in CFAs 20 to 22 is April 16th to May 14th, and July 23rd to September 30th (L. Penny, DFO, pers. comm. 2011). In Sydney Bight, snow crabs are fished from the end of July to the middle of September 15 (Schaefer *et al.* 2004). There are approximately 78 license holders fishing CFAs 20 to 22 (L. Penny, DFO, pers. comm. 2011). Crabs are harvested using fixed gear (crab traps/pots). Traps are set singly on the seafloor and marked using a buoy (Schaefer *et al.* 2004).

Sea scallop is also fished in nearshore waters, primarily through dragging. The scallop fishery in the Sydney Bight area generally has low landings but covers an extensive area in Mira Bay (Gromack *et al.* 2010)(refer to Figure 5.8.4).

Other Commercial and Exploratory Fisheries

Various other commercial fisheries occur in the RAA, although they are less commercially important to the area. Green sea urchins are harvested in subtidal areas by divers between September 15th and December 30th. In 2011, there were 29 license holders for urchin within LFA 27. Sea urchin populations are closely linked to the presence of kelp beds (Schaefer *et al.* 2004). The presence of kelp beds was not observed during the 2011 benthic habitat survey undertaken at the barge-loadout facility or transshipment location (refer to Section 5.7 for more information on the characterization of the benthic habitat in these areas).

Polychaete worm species, sandworm and bloodworm, are dug for fish bait in various areas in Sydney Bight, including Morien Bay and Mira Bay. The worms are harvested by hand year round at low tide and are used in the commercial and recreational fisheries as bait.

Harvesting for whelk is an emerging fishery in the inshore. Within LFA 27, 29 and 30, there were approximately 15 license holders trapping whelk between September 15 and December 30 (L. Penny, DFO, pers. comm. 2011).

Recreational Fishery

Recreational fishing in the marine LAA is limited primarily to recreational groundfish anglers (L. Penny, DFO, pers. comm. 2011), but also includes mackerel and invertebrate fisheries (S. Coffin-Smout, DFO, pers. comm. 2012) including soft shell clam and scallop.

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Onshore, the Port Morien Wildlife Association promotes recreational fishing and stocks several lakes and ponds in the area with speckled trout (D. Murrant, NSFA, pers. comm. 2011; J. Kennedy, PMWA, pers. comm. 2012). In the past, Schooner Pond was being stocked regularly and was a very popular local fishing spot. However, since the new Donkin Mine access road has been constructed, the old mine access road, which provided access to Schooner Pond, has not been maintained and driving conditions are such that it discourages anglers from accessing the Pond (J. Kennedy, PMWA, pers. comm. 2012). The Donkin Dam Pond (Former Donkin Reservoir on Pump House Road, west of the Donkin property), continues to be a popular fishing location.

Aquaculture

There is no coastal aquaculture in the LAA. The nearest inland aquaculture operations are five oyster aquaculture leases in the Mira River, more than 15 km southwest of the Donkin site (D. Gilby, NSFA, pers. comm. 2011).

Mi'kmaq Fishery

Aboriginal communal food, social and ceremonial (FSC) fishing is a cultural and sustenance activity and DFO negotiates agreements for Aboriginal fishing through the Aboriginal Fisheries Strategy (AFS) for FSC purposes. DFO recognizes that FSC access to fishery resources has priority over other allocations, provided conservation of the stock is not an issue. Resources fished using an FSC license are used communally to provide food for its members, and support the traditional social and ceremonial activities of the First Nations community or Aboriginal groups (DFO 2011f). During engagement activities with the KMKNO, it was suggested that the Unama'ki Institute of Natural Resources (UINR) be contacted to provide information on Mi'kmaq fishing activity in the region. The Commercial Fisheries Liaison Officer for UINR was contacted as a resource to provide information on Mi'kmaq fisheries. This request was directed to the Consultation Liaison Officer for the KMKNO. As of the writing of this report (April 2012) the KMKNO have advised that pending the findings of the updated MEKS and information provided by DFO, a Mi'kmaq commercial fisheries study for the Project would be beneficial. In consideration of the MEKS and DFO information, XCDM will review this suggestion with the KMKNO.

An MEKS conducted for the Donkin Export Coking Coal Project by Membertou Geomatics Solutions (2012) provides information on commercial fishing activities by the Mi'kmaq. A summary of the MEKS findings as they pertain to the current use of lands and resources for traditional purposes is included in Section 5.10 of the EIS; the MEKS is included in Appendix C.

With respect to Mi'kmaq fishing, lobster was found to be the most fished species in the immediate area, with 14 lobster fishing areas identified by interviewees in the waters surrounding the Donkin Peninsula from Donkin to Long Beach and into the Atlantic Ocean. All

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interviewees had indicated this fishing activity to be for commercial purposes. Other species fished, to a lesser degree, include mackerel, eel, flounder, gaspereau and crab (MGS 2012).

Looking at a larger geographic area, 47 traditional lobster fishing areas were identified in waters surrounding the Donkin Peninsula: from Donkin to Long Beach; Donkin to Glace Bay; Long Beach to Morien Bay; waters surrounding South Head, from South Port Morien to Waddens Cove and past False Bay; as well as into the Atlantic Ocean. All interviewees also indicated these activities to be for commercial purposes (MGS 2012). Eleven mackerel fishing areas and 10 crab fishing areas were identified for commercial purposes. Additional species mentioned by interviewees in the larger study area included trout, eel, smelt, flounder and gaspereau.

5.8.3 Potential Project-VEC Interactions

Table 5.8.6 below lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1, or 2 based on the level of interaction each activity or physical work will have with Commercial and Recreational Fisheries.

Table 5.8.6 Potential Project Environmental Effects to Commercial and Recreational Fisheries

Project Activities and Physical Works	Potential Environmental Effects
	Change to Net Income of Local Commercial Fishers
Construction	
Site Preparation (incl. clearing, grading and excavation)	0
Construction of Mine Site Infrastructure and Underground Preparation	0
Construction of 138 kV Transmission Line	0
Construction of Barge Load-out Facility (incl. dredging, infilling and habitat compensation)	2
Installation of Transshipment Mooring	2
Operation and Maintenance	
Underground Mining	0
Coal Handling and Preparation (incl. coal washing and conveyance)	1
Water Treatment (incl. mine water and surface runoff)	1
Coal and Waste Rock Disposal	0
Marine Loading and Transportation	2
Coal Trucking	0
Decommissioning and Reclamation	
Site Decommissioning	1
Site Reclamation	1

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Table 5.8.6 Potential Project Environmental Effects to Commercial and Recreational Fisheries

Project Activities and Physical Works	Potential Environmental Effects
	Change to Net Income of Local Commercial Fishers
0 = No interaction 1 = Interaction occurs; however, based on past experience and professional judgment, the resulting effect can be managed to acceptable levels through standard operating practices and/or through the application of best management or codified practices. No further assessment is warranted. 2 = Interaction occurs, and resulting effect may exceed acceptable levels without implementation of specified mitigation. Further assessment is warranted.	

Project activities associated with onshore construction activities (e.g., site preparation, construction of mine site infrastructure and underground preparation; and construction of 138 kV transmission line) are not predicted to have any interaction with Commercial and Recreational Fisheries and have therefore been ranked 0 in Table 5.8.6. The environmental effects of these activities on Commercial and Recreational Fisheries are therefore rated as not significant. There is no further consideration of these activities in the assessment.

Due to the lack of interactions between Commercial and Recreational Fisheries with onshore construction, there is limited or no interaction predicted for onshore activities during operation and maintenance. Underground mining, coal and waste rock disposal and coal trucking are also not predicted to interact with Commercial and Recreational Fisheries.

Coal handling and preparation as well as water treatment processes could potentially interact with the marine environment in the absence of appropriate mitigation measures and therefore there is a potential interaction with Commercial and Recreational Fisheries and are therefore ranked as a 1. However, passive and active water treatment processes will be in place to manage runoff and emissions associated with the CHPP thereby mitigating potential effects and interaction on the marine environment and indirectly, Commercial and Recreational Fisheries.

Decommissioning and reclamation of marine components could potentially interact with Commercial and Recreational Fisheries and are therefore ranked as a 1. However, given that the wharf and the transshipment anchoring foundation will remain in place when the Project is decommissioned, there will be minimal interaction with the marine environment and Commercial and Recreational Fisheries. The removal of the floating components of the transshipment site and cessation of barge and tug movements may result in a minor positive effect with respect to local navigation and removal of a source of interference with fishing activity. The cessation of marine activities will allow for restoration of local fishing activity nearly to baseline conditions, with the exception of the breakwater structure which will not be removed during decommissioning.

In consideration of the nature of the interactions and the planned implementation of known and proven mitigation, the potential environmental effects of all Project activities and physical works

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that were ranked as 0 or 1 in Table 5.8.6, on Commercial and Recreational Fisheries during any phase of the Project are rated not significant, and are not considered further in the assessment.

The remainder of the interactions noted in Table 5.8.6 (*i.e.*, construction of the barge load-out facility and transshipment mooring, and marine loading and transportation activities) are ranked as a 2. These interactions could potentially result in adverse environmental effects thereby requiring further assessment as presented in the following sections.

5.8.4 Assessment of Project-Related Environmental Effects**5.8.4.1 Assessment of Change to Net Income of Local Commercial Fishers****5.8.4.1.1 Potential Environmental Effects**

A summary of the environmental effects assessment and prediction of residual environmental effects resulting from interactions ranked as 2 on Commercial and Recreational Fisheries is included in Table 5.8.7.

It is anticipated that dredging will be required for the construction of the barge load-out facility. The dredging operation will be small scale, and involve a barge and scow operation. Similar to recent dredge works at Glace Bay and Port Morien ports, the dredge barge would be outfitted with either a crane or a long stick excavator equipped with an environmental dredging cam or bucket. As the anticipated dredging is considered to be small scale it does not warrant the mobilization of other types of dredges such as a suction cutter dredge. During dredging at sea, the operation will be surrounded by a silt boom (refer to Section 2.5.1.4). Dredging (and infilling if required) will result in a loss of benthic habitat and suspension of sediments. It may also potentially result in direct mortality of species (*e.g.*, rock crab, lobster) at the location of the proposed load-out facility. Underwater noise and vibration may result in localized dispersion of fish stocks, thereby affecting catchability.

Installation of the transshipment mooring involves deployment of a buoy moored to the seafloor by several chain legs, each secured to an anchor in the seafloor. This mooring will also therefore result in limited benthic disturbance and pose as a localized constraint to navigation of fishing vessels.

Marine construction traffic could potentially interfere with fishing gear and restrict fishing vessel navigation and fishing (primarily lobster harvesting), particularly in the vicinity of the barge load-out facility.

Similarly, during operation and maintenance, there will be continued loss of fish habitat and loss of fishing access within the barge load-out facility footprint and adjacent vessel manoeuvring and staging areas. Loss of fishing access during construction and operation and maintenance as a result of the marine footprint will result in a localized displacement of fishing activity and

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could potentially result in increased pressure on other fishing locations to replace displaced activity.

Increased vessel traffic during operations will potentially create interference with fishing gear and fishing vessel navigation in the waters between the barge load-out facility and transshipment mooring.

5.8.4.1.2 Mitigation of Project Environmental Effects

Various mitigation measures will be implemented to reduce or eliminate potential adverse environmental effects on Commercial and Recreational Fisheries.

- The Project will obtain authorization for the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat prior to conducting dredging and infilling operations to construct the barge load-out facility. To compensate for the direct loss of benthic habitat, the Project will be required to create new habitat (or improve existing habitat) to meet DFO's policy of no net loss under the *Fisheries Act*. The type and area of habitat to be created/enhanced will be detailed in a Habitat Compensation Agreement signed by both the Proponent and DFO before DFO will authorize the alteration of habitats. The specifications of the HADD compensation program will depend on the type of habitat compensation employed and assessed ecological value of existing habitat to be altered or lost (refer to Section 5.7 for more information on the benthic habitat at the barge load-out facility). A conceptual HADD compensation plan is also presented in Appendix G.
- Marine habitat will be protected as per mitigation described in Section 5.7.
- The Project will maintain ongoing consultation with local fishers during all Project phases including the established Fisheries Advisory Group.
- The Project will develop, with active participation from local fishers, a compensation policy to address gear loss and/or damage attributable to Project activities. Reasonable accommodation for loss of access to fishing grounds would be negotiated in good faith between the Project and demonstrably affected fishers.
- A Notice to Mariners and Notice to Shipping will be published to inform other vessel operators of navigational hazards during construction and operation and maintenance.
- The barge load-out facility and transshipment mooring will be marked on navigational charts and contain markings according to the Canadian Coast Guard requirements.
- Project vessels will comply with all applicable legislation, codes and standards of practice for safe navigation.

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5.8.4.1.3 Characterization of Residual Project Environmental Effects

Construction

A net loss of approximately 3.3 ha of fish habitat is predicted to occur as a result of construction of the barge load-out facility. Habitat compensation will be carried out in consultation with DFO and local fishers to achieve no net loss of fish habitat. Effects on fish habitat are therefore considered to be reversible. Effects of noise and vibration will be temporary and are not expected to disperse over a long distance given the nature of marine construction activities (*i.e.*, pile driving and marine blasting not part of marine construction plan).

Marine construction vessel activity will be mainly concentrated around the barge load-out facility during certain periods over an approximate two-year period of marine construction. This will result in a permanent displacement of fishing activity within the barge load-out facility footprint. Construction activity will be communicated to local fishers and will also be communicated in Notices to Mariners to minimize effects on local navigation. The greatest potential period of interference with fishing will be during the lobster fishing season (May 15-July 15). Fishers traditionally fishing within the footprint of the barge load-out facility and within the manoeuvring area of Project vessels will be displaced during construction, operation and maintenance. Although fishing effort may be disrupted in this area, this footprint represents a relatively small portion of lobster fishing grounds relative to the fishable area around the Donkin Peninsula within LFA 27.

Construction activities associated with the transshipment location will have a limited interaction with commercial fisheries as it will mainly involve placement of anchors on the seafloor, affecting a radius of less than 500 m. This activity will also be communicated in Notices to Mariners and through ongoing liaison with local fishers.

Operation and Maintenance

During the operation and maintenance phase, marine transport operations will involve several Project vessels including:

- 4 coal barges (each at ~4,000 t capacity),
- 1 transit tug (at ~ 5,000 hp capacity);
- 1 helper tug (at ~ 500 hp capacity);
- 1 crane barge; and
- A combination of bulk carriers including Panamaxsize (~70,000 dwt) and Cape Size (~200,000 dwt).

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As indicated in Section 2.5.2.4, to ship the desired quantity of raw coal there is a requirement to load 39 Panamax size vessels, 14 larger Cape size vessels or a combination of the two. Under favorable weather conditions it is expected that a round trip of a tug and barge from the barge load-out facility to the transshipment mooring would take approximately 4 hours resulting in approximately 7 round trips daily (CBCL 2012). Using this timeframe the loading of a Panamax size vessel is anticipated to take 3 – 4 days and the loading of a larger Cape size vessel would take 8 to 10 days. Based on this loading rate, increased vessel traffic in Morien Bay would be present between 112 and 156 days per year. It is not feasible to seasonally avoid the lobster fishing season due to inherent uncertainties in coal production and marketing schedules and the likely overlap of good weather required for both coal shipping and fishing activities. Hence, based on the use of established shipping lanes and the scenario above, interaction between fishing vessels and the bulk carrier vessels is likely to be limited.

Other than fishing vessels, there is very limited ship traffic in the LAA. Increased vessel activity between Morien Bay and Mira Bay due to Project operations may potentially result in interference to navigation of fishery vessels. There will be no formal exclusion zone around the barge load-out facility or transshipment mooring during operation and maintenance; however traditional access to fishing locations may be hindered due to Project-related vessel traffic and safety and buffer zones. There is also a risk of gear loss or damage due to operation of Project vessels in fishing areas. Increased steaming time as a result of displacement from traditional fishing grounds (e.g., in proximity to the barge load-out facility) and/or replacement of gear would result in increased operating costs for local fishers. The Project will work with local fishers who will be permanently displaced from traditional fishing grounds within the Project footprint to determine appropriate accommodation.

Ongoing consultation with the fishing community and charting of Project vessel routes will serve to minimize effects on navigation and interference with fishing gear. Active participation from local fishers is imperative to the development of a compensation policy to address demonstrated loss of fishing area and gear.

5.8.4.2 Summary of Project Residual Environmental Effects

Table 5.8.7 summarizes the residual environmental effects of the Project on Commercial and Recreational Fisheries.

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Table 5.8.7 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	

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Table 5.8.7 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		
<p>KEY</p> <p>Direction: P Positive A Adverse</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>Significance: S Significant N Not Significant</p>									

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5.8.5 Assessment of Cumulative Environmental Effects

In association with the Project environmental effects discussed above, an assessment of the potential cumulative environmental effects was conducted for other projects and activities that have potential to interact with the Project. Other projects and activities considered in the cumulative effects scoping are discussed in Section 4.2.4. Table 5.8.8 presents the potential cumulative environmental effects to Commercial and Recreational Fisheries, and ranks each interaction with other projects as 1, or 2 with respect to the nature and degree to which important Project-related environmental effects overlap with those of other projects and activities. Other projects and activities which are considered to have no cumulative interaction (*i.e.*, 0 ranking) are not included.

Table 5.8.8 Potential Cumulative Environmental Effects to Commercial and Recreational Fisheries

Other Projects and Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects
	Change to Net Income of Local Commercial Fishers
Port of Sydney Dredging and Infilling	1
Maritime Link Project	1
St. Anns Bank Area of Interest	1
KEY	
0 = Project environmental effects do not act cumulatively with those of other projects and activities.	
1 = Project environmental effects act cumulatively with those of other projects and activities, but the resulting cumulative effects are unlikely to exceed acceptable levels with the application of best management or codified practices.	
2 = Project environmental effects act cumulatively with those of other projects and activities and the resulting cumulative effects may exceed acceptable levels without implementation of project-specific or regional mitigation.	

Recently completed and future proposed dredging and infilling activities in the Sydney Harbour have resulted in loss of fish habitat and interference with local fishing activity. However, this habitat loss is being compensated to achieve no net loss of fish habitat; compensation projects completed to date to offset this habitat loss have included lobster habitat creation projects (low profile artificial reefs at eight locations in Sydney Harbour using a total of 80,000 tonnes of placed rock) developed in consultation with fishers fishing in Sydney Harbour. While this effect occurs in the RAA (NAFO Unit Area 4Vn, LFA 27), these are different fishing areas and affected fishers (*i.e.*, the Sydney Harbour Fishing Association) than those potentially affected by the Donkin Export Coking Coal Project.

The Maritime Link Project will potentially result in fish habitat loss and interference with fishing vessels during the construction phase, which may potentially overlap temporally with Donkin marine construction. The Maritime Link Project is currently undergoing environmental assessment and will be subject to regulatory requirement and mitigation to minimize effects on the marine environment and fisheries. Similarly to the Sydney Harbour projects, this work will

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affect fishers in 4Vn and LFA 27 although it is not anticipated that any of the fishers currently fishing in the area affected by the Donkin Export Coking Coal Project will be affected also by the Maritime Link project so cumulative effects are minimal.

DFO is considering designation of St Anns Bank as a Marine Protected Area (MPA). This designation could potentially result in restrictions to fishing activities. If this occurs, there will be displacement of fishers and increased pressures on other surrounding areas in the region. This could result in a cumulative effect on net income for fishers since construction and operation and maintenance of the Donkin Export Coking Coal Project will potentially result in displacement of fishers due to loss of fish habitat and navigation restrictions. However, there is little overlap in terms of fisheries occurring on St. Anns Bank and in the nearshore LAA (e.g., additional groundfish and pelagic species and snow crab on St Anns Bank) therefore overlap of effects of potential displacement is expected to be minimal. Furthermore, the designation of an MPA involves substantial consultation with marine users in the area so potentially affected fishers would be involved in conservation decisions and restrictions placed upon fishing on St. Anns Bank.

5.8.6 Determination of Significance

Construction and operation and maintenance of marine facilities for the Project will result in adverse effects which could result in a reduction of net income to local commercial fishers which could persist over the life of the Project and beyond decommissioning. This reduction in net income would most likely be attributable to potential displacement due to Project construction and/or ongoing Project vessel traffic during operation and maintenance. However, this loss of net income will be reasonably accommodated by the Project. With the proposed mitigation to fisheries and environmental protection measures for the marine habitat, the environmental effect of a change in net income of local commercial fishers is predicted to be not significant. Ongoing consultation with local fishers will provide feedback on the effectiveness of this mitigation and confirm effects prediction.

The characterization of the potential cumulative environmental effects and associated mechanisms, combined with the proposed mitigation measures proposed in Section 5.8.5 and 5.8.6 demonstrate that the residual cumulative environmental effect of a change in net income to local commercial fishers as a result of past, present, and reasonably foreseeable projects and activities that have been or will be carried out in combination with the environmental effects of the Project during all phases, on commercial and recreational fisheries is rated not significant.

Additionally, the proposed mitigation measures demonstrate that the Project contribution to the cumulative environmental effects on a change in net income for local commercial fishers as part of Commercial and Recreational Fisheries is rated not significant.

Overall, the residual adverse environmental effects on Commercial and Recreational Fisheries is rated not significant.

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5.8.7 Follow-up and Monitoring

No formal follow-up and monitoring is proposed for Commercial and Recreational Fisheries. The Project will continue to engage the local fishers in consultation as the Project progresses and the established Fisheries Advisory Group. Follow-up and monitoring associated with a habitat compensation plan is described in Section 5.7 (Marine Environment).

5.9 LAND USE

Section 2(1) of CEAA considers socio-economic effects in terms of any change or resulting effect that the project may cause in the environment (including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species) on health and socio-economic conditions. In consideration of this interpretation of socio-economic effects, while also meeting the requirements of the EIS Guidelines for this EA, this analysis focuses on effects the Project may have on land use as a result of changes to the biophysical environment.

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. The Land Use VEC considers existing land development (industrial, commercial, institutional, residential); settlement areas; recreation, areas of special community or social value; land ownership and post closure land use. The potential environmental effects of the Project are assessed for the immediate vicinity of the proposed Project and surrounding areas; including Donkin, Port Morien, Main-a-Dieu and Glace Bay.

This VEC takes into consideration the assessment of Atmospheric Resources (Section 5.1) (e.g., consideration of dust and noise) and Current Use of Lands for Traditional Purposes (Section 5.10).

5.9.1 Scope of Assessment**5.9.1.1 Regulatory Setting**

The Project is located within the Cape Breton Regional Municipality (CBRM) Nova Scotia. In Nova Scotia all municipalities are enabled to create legally binding Municipal Planning Strategies (MPS) in compliance with the Province of Nova Scotia's *Municipal Government Act* (MGA) (CBRM 2004). The CBRM MPS, adopted in 2004 and later amended in 2011, is used to guide the development and management of the Municipality, giving policy direction to regulate the use of land within the borders of a municipality so as to minimize conflicts in land use (CBRM 2004). The MPS identifies a number of policies which are used by council to consider development proposals in an equitable manner (CBRM 2004).

Coal is a natural resource of the Province of Nova Scotia and it is the Province's responsibility to regulate its extraction and any ancillary components, the purpose of which are to process the

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extracted coal into a marketable commodity (CBRM 2004). As stated in Nova Scotia's *Mineral Resource Act*, all minerals are reserved to the Crown and the Crown owns all minerals in or upon the land in the Province and has the right to explore for, work and remove those minerals (Mineral Resources Act 1990). The Province of Nova Scotia does not give municipalities the authority to directly regulate mining activities extracting other known mineral deposits (CBRM 2004).

CBRM adopted Land Use Bylaws (LUB) in 2004 and later amended in 2011. Sections 219 and 220 of the MGA links the MPS with a LUB stating that "provisions in a municipal planning strategy or a strategy amendment that deal with 'regulating land use and development' must be implemented by a LUB" (MGA 1998). The development of the LUB is adopted at the same time as the MPS and is used to carry out the intent of the MPS. The Project area on the Donkin Peninsula falls within the Rural Cape Breton zone identified within CBRM's LUB.

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

5.9.1.2 Influence of Consultation and Engagement on the Assessment

Coal mining is an activity of historical and cultural importance to the Project Area. 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.

Public interest has been expressed with respect to maintenance of access to the Donkin Peninsula for valued recreational activities such as bird watching, hiking and fishing. This has been considered in the assessment of Land Use.

5.9.1.3 Selection of Environmental Effects and Measurable Parameters

The relevant environmental effect for assessment of Land Use is Change in Land Use. Project activities could potentially result in a change in current and future land use on the Donkin Peninsula and surrounding communities. This considers existing land development (*i.e.*, industrial, commercial, institutional, recreational), settlement areas, recreation, areas of special community or social value, land ownership and post closure land use.

The measurable parameters used for the assessment of the environmental effects and the rationale for their selection is provided in Table 5.9.1.

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Table 5.9.1 Measurable Parameters for Land Use

Environmental Effect	Measurable Parameter	Rationale for Selection of the Measurable Parameter
Change in Land Use	<ul style="list-style-type: none"> • Recreational land use or areas of special community or social value • Exclusion or promotion of development (industrial, commercial, residential) • Additional housing or community infrastructure required to accommodate Project activities and worker requirements • Number and type of adjacent properties along transmission line and coal trucking route 	<p>Identification of recreational use of land controlled by the Proponent and on adjacent properties will help determine potential effects of the Project on recreational land use.</p> <p>The number and type of adjacent properties to Project lands (including transmission line) and the coal trucking route will provide an indication of extent of environmental effects on the use and enjoyment of properties.</p> <p>The requirement for additional housing or community infrastructure to accommodate Project activities and worker requirements will indicate potential demand on existing services and need for further development.</p> <p>Project activities may involve improvements to lands designated for industrial uses and contribute to ongoing economic activity. They may also preclude future land uses and development during decommissioning.</p>

5.9.1.4 Temporal and Spatial Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on land use include the periods of construction, operation and maintenance, and decommissioning and reclamation. Temporal boundaries also consider periods of seasonal land use activities and potential sensitivity to Project effects.

Generally, informal recreational activities occurring on the Donkin Peninsula occur from the early spring to early fall. The peninsula has been identified as an important recreational resource due in part to the bird watching opportunities in the area; therefore, recreational activities in part follow the spring and fall bird migrations with peak activity in May and September.

The spatial boundaries for the environmental effects assessment of the Land Use VEC are defined below.

Project Development Area (PDA): The PDA includes the area of physical disturbance (*i.e.*, “footprint” for the Project including infrastructure for the mine site as well as stockpiles, coal waste piles, conveyor system, 138 kV transmission line, and trucking routes. The PDA also includes the barge load-out facility and transshipment mooring and vessel route between the two.

Local Assessment Area (LAA): For Land Use, the LAA is defined as the Donkin Peninsula and the nearshore waters around Donkin Peninsula from Morien Bay to the transshipment area in Mira Bay.

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Regional Assessment Area (RAA): The RAA includes the CBRM administrative boundary inconsideration of potential Project related demand on other land uses and other socioeconomic effects.

5.9.1.5 Residual Environmental Effects Description Criteria

CEAA has presented a series of characteristics that can be used to describe environmental effects. Terms that will be used to characterize residual environmental effects for Land Use are presented in Table 5.9.2.

Table 5.9.2 Characterization Criteria for Residual Environmental Effects on Land Use

Criterion	Description
Direction	Positive: condition is improving compared to baseline conditions Neutral: no change compared to baseline conditions Adverse: negative change compared to baseline conditions
Magnitude	Negligible: no measurable adverse effects anticipated Low: specific group, residence or neighbourhood affected such that adjacent land use activities will be disrupted such that current activities can continue even after short periods of time Moderate: part of a community affected such that adjacent land use activities will be disrupted such that current activities cannot continue for extended period of time longer than two years High: community affected such that adjacent land use activities will be disrupted such that current activities cannot continue for extended periods of time longer than two years and are not compensated for
Geographical Extent	Site-specific: effects restricted to within the Project Development Area Local: effects extend beyond the Project Development Area but remain within the Local Assessment Area Regional: effects extend into the Regional Assessment Area
Frequency	Once: effect occurs once Sporadic: effect occurs more than once at irregular intervals Regular: effect occurs on a regular basis and at regular intervals Continuous: effect occurs continuously
Duration	Short-term: effects are measurable for days to a few months Medium-term: effects are measurable for many months to two years Long-term: effects are measurable for multiple years but are not permanent Permanent: effects are permanent
Reversibility	Reversible: effects will cease during or after the Project is complete Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation works
Ecological Context	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 Undisturbed: effect takes place in an area that has not been adversely affected by human development

5.9.1.6 Threshold for Determining the Significance of Residual Environmental Effects

A **significant adverse residual environmental effect** is one where the proposed use of land for the Project and related facilities is not compatible with adjacent or historical land use

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activities as designated through a regulatory land use process, and/or the proposed use of the land will create a change or disruption that widely restricts or degrades present land uses to a point where the activities cannot continue at current levels and for which the environmental effects are not mitigated or compensated.

5.9.2 Existing Conditions**5.9.2.1 Social Demographics**

The Project is located at the site of the existing Donkin Mine on the Donkin Peninsula within the Cape Breton Regional Municipality (CBRM) on the Atlantic coast of Canada. CBRM is the second largest municipality in Nova Scotia covering a total area of 2,470 km² (CBRM 2012). Donkin is currently within District 2, the fourth largest district in the municipality covering a distance 167 km² (CBRM 2010). There are 10 communities in the district including Donkin and Port Morien, Birch Grove, Tower Road and Port Caledonia with a total population of 7,098 (CBRM 2010). A recent boundary review process and proposal was approved by Nova Scotia Utility and Review Board (NSUARB) on October 3, 2011 (NSUARB 2011). The new boundaries will be implemented during the next municipal election in October 2012. The new district boundary for the communities near the Project site will be District 8 with a population of 7,178 and an area of 550 km² (NSUARB 2011).

The history of Cape Breton is closely associated with coal mining activities. It is generally accepted that the first commercial coal mine in North America was at Port Morien and this coal mine commenced operations around 1720. The site of this coal mine is approximately 7 km from the Donkin portals. Essentially a resource-based and manufacturing economy for most of its history, a combination of technological change and rising costs from the 1950s onward resulted in a gradual decline of the key industries: coal mining, steel production, fishing, forestry and agriculture. Publicly-funded economic development initiatives have helped to slow the decline, but the region still suffers from slow job creation, relatively high unemployment, population declines largely as a result of out-migration, an aging population and labour force, and relatively low average household incomes. Most recent data available indicates that today there is a total work force of approximately 44,000 in CBRM (Statistics Canada, 2006). Of these, approximately 1,700 are experienced in sciences and 7,400 in trades, transport and equipment operations (Statistics Canada 2006). There is an ongoing effort to diversify the local economy through tourism, telecommunications, coal production, wind power and service-based industries.

Communities which were once heavily laced with coal and coal mining activities have undergone a major economic transition over the past decades with the closure of the mines and steel industry. The population in CBRM has dropped in 2006 by 3.5 percent from 105,968 in 2001 to 102,250 (Statistics Canada 2007). In the 2011 census, as shown in Table 5.9.3, the population in CBRM has dropped again by 4.7 percent to 97,398 (Statistics Canada 2012a). In 2011 the population in Donkin dropped 19.1 percent from 708 in 2006 to 573 (Statistics Canada

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2012b). Donkin’s population represents 0.6 percent of CBRM’s total population. CBRM’s Integrated Community Sustainability Plan has targeted the revival of the coal mining industry through the redevelopment of the mine in Donkin, along with additional development opportunities (Stantec 2010b). The revival of the mine could generate additional direct and indirect jobs in “high-tech” mining (Stantec 2010b). It is predicted that an overall total (direct and spinoff) of 5,430 person-years of employment in the first five years and about 408 annually during operations. Within Nova Scotia it is predicted that an overall total (direct and spinoff) of 8,497 person-years of employment in the first five years and about 724 annually during operations.

Table 5.9.3 Statistic Canada 2011 Population Census

Population and Dwelling Counts	Donkin, CFA	Cape Breton Regional Municipality	Nova Scotia
Population in 2011	573	97,398	921,727
Population 2006	708	102,250	913,462
2006 to 2011 Population Change (%)	-19.1	-4.7	0.9
Total Private Dwellings	274	45,371	442,155
Private Dwellings Occupied by Usual Residents ¹	253	41,122	390,279
Population Per Square Kilometer	60.3	40.0	17.4
Land Area (square km)	9.50	2,433.35	52,939.44

¹ A separate set of living quarters which has a private entrance in which a person or a group of persons live permanently (Statistics Canada 2012a).

Statistics Canada 2012a&b

In 2006, the average household income for 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.

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. However, following a steep rise in unemployment levels in Donkin in the early 1990s instigated by a recession and the demise of key industries in the region, unemployment levels in the community have declined between 1996 and 2006, and at a greater pace than in CBRM and the Province of Nova Scotia as a whole.

5.9.2.2 Land Use

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

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Although once settled and some of the lands have been grazed since DEVCO closed the mine tunnels in 1992, the use of Donkin Peninsula has been sparse. Much of the area has been left to revegetate and regular use has been limited to community access to the headland and trails for walking use. The Donkin Peninsula (Cape Perce), Schooner Pond and Schooner Cove serve as popular local recreational respites for the communities of Port Caledonia, Donkin and Port Morien (J. Kennedy, PMWA, pers. comm. 2012). Birdwatchers, hikers and the local Port Morien Wildlife Association frequent the area (J. Kennedy, PMWA, pers. comm., 2012).

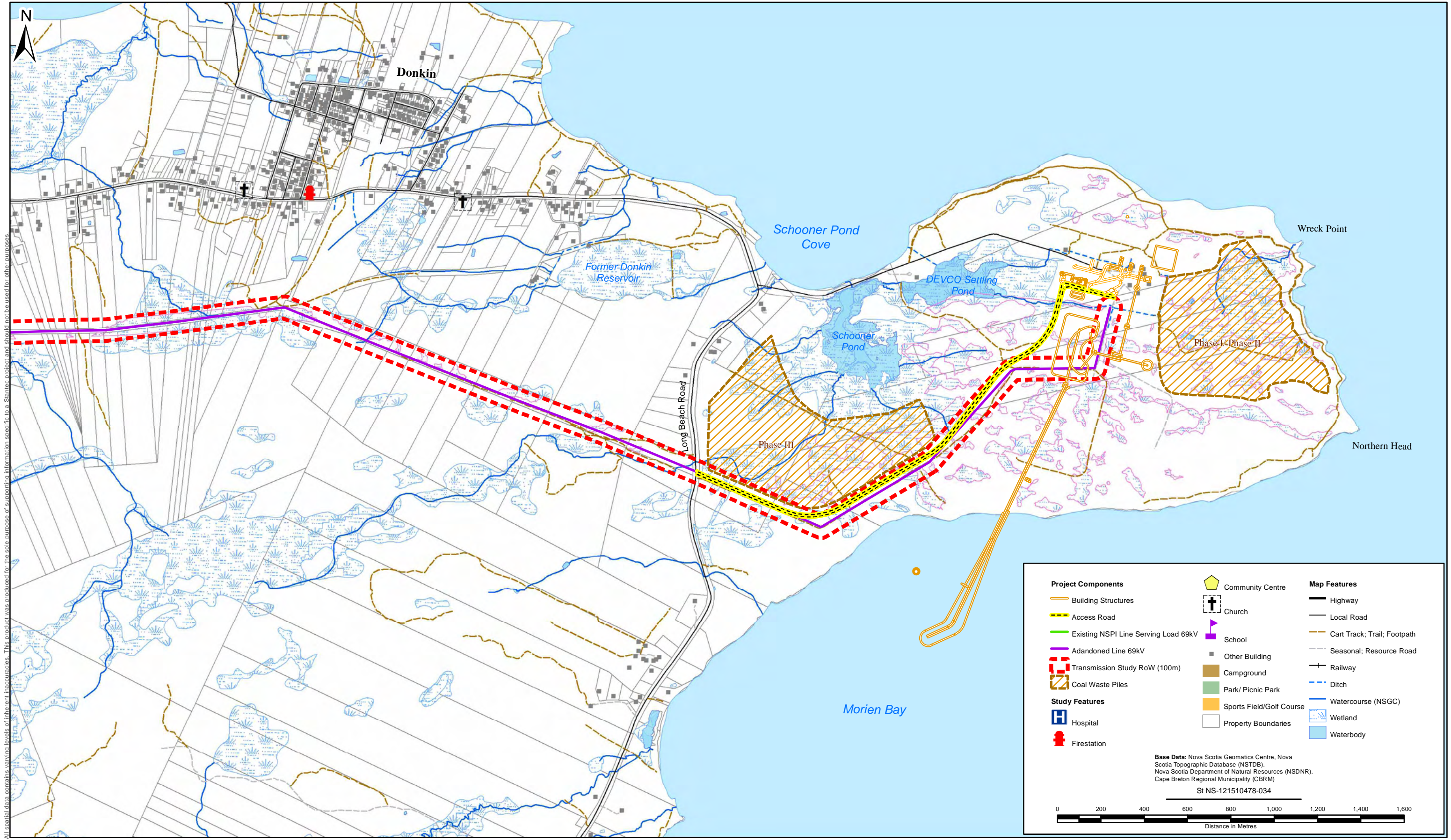
Residential Land Use

Residential land use on the Donkin Peninsula is limited to residential properties on Long Beach Road. There are five residential properties located on Long Beach Road west of the PDA with the nearest residential receptor located approximately 150 m from the proposed Phase III (west) coal waste pile and 1.5 km from the existing and future mine site as shown in Figure 5.9.1a. The town of the Donkin is located approximately 2.5 km west of these residents. The majority of residential development in the Donkin community is located north of the Donkin Highway following the traditional street grid which forms about a dozen residential blocks (CBCL 2008).

The PDA also includes the transshipment mooring location and the transmission line corridor. The land located to the west of the proposed transshipment mooring, approximately 8.8 km from the Donkin Peninsula, is largely unpopulated, however there are a few cottages/residents located near South Port Morien. It was noted during marine surveys that there were no structures visible from the transshipment site.

The proposed transmission line extending from Victoria Junction to the Project site will pass in close proximity to a number of small towns including Port Caledonia, Marconi Towers, McLeods Crossing and Tompkinville, shown in Figures 5.9.1a-d.

There are no new planned developments in the area (e.g., no subdivision plans) as CBRM's population remains in a state of decline and interest in coastal development appears to be waning (D. Foster, CBRM, pers. comm. 2011).



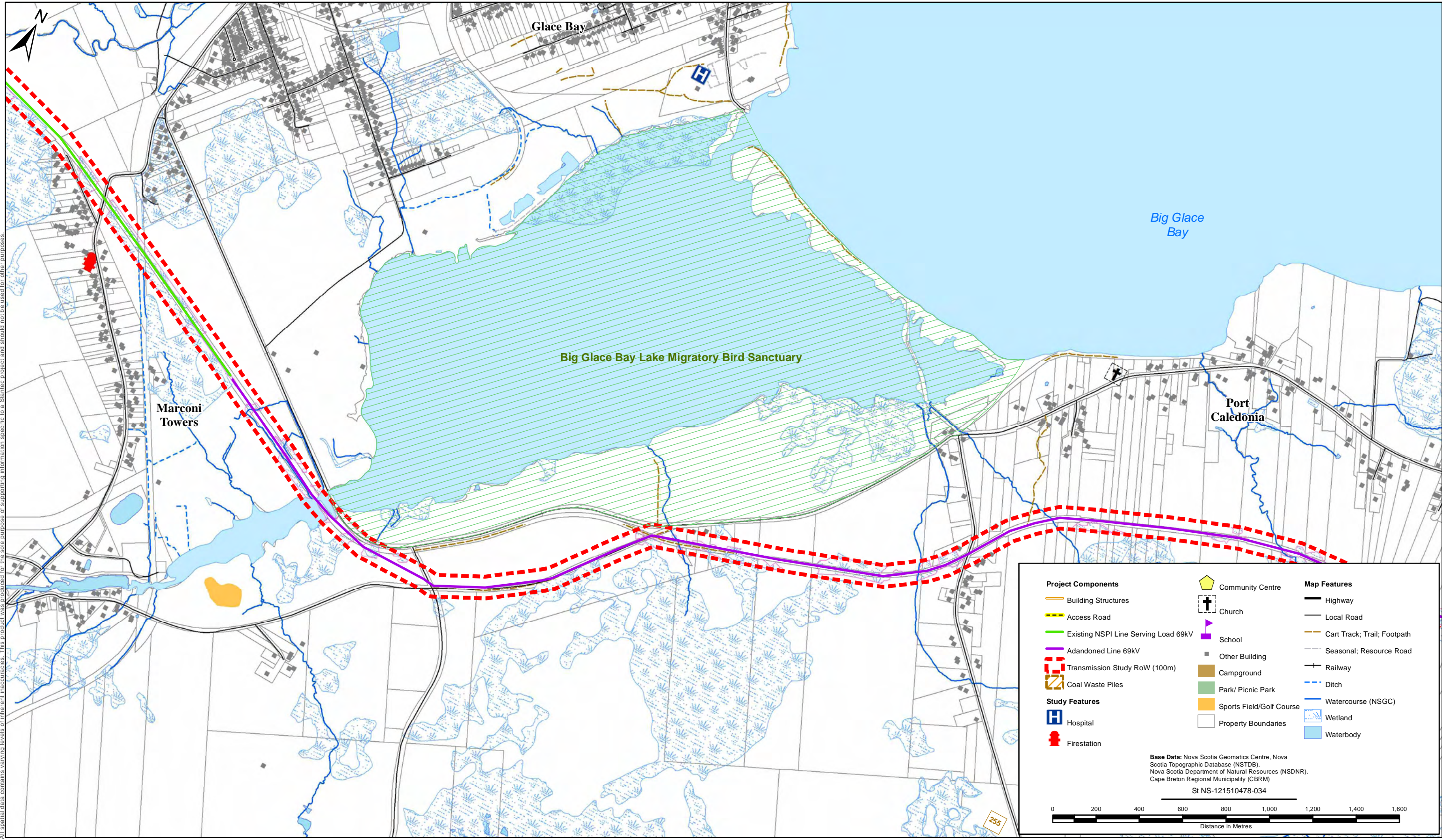
All spatial data contains varying levels of inherent inaccuracies. This product was produced for the sole purpose of supporting information specific to a Stantec project and should not be used for other purposes.

PREPARED BY:	K Keizer
REVIEWED BY:	E Hickey
CLIENT:	

Donkin Export Coking Coal Project

Land Use Overview (Map 1 of 4)

FIGURE NO.:	5.9.1 a
DATE:	Jun 22, 2012



PREPARED BY:
K Keizer

REVIEWED BY:
E Hickey

CLIENT:
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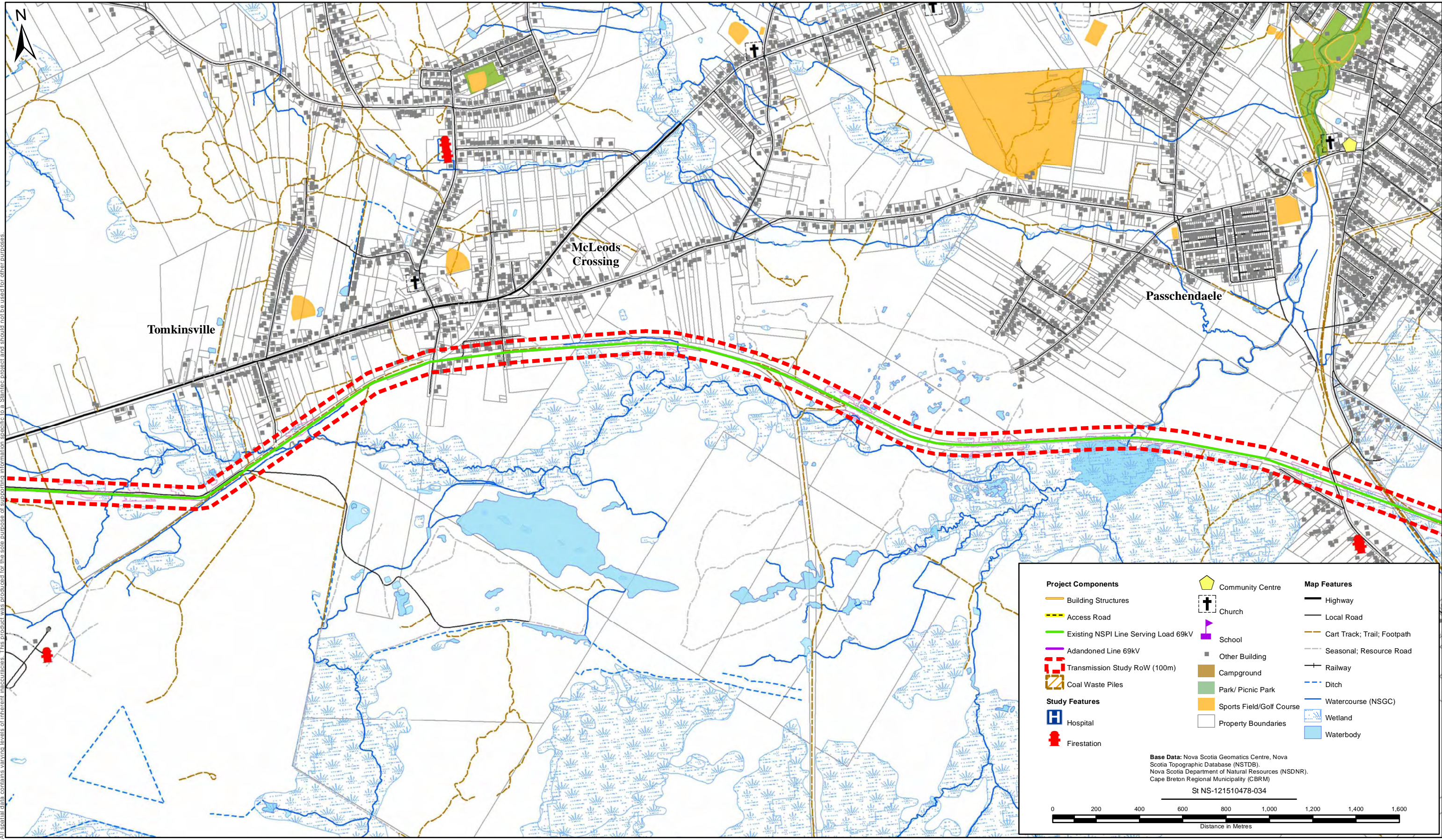
Donkin Export Coking Coal Project

Land Use Overview (Map 2 of 4)

FIGURE NO.:
5.9.1 b

DATE:
Jun 22, 2012

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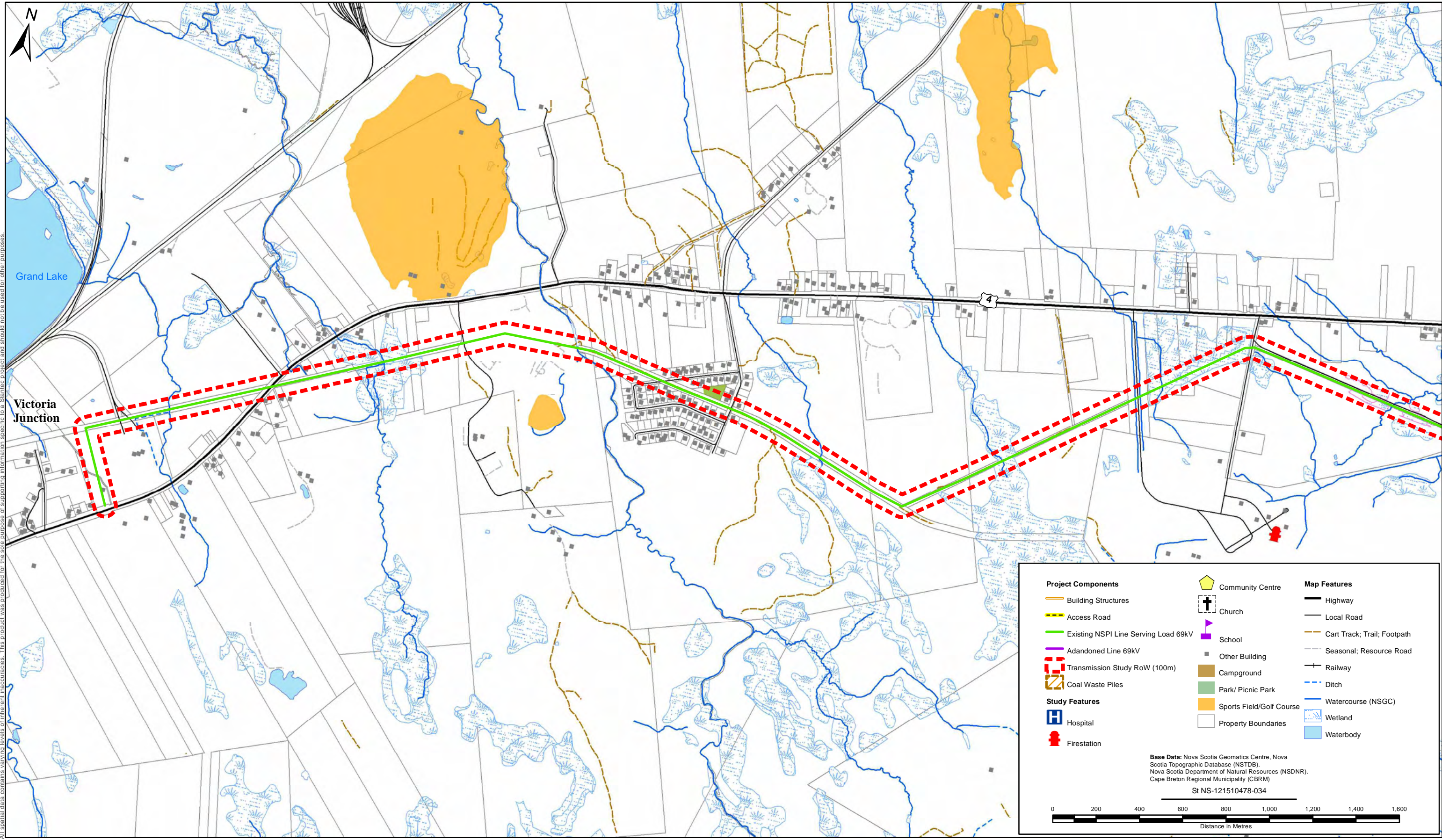


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REVIEWED BY:	E Hickey
CLIENT:	

Donkin Export Coking Coal Project

Land Use Overview (Map 3 of 4)

FIGURE NO.:	5.9.1 c
DATE:	Jun 22, 2012



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Donkin Export Coking Coal Project

Land Use Overview (Map 4 of 4)

FIGURE NO.:	5.9.1 d
DATE:	Jun 22, 2012

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Commercial, Industrial and Institutional Land Use

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

The only school in the Donkin area is Donkin Elementary Junior High School for grades primary to nine and is associated with the Port Morien School, Gowrie, forming the Donkin-Gowrie Complex. The school is located 3.5 km from the Project site. One of the highlights for the school recently has been the addition of a new gymnasium (The Lieutenant Governor's Community Spirit Award Nomination n.d.). The school, described as a modern, spacious facility, hosts two clubs; the Sea Cadets and the Boys & Girls Club. Students in grades ten to twelve travel 11 km to Glace Bay High School.

The Donkin Volunteer Fire Department currently has 32 volunteers and 11 Honorary Members trained in Level I and Level II firefighting as well as first aid, medical and ice rescue. The Donkin school was converted to a firehall in 1977. The Fire Department Ladies' Auxiliary assists in fundraising drives to purchase much needed equipment and fund maintenance for the building which is now in its ninth decade of use (The Lieutenant Governor's Community Spirit Award Nomination n.d.). Royal Canadian Legion Donkin Branch 005 is one of the oldest in Nova Scotia, receiving its Charter on June 23, 1917. Originally, the building was part of the Dominion No. 6 Colliery; additions and changes have been made throughout the years with a complete renovation in 1976.

The fire department is located 3.7 km from the Project site. There is currently no local police department in the Donkin community; the area is patrolled by the CBRM police department (Cape Breton Regional Police). The nearest healthcare facility is the Glace Bay Health Care Facility located 8.8 km from the Project site.

There are three churches located in the community; St. Gregory's Catholic Church; St. Luke's United Church and St. Luke's Anglican Church. The churches are located 3.0 km, 3.7 km and 6.4km, respectively from the Project site.

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

Along the transmission line there is a mix of residential, commercial, industrial and institutional uses. As illustrated on Figures 5.9.1a-d, land uses in the vicinity of the transmission corridor

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include racetracks, secondary schools, Cape Breton University and Nova Scotia Community College, sport fields, and a community park.

Recreational Land Use and Tourism

Schooner Pond Beach is a designated beach under the *Beaches Act*. Schooner Pond Beach is located 0.9 km to the northwest of the PDA. There are no other formal recreational or tourism (*i.e.*, provincial/municipal parks or trails, designated tourism destinations or community/organization owned recreation/tourist sites) activities on the Donkin Peninsula or along the transmission line.

Although not considered formal recreation as 99 percent of the peninsula is privately owned by XCDM, the Donkin Peninsula is an important recreational area for the local community. The peninsula is an active bird watching site for many of the local birders (J. Kennedy, PMWA, pers. comm. 2012). As illustrated in Figure 5.9.1a, there is a main trail located on the perimeter of the peninsula following the coast line. This path is used for hiking, walking, and bird watching use. Additionally there are a number of smaller footpaths through the forests on the north side on the peninsula. It was noted during environmental field studies conduct by Stantec, the common areas of recreational activities extended from Schooner Pond Cove to the southeast of the peninsula where footpaths began to narrow. As indicated in Sections 5.6 (Freshwater Fish and Fish Habitat) and 5.8 (Commercial and Recreational Fisheries), there has been recreational fishing activities on the peninsula, including stocking of brook trout, primarily within Schooner Pond less so within the DEVCO settling pond. Access to these waterbodies is currently poor due to lack of road maintenance over the section of beach reserve owned by the Crown (note this access was previously the mine access road which has since been replaced by another route). Poor driving conditions along this section not under XCDM ownership has resulted in a reduction of recreational fishing in this area (J. Kennedy, PMWA, pers. comm. 2012).

Similar to the peninsula, recreation along the transmission line RoW consists of informal recreational uses such as hiking and ATV use.

There are no plans for development (other than mining) to occur in the RAA; however, the Province will be completing minor upgrades to the beach at Mira Bay, a popular swimming area (K. Elworthy, ECBC, pers. comm. 2011). It is not foreseen that the Project would overlap with the upgrades.

The EIS Guidelines require consideration of seasonal fluctuations in traffic which may be linked to tourism activity in the area. The Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) maintains a traffic count program that classifies roads into traffic count groups to provide seasonal adjustment factors. Daily volumes of vehicular traffic in the Donkin area fluctuate from one time of the year to another, with volumes typically higher in the summer and lower in the winter. Traffic volumes on roads between the Donkin mine site and the Glace Bay and Sydney areas do not vary substantially from one season to the next seasonal variation

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percentages are summarized in Table 5.9.4. While spring and fall volumes in the area are about the same as average annual daily volumes, winter volumes are about 14 percent lower than the average and summer volumes are 13 percent higher than average.

Since summer volumes are only slightly higher than the annual average daily traffic volume, tourist related trips do not represent a large part of the summer daily traffic volume.

Table 5.9.4 Seasonal Variation in Average Daily Volumes

Season	Average Seasonal Daily Volume as a Percent of Annual Average Daily Volume
Winter (December, January, February, March)	86 %
Spring/Fall (April, May, October, November)	101 %
Summer (June, July, August, September)	113 %

Calculated using 2012 Counter Group A and B factors obtained from NSTIR.

5.9.3 Potential Project-VEC Interactions

Table 5.9.5 below lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1, or 2 based on the level of interaction each activity or physical work will have with Land Use.

Table 5.9.5 Potential Project Environmental Effects to Land Use

Project Activities and Physical Works	Potential Environmental Effects Change in Land Use
Construction	
Site Preparation (incl. clearing, grading and excavation)	2
Construction of Mine Site Infrastructure and Underground Preparation	2
Construction of 138 kV Transmission Line	2
Construction of Barge Load-out Facility (incl. dredging, infilling and habitat compensation)	2
Installation of Transshipment Mooring	1
Operation and Maintenance	
Underground Mining	2
Coal Handling and Preparation (incl. coal washing and conveyance)	2
Water Treatment (incl. mine water and surface runoff)	2
Coal and Waste Rock Disposal	2
Marine Loading and Transportation	2
Coal Trucking	2

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Table 5.9.5 Potential Project Environmental Effects to Land Use

Project Activities and Physical Works	Potential Environmental Effects Change in Land Use
Decommissioning and Reclamation	
Site Decommissioning	2
Site Reclamation	2
0 = No interaction 1 = Interaction occurs; however, based on past experience and professional judgment, the resulting effect can be managed to acceptable levels through standard operating practices and/or through the application of best management or codified practices. No further assessment is warranted. 2 = Interaction occurs, and resulting effect may exceed acceptable levels without implementation of specified mitigation. Further assessment is warranted.	

The only Project activity which is not likely to result in a substantive interaction with Land Use is the installation of the transshipment mooring. The transshipment mooring will consist of a single buoy mooring anchored to the seafloor by a minimum of four anchors. Project activities associated with the construction of the transshipment mooring are expected to be minimal and are not predicted to interact with Land Use and there is no further consideration of this activity in the assessment.

All other remaining Project activities listed in Table 5.9.5 for construction, operation and maintenance, and decommissioning and reclamation activities could potentially result in significant changes to Land Use and have therefore been ranked as a 2 for further assessment in Section 5.9.4.

5.9.4 Assessment of Project-Related Environmental Effects

5.9.4.1 Assessment of Change in Land Use

5.9.4.1.1 Potential Environmental Effects

Construction

Historically, the community has been built on coal mining and fishing industries. The proposed Project is located in a historically industrial area that has been previously influenced by industrial and coal mining users. The Project activities are consistent with historical uses on the peninsula and are intended to enhance present capabilities of the mine site.

During the construction of the surface facilities, it is anticipated that there will be periodic increases in ambient noise levels at the site. Construction activities, including grading and excavation, the installation of utilities, roadways, and the construction of the site buildings and water treatment facilities, will require the use of heavy equipment, trucks and smaller equipment. This equipment can generate both temporary steady and episodic noise that may

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extend from the PDA to the LAA. Likewise, installation of the 138 kV transmission line will result in dust and noise emissions which could potentially affect adjacent properties along the RoW.

During site preparation and construction of the mine infrastructure the Project has potential to interact with recreational activities on the Donkin Peninsula by limiting access where construction activities are occurring. Construction of barge load-out facility has potential to limit recreational activities at that location (e.g., recreational fisheries and recreational boating). However, as noted in Section 5.8 (Commercial and Recreational Fisheries), recreational fishing is limited on the peninsula so there is expected to be minimal interaction with Land Use. Nevertheless, the construction of the barge load-out facility represents permanent change in land use facilitating industrial development.

During the construction of the transmission line there is potential to interact with informal recreational land use within the RoW by limiting access where construction activities are occurring. Although there are no formal trails along the transmission line route, there are informal hiking and ATV trails along the route

Operation and Maintenance

Similarly to construction, noise and dust emissions during Project operation and maintenance (i.e., through operation of conveyors, stackers, dozers, the coal handling and preparation plant, and onsite transformers, and operation of marine facilities) could result in a potential loss of enjoyment of residential properties in the vicinity of the PDA. Schooner Pond Beach is located 0.9 km from the mine site. Access to the beach will not be restricted; however potential effects include increased noise levels and dust emissions. Access to the peninsula may be restricted for safety and security reasons, limiting informal recreational use of the peninsula. The operation of the transmission line may lead to an increase in hiking and ATV traffic along the RoW by increasing access along the currently non-maintained RoW.

Coal waste disposal piles will visually alter the views from some of the nearby residential properties potentially resulting in a degradation of visual amenity.

Project trucking (e.g., trucking of coal to domestic customers and the Port of Sydney should marine transportation prove impractical at any time) could potentially have an adverse effect on local traffic including tourism traffic. However, the Project will enhance the existing industrial use of the peninsula while providing socio-economic benefits to the region (refer to Section 2.10).

Given the anticipated number of jobs and services associated with the Project, there may be an increased demand on existing services requiring further development. Additional housing and associated infrastructure may be required to accommodate Project worker requirements, although it is anticipated that many jobs would be fulfilled by local workers not requiring new accommodations.

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Decommissioning and Reclamation

Once the mine operation has concluded, the site will be restored to a condition that will provide opportunities for other land use. Potential post-closure land use options will be identified based on the intended post-closure land use type (*i.e.*, native vegetation, ecological reforestation, recreational use, commercial and/or industrial use, *etc.*) where each will have specific closeout criteria. The process of defining post-closure land use options and scoping of their associated activities will be undertaken in consultation with the local community and other relevant stakeholders.

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

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

5.9.4.1.2 Mitigation of Project Environmental Effects

Various mitigation measures will be implemented to reduce or eliminate potential adverse environmental effects on Land Use.

- During the construction and operation and maintenance of the Project, noise and air (dust) emissions will be mitigated to acceptable levels (refer to Section 5.1.5).
- Vegetation buffer – while vegetation is more of a psychological barrier to noise, the minimization of clearing in the Project area will leave sufficient tree cover to provide a beneficial visual barrier with some reduction in noise.
- Coal waste piles will be progressively revegetated with native vegetation, where practical, to encourage a self-sustaining and productive ecosystem on the reclaimed land and reduce visual effects.
- Public access to the peninsula for informal recreational purposes will be maintained along the coastal perimeter as to not interfere with construction or operation and maintenance activities. The terms of continued public access to the site (*e.g.*, permitted locations, times of day, allowable activities) will be developed by the Project in consultation with local users in consideration of safety and security requirements. Signage and/or fencing will be installed around Project facility to protect public safety and other forms of public notice (*e.g.*, ads in newspapers and meetings with recreation groups and individuals) will also be undertaken.

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- Construction and operation and maintenance of the transmission line will be the responsibility of NSPI and will follow NSPI standards, minimizing effects on land use.
- Recommendations identified within the traffic impact study (AR&TM 2009) (e.g., road upgrades and improved signalization) for the Exploration Phase EA remain valid for the current Project. The recommendations identified will mitigate potential traffic conflicts and safety hazards associated with the Project including occasional trucking of product coal as necessary.
- Decommissioning and reclamation activities will be conducted in accordance with the MCRP.

5.9.4.1.3 Characterization of Residual Project Environmental Effects

Construction

There are five residential properties located approximately 1.5 km from the existing and future mine site with nearest receptor approximately 150 m from the proposed Phase III (west) coal waste disposal pile, some of which may occasionally be subject to Project noise and dust emissions over the life of the Project. As indicated in Section 5.1 (Atmospheric Resources), these emissions will not result in an exceedance of regulatory standards.

The 138 kV transmission line from the Project site to Victoria Junction will be installed where practical along the existing RoW, including along power transmission corridors currently used by NSPI for several transmission and distribution lines, between Victoria Junction and Seaboard Switching Station. Clearing will be required between the Seaboard Switching Station and the Donkin mine site, as the existing RoW is out of service and has become overgrown as it was not maintained as an active transmission line. The RoW is currently owned by XCDM, who will grant NSPI easements over these properties to construct the new line. The construction of the transmission line will also involve pole installation and the stringing of the wires, producing air and noise emissions. These emissions are likely measurable, however given the fact that the majority of the transmission line RoW has already been cleared and with the planned mitigation, these quantities of emissions are expected to be low.

Construction of the barge load-out facility is planned for start of Q4 2014 for completion by Q2 2016. A Notice to Mariners will be issued to inform local vessel operators, including recreational boaters, of construction activity in the area.

There will be additional truck traffic on local roads during the construction phase on the mine development. Noise and traffic interruptions associated with increased truck traffic during construction are predicted to be localized and infrequent; upgraded roadways will maintain roadway performance and safety standards.

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In summary, given the implementation of appropriate mitigation, effects of Project construction on land use are expected to be minor and temporary in nature.

Operation and Maintenance

At full production the Project is expected to employ 283 full time employees. However, many of them will be people already resident in communities within an easy commute distance of the mine. As a result, the number of people moving into the region to take up work at the mine is expected to be small, and will probably include return migrants (*i.e.*, former residents of the region) who would likely benefit from family housing and other social supports.

Because Donkin Project operations will result in little in-migration, it will result in few if any social problems and place few if any new demands on existing community infrastructure and services. Any new in-migration-related demand for community infrastructure and services that does occur can be easily accommodated given that the small numbers of additional people are likely to be distributed across various communities, some of substantial size, and given the fact that past out-migration has left spare infrastructure and services capacity across the region.

In addition to the effects of Project-related demographic change, the Project will have local social and other effects by providing direct and multiplier employment and income to local residents. This will result in a wide range of positive effects for them and their family members. These effects of new employment and income can place new demands on community infrastructure and services. The scale of this effect will be small however, given the relatively small number of Project employees and the fact that they will be distributed across various communities, some of substantial size (*e.g.*, Sydney). Any additional development that may be required is predicted to be a positive effect on land use in a region that is generally suffering from low economic development.

During the thirty-year operation of the mine, there will be approximately 20 million cubic metres of coal waste generated that will require disposal. A coal waste disposal concept study was undertaken to evaluate various options for disposal (refer to Section 2.7.1 and Appendix E for more information). This study evaluated various waste disposal alternatives including several onsite surface disposal options. The preferred disposal option involves developing two main waste disposal piles (east coal waste disposal pile and west coal waste disposal pile) and was chosen to minimize the area to be disturbed. The Phase III (western) coal waste disposal pile is located 150 m from the nearest resident. There is potential for the coal waste piles to visually alter the viewscales from some of the nearby residential properties potentially resulting in a degradation of visual amenity. The Phase III coal waste pile will not be developed until year 13 of Project operation. Mitigation measures including progressive development and reclamation of the coal waste disposal piles will partially mitigate the altered viewscales. Noise and dust emissions as well as the alteration of the visual landscape are not expected to result in a loss of enjoyment of residential properties.

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The execution of the Project will involve increases in both employee vehicle and transport truck movements on public roads. Since most employee trips will be from the higher population areas, *i.e.*, Sydney toward Glace Bay, it is expected that most will travel the Donkin Highway/Long Beach Road to the Project site. From the perspective of passenger vehicles, it was determined that these additional vehicles will not have any measurable effect on the level of service on this road network. Trucking of product coal may be required for delivery to domestic customers and the Port of Sydney should marine transportation prove impractical at any time. The Traffic Impact Study, discussed in Section 2.5.2.3 (Coal Trucking) identified that the proposed haul route would provide satisfactory levels of performance and safety while accommodating traffic generated by construction of the Donkin Coal Mine from 2009 to 2014 (AR&TM 2009). The truck traffic associated with construction will be in compliance with current vehicle and weight regulations and is not expected to affect road operation.

Furthermore, since there is little seasonal variation in volumes on roads in the Study Area, traffic volumes generated by the proposed coal mine, including truck trips, are not expected to have any noticeable effect on the tourist industry in CBRM.

Although there is minimal tourism or recreational activities located on the Donkin Peninsula (*i.e.*, Schooner Pond Beach), local informal recreational use such as hiking, and bird watching could be affected if access to the Donkin Peninsula is restricted. For safety and security reasons, these informal recreational activities will be restricted in close proximity to mining activities and infrastructure. The Project will allow informal recreational activities to continue along the coastal perimeter of the peninsula. The terms of continued public access to the site (*e.g.*, permitted locations, times of day, allowable activities) will be developed by the Project in consultation with local users in consideration of safety and security requirements. Signage and/or fencing will be installed around Project facility to protect public safety and other forms of public notice will also be undertaken.

Schooner Pond has traditionally been a popular recreational fishing location and is the only freshwater body on the peninsula with the ability to support recreational fishing and has been known to be stocked with trout in the past. However, it is understood that due to limited accessibility to Schooner Pond, recreational use of this area has decreased.

The operation of the transmission line extending from Victoria Junction to Seaboard is not predicted to have a substantial effect on adjacent land use as the transmission line will be within existing transmission RoWs. The operation/existence of the transmission RoW from Seaboard to the Donkin mine site may lead to an increase in hiking and ATV traffic along the RoW by increasing access along the currently non-maintained RoW. This portion of the RoW is owned by XCDM, who will grant NSPI easements over these properties to construct the new line. There is no policy prohibiting the public use of a transmission RoW; however, the land generally is not owned by NSPI and any public access would be at the discretion of the land owner (NSPI pers. comm., 2012).

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5.9.4.2 Summary of Project Residual Environmental Effects

Table 5.9.6 summarizes the residual environmental effects of the Project on Land Use.

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Table 5.9.6 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	<ul style="list-style-type: none"> Acoustic and dust mitigation measures (refer to Section 5.1.4). 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	<ul style="list-style-type: none"> 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	

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Table 5.9.6 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		
<p>KEY</p> <p>Direction: P Positive A Adverse</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>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</p> <p>Significance: S Significant N Not Significant</p>									

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5.9.5 Assessment of Cumulative Environmental Effects

In association with the Project environmental effects discussed above, an assessment of the potential cumulative environmental effects was conducted for other projects and activities that have potential to interact with the Project. Table 5.9.5 identified the potential for spatial and temporal overlap between the Project residual effects and environmental effects of other projects and activities conducted or to be conducted in the RAA. Table 5.9.7 below presents the potential cumulative environmental effects to the Land Use, and ranks each interaction with other projects as 0, 1, or 2 with respect to the nature and degree to which important Project-related environmental effects overlap with those of other projects and activities.

Table 5.9.7 Potential Cumulative Environmental Effects to Land Use

Other Projects and Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects
	Change in Land Use
Historical Coal Mining and Remediation Activities	1
Port of Sydney Dredging and Infilling	1
Maritime Link Project	1
KEY	
0 = Project environmental effects do not act cumulatively with those of other projects and activities.	
1 = Project environmental effects act cumulatively with those of other projects and activities, but the resulting cumulative effects are unlikely to exceed acceptable levels with the application of best management or codified practices.	
2 = Project environmental effects act cumulatively with those of other projects and activities and the resulting cumulative effects may exceed acceptable levels without implementation of project-specific or regional mitigation.	

The development of the Donkin mine will create changes to recreational, commercial and industrial uses including enhanced industrial use and associated economic benefits for the region. These effects will be long lasting and could overlap with similar effects on land use within the RAA. In particular, historical coal mining and remediation have changed land use within the RAA. The remediation of the old mine sites has improved land use and the potential for future redevelopment. The dredging and infilling in the Port of Sydney (including recent channel dredging and infilling) as well as the Maritime Link Project, will serve to improve industrial and commercial land use and economic benefits in the RAA.

There could be temporary and/or localized disruptions of other land uses during the construction and operation of those other projects but these have been and will be controlled through good management practices, environmental and land use permitting and public consultation. In general, there is expected to be a net cumulative benefit to industrial and commercial land use and associated economic development in an area that has been subject to economic decline in recent years. Adverse effects on land use (e.g., dust, noise, views) will not overlap spatially and/or temporally to create cumulative adverse effects on land use. Economic benefits from

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increased industrial development will create long term cumulative economic and land use benefits for CBRM.

5.9.6 Determination of Significance

The Project will directly enhance industrial land use on the Donkin Peninsula by improving and expanding existing facilities and infrastructure as well as indirectly enhance commercial, industrial and institutional land uses within CBRM from spin-off opportunities. Therefore, it is predicted that the effect of the Project on commercial, industrial and institutional land use will be long term and positive. There is predicted to be adverse effects on residential land use related to noise and dust emissions, increased traffic, and altered viewscape, as well as an adverse effect on recreational land use although these effects will be mitigated and will not be significant.

The characterization of the potential cumulative environmental effects and associated mechanisms, combined with the proposed mitigation measures proposed in Section 5.9.5.1.2 and Section 5.9.6 demonstrate that the residual cumulative environmental effect of a Change in Land Use as a result of past, present, and reasonably foreseeable projects and activities that have been or will be carried out, in combination with the environmental effects of the Project during all phases, on land use is rated not significant.

Overall, the residual adverse environmental effect on Land Use is rated not significant and there will be a positive effect on the local economy through industrial development of the coal resource.

5.9.7 Follow-up and Monitoring

No follow-up and monitoring is proposed for Land Use.

5.10 CURRENT USE OF LAND AND RESOURCES FOR TRADITIONAL PURPOSES BY THE MI'KMAQ

The Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC 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. It was selected as a VEC due to the potential for the Project to interfere with current use of land and resources for traditional purposes by the Mi'kmaq, and in accordance with Project-specific EIS Guidelines (CEA Agency 2012) and federal and provincial regulatory requirements.

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 that can meaningfully contribute to Project-related research and the environmental assessment process.

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The Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC has linkages to the following other VECs: Archaeological and Heritage Resources (Section 5.11), Commercial and Recreational Fisheries (Section 5.8), Freshwater Fish and Fish Habitat (Section 5.6), Wetlands (Section 5.4), Birds and Wildlife (Section 5.3), and Rare Plants (Section 5.5).

5.10.1 Scope of Assessment**5.10.1.1 Regulatory Setting**

The *Constitution Act, 1982* enshrines constitutional protection from Crown infringement of the rights of Aboriginal people in Canada. These rights have subsequently been recognized and protected under more recent legislation and Supreme Court decisions. For example, a number of court cases (e.g., *Haida Nation v. BC* in 2004; *Taku River Tlingit v. BC* in 2004; *Mikisew Cree v. Canada* in 2005) have found that governments have a duty to consult with Aboriginal peoples when proposed activities have the potential to adversely affect Aboriginal rights, including title, and treaty rights (NSOAA 2011a).

On August 31, 2010, the Assembly of Nova Scotia Mi'kmaq Chiefs, which represents the 13 Mi'kmaq First Nation communities in the province, signed a historic agreement with the Governments of Canada and Nova Scotia. The resultant *Terms of Reference for a Mi'kmaq-Nova Scotia-Canada Consultation Process* outlines a consultation process for the parties to follow when governments are making decisions that have the potential to adversely affect asserted Mi'kmaq Aboriginal and treaty rights (NSOAA 2011a).

With respect to the Donkin Export Coking Coal Project, the federal and provincial governments will undertake consultation activities directly with the Mi'kmaq according to the Terms of Reference. Canada and Nova Scotia will coordinate their respective consultation procedures, where appropriate, as part of the harmonized EA process for the Project (CEA Agency 2012).

In June 2009, the Province released a *Proponents' Guide: Engagement with the Mi'kmaq of Nova Scotia*, which was subsequently revised and republished in November 2011 as the *Proponents' Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia* (NS OAA 2011b). The Guide outlines how proponents can fulfill the important role they play in consultation with the Mi'kmaq of Nova Scotia. Although third parties (e.g., proponents) have no legal duty to consult, governments may delegate procedural aspects of consultation to third parties. The Guide outlines those procedural aspects (NS OAA 2011a).

To further assist the federal and provincial governments with their Mi'kmaq consultation processes, the *EIS Guidelines for the Donkin Export Coking Coal Project* (CEA Agency 2012) state that the EIS must describe the concerns raised by the Mi'kmaq in respect of the Project, and how they have been or will be considered (where applicable) and addressed (where appropriate). This is consistent with the requirements of federal and provincial EA legislation.

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Refer to Section 5.10.1.2 of this report for more information regarding the Influence of Consultation and Engagement on the Assessment.

The definition of “environmental effect” under CEAA includes the effect of any project-related environmental change on “...current use of lands and resources for traditional purposes by Aboriginal persons” (Section 2(b)(iii)). Federal EAs must therefore determine if a project will affect such current use and, if so, the EA must also prescribe mitigation (if appropriate) for any demonstrated adverse environmental effects.

The Environmental Assessment Regulations pursuant to the Nova Scotia *Environment Act* require that all provincial EAs identify and address the concerns of Aboriginal people regarding the adverse effects or the environmental effects of the proposed undertaking (Sections 9(1A)(xiii)-(xv)). Furthermore, when formulating an EA decision, the Minister shall consider the concerns expressed by Aboriginal people, the steps taken by the proponent to address those concerns, and existing land use in the area of the undertaking (Sections 12(c), (d), and (g)).

The EIS Guidelines require assessment of Project-related environmental effects on Current Use of Land and Resources for Traditional Purposes by the Mi’kmaq (including any traditional hunting, fishing, trapping, gathering, cultural, spiritual, or ceremonial activities that could be adversely affected by the Project) and the prescription of measures to avoid, mitigate, compensate or accommodate adverse effects. The Guidelines also require consideration of potential social and/or economic effects to the Mi’kmaq that may arise as a result of any change in the environment due to the Project.

In addition to the above, the EIS Guidelines require incorporation of traditional and local knowledge gathered through a Mi’kmaq Ecological Knowledge Study (MEKS) undertaken as per the *Mi’kmaq Ecological Study Protocol* ratified by the Assembly of Nova Scotia Mi’kmaq Chiefs on November 22, 2007 (Assembly 2007). Accordingly, a Protocol-compliant MEKS was conducted by Membertou Geomatics Solutions (MGS) for the Donkin Export Coking Coal Project (MGS 2012). The complete MEKS report is appended to this EIS (Appendix C).

A previous MEKS was carried out by MGS in 2006 in association with the provincial EA Registration for the exploratory phase of the Project (CBCL 2008). Selected information from that earlier MEKS (MGS 2006) is referenced where relevant to the environmental effects assessment for the Current Use of Land and Resources for Traditional Purposes by the Mi’kmaq VEC. However, the results of the 2012 Project-specific MEKS are deemed an accurate and up-to-date representation of Mi’kmaq traditional use within the area currently under assessment.

The Proponent’s commissioning of an MEKS in no way removes or replaces the Crown’s duty to consult with the Mi’kmaq, and the MEKS cannot be used for justification of the infringement of Aboriginal rights under Section 35 of the *Constitution Act, 1982*. Furthermore, Proponent-

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initiated Mi'kmaq engagement efforts conducted in support of the EA (refer to Section 3.3) are not intended to fulfill or substitute governmental consultation obligations.

5.10.1.2 Influence of Consultation and Engagement on the Assessment

During the Mi'kmaq engagement process, the main issues raised included updating the original MEKS, developing training, employment and procurement opportunities for First Nations people and firms, and consideration of involving the Unama'ki Institute of Natural Resources (UINR) in the fisheries studies. Additional environmental concerns included wastewater treatment, tailings, methane monitoring, and coal dust on site and during transportation.

5.10.1.3 Selection of Environmental Effects and Measurable Parameters

The environmental assessment of Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq is focused on the following environmental effect:

- Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq.

This environmental effect was selected due to the potential for the Project to alter or otherwise affect areas and resources currently used by Mi'kmaq people for traditional purposes such as hunting, fishing, trapping, gathering, cultural, spiritual, or ceremonial activities. As specified under CEAA, the focus of this VEC is on current use of land and resources for traditional purposes by the Mi'kmaq of Nova Scotia, although the MEKS also addresses past use and occupation by the Mi'kmaq.

The environmental effect used for the assessment, measurable parameters, and the rationale for their selection are provided in Table 5.10.1.

Table 5.10.1 Measurable Parameters for Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Environmental Effect	Measurable Parameter	Rationale for Selection of the Measurable Parameter
Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq	<ul style="list-style-type: none"> • Documented current use of land and resources for traditional purposes by the Mi'kmaq • Project effects on traditional land access • Change in habitat that could affect resource use for traditional purposes • Potential social and/or economic effects to the Mi'kmaq that may arise as a result of any change in the environment due to the Project 	<p>A key consideration in the assessment of environmental effects of the Project on this VEC is whether or not the land and resources are currently used by the Mi'kmaq for traditional purposes, including hunting, fishing, trapping, gathering, cultural, spiritual, or ceremonial purposes.</p> <p>In addition to the above, the EIS Guidelines require consideration of potential social and/or economic effects to the Mi'kmaq that may arise as a result of any change in the environment due to the Project.</p>

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5.10.1.4 Temporal and Spatial Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq include the periods of construction, operation and maintenance, and decommissioning and reclamation. Temporal boundaries also consider periods of enhanced biological sensitivity for resource species and times used for resource harvesting with respect to current use for traditional purposes (e.g., fishing and hunting and gathering).

The spatial boundaries for the environmental effects assessment of Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq are defined below.

Project Development Area (PDA): The PDA includes the area of physical disturbance (*i.e.*, “footprint” for the Project), including infrastructure for the mine site as well as stockpiles, coal waste piles, conveyor system, 138 kV transmission line, and trucking routes. The PDA also includes the barge load-out facility and transshipment mooring and vessel route between the two.

Local Assessment Area (LAA): For the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC, the LAA is defined as the Donkin Peninsula, the RoW for the transmission line heading west from Donkin Mine to Marconi Towers, and the proposed marine transshipment site in Mira Bay, as well as locations in the immediate vicinity (*i.e.*, within 50 m) of these identified areas, including nearshore waters around Donkin Peninsula and the transshipment site. The spatial boundaries of this LAA are consistent with the boundaries of the area that was considered in the MEKS for the analysis of traditional use activities.

Regional Assessment Area (RAA): The RAA is the area within which cumulative environmental effects for Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq may occur, depending on physical and biological conditions and the type and location of other past, present, and reasonably foreseeable projects. The scope of the Project-specific MEKS report (MGS 2012; Appendix C) includes the LAA (referred to in the 2012 MEKS report as the Project Site) within a larger MEKS Study Area that extends 5 km in all directions around the lands and waters of the LAA (from the edge) and encompasses the areas of Donkin, Glace Bay, Birch Grove, Port Morien, South Port Morien, and into the Atlantic Ocean, as indicated on Map A in the MEKS (Appendix C). The RAA is limited to and includes the MEKS Study Area defined above.

5.10.1.5 Residual Environmental Effects Description Criteria

Terms that will be used to characterize residual environmental effects for Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq are presented in Table 5.10.2.

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Table 5.10.2 Characterization Criteria for Residual Environmental Effects on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Criterion	Description
Direction	<p>Positive: condition is improving compared to baseline status</p> <p>Neutral: no change compared to baseline status</p> <p>Adverse: negative change compared to baseline status</p>
Magnitude	<p>Negligible: no measurable adverse effects anticipated</p> <p>Low: no net loss in the availability of or access to land and/or resources currently used for traditional purposes by the Mi'kmaq</p> <p>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</p> <p>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</p>
Geographical Extent	<p>Site-specific: effects restricted to within the Project Development Area</p> <p>Local: effects extend beyond Project footprint but remain within the local assessment area</p> <p>Regional: effects extend into the regional assessment area</p>
Frequency	<p>Once: effect occurs once</p> <p>Sporadic: effect occurs more than once at irregular intervals</p> <p>Regular: effect occurs on a regular basis and at regular intervals</p> <p>Continuous: effect occurs continuously</p>
Duration	<p>Short-term: effects are measurable for days to a few months</p> <p>Medium-term: effects are measurable for many months to two years</p> <p>Long-term: effects are measurable for multiple years but are not permanent</p> <p>Permanent: effects are permanent</p>
Reversibility	<p>Reversible: effects will cease during or after the Project is complete</p> <p>Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation works</p>
Ecological Context	<p>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</p> <p>Undisturbed: effect takes place in an area that has not been adversely affected by human development</p>

5.10.1.6 Threshold for Determining the Significance of Residual Environmental Effects

A **significant adverse residual environmental effect** on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq is defined as a Project-related environmental effect that results in a long-term, unaccommodated loss of the availability or access to land and resources that are currently used by the Mi'kmaq for traditional purposes, such that these lands and resources cannot continue to be used by the Mi'kmaq at current levels within the LAA for more than one year.

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5.10.2 Existing Conditions

The Mi'kmaq have occupied the land and used the resources of Nova Scotia for millennia, long before first European contact in the 16th century (NS Museum 1996). The earliest evidence of aboriginals populating Mainland Nova Scotia, found at the foot of the south slopes of the Cobequid Mountains at present day Debert, indicates that the area was occupied approximately 11,000 years ago by Paleo-Indian peoples (MGS 2012).

At the time of first European contact, the territory of the Mi'kmaq comprised seven traditional political districts scattered across Atlantic Canada and the Gaspé Peninsula in Quebec, including Unama'ki (*i.e.*, the Mi'kmaq term for Cape Breton Island) (MGS 2012). Prehistoric Mi'kmaq artifacts and archaeological sites dating as far back as the Archaic Period (9,000-2,500 years before present) have been recorded in Cape Breton. These include discoveries at Ingonish Island, Grand River, Loch Lomond, Troy Beach, Little Narrows, Belfry Lake, Fourchu Bay, Cheticamp Island, and Mira River (MGS 2012).

Section 5.11 (Archaeological and Heritage Resources VEC) contains further information regarding potential for Mi'kmaq archaeological resources.

Today, there are five Mi'kmaq communities in Cape Breton: Membertou First Nation, Eskasoni First Nation, Waycobah First Nation, Wagmatcook First Nation, and Potlotek First Nation. An overview of these communities is presented in Table 5.10.3.

Table 5.10.3 Characteristics of Cape Breton Mi'kmaq Communities, 2011

Reserve	Size (ha)	Location	Total Population as of December 2011 (On and Off-Reserve)
Membertou First Nation			
Membertou #28B	45.2	1.6 km south of Sydney	1,288
Caribou Marsh #29	219.3	8 km southwest of Sydney	
Sydney #28A	5.1	1.6 km northeast of Sydney	
Malagawatch #4 *	132.26	62.4 km southwest of Sydney	
Eskasoni First Nation			
Eskasoni #3	3,504.6	40 km southwest of Sydney	4,060
Eskasoni #3A	28.5	40 km southwest of Sydney	
Malagawatch #4 *	132.26	62.4 km southwest of Sydney	
Waycobah First Nation			
Whycocomagh #2	828.5	70.4 km west of Sydney	943
Malagawatch #4 *	132.26	62.4 km southwest of Sydney	

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Table 5.10.3 Characteristics of Cape Breton Mi'kmaq Communities, 2011

Reserve	Size (ha)	Location	Total Population as of December 2011 (On and Off-Reserve)
Wagmatcook First Nation			
Wagmatcook #1	319.7	51.2 km west of Sydney	761
Margaree #25	8	68.8 km northwest of Sydney	
Malagawatch #4 *	132.26	62.4 km southwest of Sydney	
Potlotek First Nation			
Chapel Island #5	592.5	68.8 km southwest of Sydney	665
Malagawatch #4 *	132.26	62.4 km southwest of Sydney	
* Malagawatch #4 is 661.3 ha in size, with 20% or 132.26 ha held by each of the following five Reserves: Chapel Island, Sydney, Eskasoni, Wagmatcook, and Whycocomagh.			

CBU n.d.

The nearest Mi'kmaq community to the LAA is Sydney #28A (Membertou First Nation), located approximately 26.5 km to the west of the Donkin Peninsula. The two next closest Mi'kmaq communities to the LAA also belong the Membertou First Nation; Membertou #28B and Caribou Marsh #29 are located approximately 27.8 km and 32.2 km to the southwest of the Donkin Peninsula, respectively.

Mi'kmaq Ecological Knowledge Study

The Project-specific MEKS carried out by MGS (2012) identifies Mi'kmaq traditional use activities that have taken place or currently are taking place within the LAA (referred to as the Project Site in the MEKS) and surrounding RAA (referred to as the Study Area in the MEKS), as well as any Mi'kmaq traditional ecological knowledge that presently exists with respect to those areas.

The two main components of the Project-specific MEKS are:

- A study of past and present Mi'kmaq traditional land and resource use activities (using interviews as the key source of information); and
- A Mi'kmaq species significance analysis considering resources that are important to Mi'kmaq use.

As a first step to gathering traditional use data, the MGS MEKS team initiated dialogue and correspondence with the five Mi'kmaq First Nations in Cape Breton (refer to Table 5.10.3). Discussions occurred regarding the identity of individuals who undertake traditional land use activities, or those who are knowledgeable of the land and resources, and an initial list of key

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people was developed by the MGS team. These individuals were then contacted by MGS and interviews were scheduled (MGS 2012).

For this MEKS, 19 interviews were undertaken by MGS and 38 individuals provided information in regards to past and present traditional use activities. All interviewees resided within or were from the five aforementioned Mi'kmaq communities (MGS 2012). All of the interviews were completed in accordance with the *Mi'kmaq Ecological Knowledge Study Protocol* (Assembly 2007).

In addition to interviews, a combination of desktop research and site visits were also used to identify past and present land and resource uses and features of the LAA and RAA which are of particular importance to the Mi'kmaq people. Further details about the methods employed for the MEKS are provided in the attached MEKS report (Appendix C).

The MEKS found that the Mi'kmaq have historically undertaken traditional use activities in the LAA and RAA, and that these practices continue to occur today in varying locations and at varying times of year. Much of the following information has been sourced from the Project-specific MEKS prepared by MGS (2012). Other sources are cited where applicable. Appendix C includes additional information collected in the course of the 2012 MEKS regarding Mi'kmaq historical and current use land and resources for traditional purposes.

Mi'kmaq Traditional Use Activities

The primary Mi'kmaq traditional use activity that currently takes place in the LAA and RAA is fishing in the coastal waters of the region, with lobster being the most fished species by a considerable margin. Other land and resource uses that occur in both the LAA and the RAA include brush picking and gathering. Hunting areas and a cultural site were identified within the wider RAA only.

Use of Land and Resources for Traditional Fishing Purposes

Fishing is an important tradition and commercial activity for the Mi'kmaq, and the commercial lobster fishery is the most important traditional use activity identified in the MEKS.

In the LAA, 14 traditional lobster fishing areas were identified in the waters surrounding Donkin Peninsula, from Donkin to Long Beach, and into the Atlantic Ocean. Other species fished in the LAA, but to a relatively lesser degree, are mackerel, eel, flounder, gaspereau, and crab.

Within the greater RAA, 47 lobster fishing areas were identified in the following general regions: surrounding the Donkin Peninsula; from Donkin to Long Beach; from Donkin to near Glace Bay; from Long Beach to Morien Bay; surrounding South Head; from South Port Morien to Waddens Cove; past False Bay; and into the Atlantic Ocean.

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The RAA also includes 11 mackerel fishing areas. These are generally located offshore from Glace Bay to Big Glace Bay; offshore from Donkin to Schooner Pond; offshore from Wreck Point to Northern Head, on the Donkin Peninsula, and into Morien Bay; from Long Beach to Arnold Point, south of Port Morien; and offshore near South Port Morien from Campbell Point to the tip of South Head.

Ten crab fishing areas were described by interviewees in the following general areas of the RAA: offshore from Glace Bay to Big Glace Bay; offshore from Donkin to Schooner Pond; offshore from Wreck Point to Northern Head, on the Donkin Peninsula, and into Morien Bay; and from Long Beach to Arnold Point, south of Port Morien.

Other species fished in the RAA, to a relatively lesser degree than those mentioned above, are trout, eel, smelt, flounder, and gaspereau.

Most of the aforementioned fishing activity in the LAA and RAA was identified by MEKS interviewees as fishing for commercial purposes, although not necessarily under commercial licenses, and the majority of this fishing activity (69 percent in the LAA and 66 percent in the RAA) was classified as current use.

The MEKS did not identify any fishing conducted exclusively for the purposes of food, social or ceremonial (FSC) uses. However, each Mi'kmaq First Nation has a single FSC fishery license which loosely regulates the species, location, and tagging process. Although there is currently minimal FSC fishing activity in the LAA, Morien and Mira Bays are licensed and there is potential for those areas to become more heavily fished for FSC purposes in the future depending on species availability and interests. From a FSC perspective, all species are important, not just the commercially valuable ones such as lobster and crab, and some concern has recently been expressed by the Mi'kmaq that the importance of non-commercial fisheries should not be overlooked (J. Couture, DFO, pers. comm. 2012). Additional information regarding the FSC fishery has been requested from the Mi'kmaq Rights Initiative (also known as the Kwilmu'kw Maw-klusuaqn or KMKNO).

The previous MEKS for the Donkin underground exploration project (MGS 2006) similarly identified lobster fishing as a major traditional use activity in the area. The findings of that earlier MEKS indicate that the coastal waters surrounding Donkin, Glace Bay, and Big Glace Bay were utilized for individual food fishery lobster fishing in addition to commercial fishing. It is possible, but unconfirmed, that individual food/sustenance lobster fishing activities may still take place in those areas and/or in other portions of the LAA or RAA.

Other fishing activity reported in the 2006 MEKS includes urchin harvesting off the waters of Glace Bay as well as at Port Morien to Phalen's Bay, inland eel and salmon fishing, and scallop harvesting and cod fishing in the coastal waters around Donkin (MGS 2006).

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Use of Land and Resources for Traditional Hunting and Trapping Purposes

No Mi'kmaq hunting or trapping activities are known to occur in the LAA; however, MEKS interviewees identified the following hunting areas toward the western extent of RAA: a rabbit hunting area located near McLeods Crossing, a deer hunting area situated near McKays Corner, and a partridge hunting area between McLeods Crossing and McKays Corner. A second rabbit hunting area in the RAA is situated in Birch Grove, several kilometres to the southeast of the other hunting areas mentioned above.

Use of Land and Resources for Traditional Gathering/Harvesting Purposes

Some members of the Mi'kmaq community gather pine cones and engage in brush picking for commercial purposes (*i.e.*, for the production of Christmas wreaths that are offered for sale) within the LAA. The Project transmission line corridor crosses an area to the south of Big Glace Bay where these traditional Mi'kmaq activities currently take place.

Gathering activities within the greater RAA primarily consist of blueberry gathering near McLeods Crossing and McKays Corner, with brush picking and gathering of mayflowers and pine cones also occurring to a relatively lesser degree. The majority of this gathering activity (67 percent) was reported as current use.

When the previous MEKS was conducted in 2006, interviewees identified additional traditional plant resources that the Mi'kmaq harvested for food, medicinal, and spiritual purposes. Blackberries, blueberries, cranberries, and raspberries were all identified as being harvested for food in the Donkin area. In addition, the following traditional Mi'kmaq medicinal plants were reported around the Donkin area, Glace Bay, and Schooner Pond: balsam, cherry bark, cow parsnip, flagroot, tamerak, yarrow, dogwood, golden thread, and cedar. Sweetgrass was also found to be harvested in some coastal areas surrounding Big Glace Bay through to Schooner Pond (MGS 2006).

Harvesting of natural resources for artwork and the construction of various tools was also reported in the 2006 MEKS. Mi'kmaq have used the Port Morien area for the harvesting of ash and maple trees and have collected flint stones from Flint Island, which is located off the coast of the Donkin Peninsula (MGS 2006).

Use of Land and Resources for Traditional Cultural Purposes

Big Glace Bay Lake in the RAA was identified as a cultural site because eagles had been sighted in the area as recently as 2011. An eagle sighting is generally considered an event of cultural importance to the Mi'kmaq.

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Resources of Importance for Mi'kmaq Use

During field visits carried out by MGS in support of the MEKS, the following plant species of potential importance to the Mi'kmaq were noted throughout the LAA: sage, golden thread, lichen, Labrador tea, raspberry, blueberry, strawberry, blackberry, snowberry, bunchberry, huckleberry, and fox berry. Trees including alder, apple, willow, cherry, birch, mountain ash, hazelnut, spruce, and tamarack were also found. Habitat areas and signs of deer, eagle, coyote, and rabbit were also visible throughout the LAA.

The MEKS identified several resource and land/water use areas within the LAA and RAA that continue to be utilized by the Mi'kmaq to varying degrees (refer to Table 5.10.4).

Table 5.10.4 Resources of Traditional Importance to the Mi'kmaq Identified as Occurring within the LAA and RAA (MGS 2012)

Type of Use	Number of Areas		Number of Resources	
	Within LAA	Within RAA	Within LAA	Within RAA
Food/Sustenance	21	104	6	14
Medicinal/Ceremonial	0	1	0	1
Tools/Art	2	3	2	3

With the exception of American eel, which has been designated as a species of special concern by COSEWIC, none of the species of plants or animals identified by interviewees within the LAA or RAA are rare. All other species identified by MEKS interviewees in 2012 are considered common and abundant throughout Nova Scotia.

5.10.3 Potential Project-VEC Interactions

Table 5.10.5 below lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1, or 2 based on the level of interaction each activity or physical work will have with the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC.

Table 5.10.5 Potential Project Environmental Effects on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Project Activities and Physical Works	Potential Environmental Effect
	Change in Land and Resource Use for Traditional Purposes by the Mi'kmaq
Construction	
Site Preparation (incl. clearing, grading and excavation)	2
Construction of Mine Site Infrastructure and Underground Preparation	2
Construction of 138 kV Transmission Line	2

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Table 5.10.5 Potential Project Environmental Effects on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Project Activities and Physical Works	Potential Environmental Effect
	Change in Land and Resource Use for Traditional Purposes by the Mi'kmaq
Construction of Barge Load-out Facility (incl. dredging, infilling and habitat compensation)	2
Installation of Transshipment Mooring	2
Operation and Maintenance	
Underground Mining	0
Coal Handling and Preparation (incl. coal washing and conveyance)	2
Water Treatment (incl. mine water and surface runoff)	1
Coal and Waste Rock Disposal	2
Marine Loading and Transportation	2
Coal Trucking	0
Decommissioning and Reclamation	
Site Decommissioning	1
Site Reclamation	1
0 = No interaction 1 = Interaction occurs; however, based on past experience and professional judgment, the resulting effect can be managed to acceptable levels through standard operating practices and/or through the application of best management or codified practices. No further assessment is warranted. 2 = Interaction occurs, and resulting effect may exceed acceptable levels without implementation of specified mitigation. Further assessment is warranted.	

No Project activities during the construction phase received a ranking of 0 or 1 in Table 5.10.5. Underground mining and coal trucking activities during the operation and maintenance phase of the Project will have no interaction with Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq. Underground mining activities will take place entirely below the surface of the ground and beneath the seabed. These sub-surface mining operations will not be perceptible above-ground and will not restrict or otherwise affect current use of terrestrial or marine land/water and resources for traditional purposes by the Mi'kmaq.

Coal trucking activities, if required for delivery to domestic customers or should marine transportation becomes impractical at any time, will be carried out along a route that follows existing roads and highways. The lands comprising the haul route have been previously disturbed (*i.e.*, cleared and paved) and are currently subject to routine car and truck traffic. Therefore, coal trucking activities will not affect current land and resource use for traditional purposes by the Mi'kmaq.

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As indicated by the rankings of 1 in Table 5.10.5, water treatment activities during the operation and maintenance phase of the Project will interact with Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq in such a way that is not anticipated to lead to significant environmental effects. Passive and active water treatment systems will remove fines and potential acidic contamination from mine wastewater and site runoff prior to discharge into the marine environment. In so doing, operation of the water treatment system will protect marine water quality, an important component of fish habitat, thus minimizing potential Project effects on marine Mi'kmaq fisheries in the LAA.

The serpentine pond and DEVCO settling pond, two anthropogenic bodies of freshwater that form components of the passive water treatment system have supported brook trout in the past. These two ponds represent a negligible proportion of the freshwater resources in the region, and the MEKS did not identify any current or historical Mi'kmaq trout fishing within the LAA (where the ponds are situated). Operation of the water treatment system is therefore considered unlikely to substantially interact with current use of freshwater resources for traditional purposes by the Mi'kmaq.

Project decommissioning and site reclamation activities will similarly interact with the VEC in such a way that is not anticipated to lead to significant environmental effects.

One of the objectives of Project decommissioning and site reclamation will be to restore land affected by mining to conditions capable of supporting prior land use, equivalent uses, or other environmentally acceptable uses (refer to Section 2.5.3 [Site Decommissioning]). These Project activities are therefore anticipated to have a neutral or positive effect on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq.

In consideration of the nature of the interactions and the planned implementation of known and proven mitigation, the potential environmental effects of all Project activities and physical works that were ranked as 0 or 1 in Table 5.10.5, on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq during any phase of the Project are rated not significant, and are not considered further in the assessment. The remainder of interactions noted in Table 5.10.5 have been ranked as 2 and are discussed in the following sections.

5.10.4 Assessment of Project-Related Environmental Effects**5.10.4.1 Assessment of Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq****5.10.4.1.1 Potential Environmental Effects**

Project construction, operation and maintenance activities have potential to affect Mi'kmaq land and resource use for current and future generations. Potential Project-related changes in marine and terrestrial habitats could affect traditional land/water use by the Mi'kmaq. Restricted access to the PDA (including mine site and marine construction area) during construction could

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constrain First Nations fishing, hunting, and harvesting opportunities. During Project operation and maintenance, the presence of terrestrial and marine infrastructure associated with the mine facility and ongoing Project activities could similarly restrict Mi'kmaq fishing, hunting, and harvesting opportunities.

Potential effects of any Project-induced change in the environment on heritage and archaeological resources in the LAA that are of importance or concern to the Mi'kmaq are discussed in Section 5.11 (Archaeological and Heritage Resources).

Construction

Site preparation will include clearing and grubbing of vegetation, potentially including removal or destruction of resources (e.g., species or habitats) of traditional importance to the Mi'kmaq. Construction of mine site infrastructure similarly has potential to result in removal or destruction of such resources.

As noted in Section 5.10.2, the RoW for the transmission line intersects an area south of Big Glace Bay where current pine cone gathering and brush picking activities are known to be carried out by the Mi'kmaq. This portion of the transmission line corridor is presently overgrown and will need to be cleared to facilitate construction of the 138 kV transmission line. Clearing of the RoW may remove or destroy pine cone and brush resources locally. In addition, general construction activity within the RoW will temporarily restrict access to the area, thereby obstructing Mi'kmaq use of the land and resources within the portion of the RoW under active construction. Given that the gathered resources are used to make wreaths that are sold for profit, potential Project-related interference with this traditional activity could result in a loss or reduction of income for some Mi'kmaq.

American eel were observed in two streams along the transmission line corridor and have potential to inhabit other water bodies on the Donkin Peninsula and along the transmission line route (refer to Section 5.6 [Freshwater Fish and Fish Habitat]). As noted in Section 5.10.2, eels are a species of traditional importance to the Mi'kmaq that is also designated as a species of special concern by COSEWIC. Potential Project-related disturbances to eel habitat, as described in Section 5.6 (Freshwater Fish and Fish Habitat), could therefore have an adverse effect on Mi'kmaq use of the resource.

Construction of the barge load-out facility and installation of transshipment mooring will be carried out in the marine environment and therefore have potential to interact with traditional Mi'kmaq fishing activities in the LAA.

The results of the Project-specific MEKS (MGS 2012) clearly indicate that the waters of the LAA and surrounding area are fished commercially by the Mi'kmaq for lobster, crab, mackerel, and other fish species (refer to Section 5.10.2). Potential environmental effects on fish, fish habitat,

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and commercial fishing activity could therefore compromise an important source of income for the Mi'kmaq and thus have adverse socio-economic effects.

As described in Section 5.8 (Commercial and Recreational Fisheries), fishery resources have potential to be adversely affected by Project-related interactions with fish and fish habitat (*i.e.*, suspension of sediment, loss of benthic habitat, direct mortality of fish species, dispersion of fish stocks), while marine construction activities and related Project vessel traffic may interfere with Mi'kmaq fishing gear, conflict with the navigation of Mi'kmaq fishing vessels, and/or prevent Mi'kmaq fishermen from accessing their traditional fishing grounds.

Operation and Maintenance

Coal and waste rock disposal during Project operation and maintenance will occupy a large surface area of land (*i.e.*, coal waste disposal piles) that otherwise potentially could have been used for traditional purposes by the Mi'kmaq. Coal handling and preparation operations, including associated stockpile areas, will similarly occupy land that otherwise potentially could have been used for traditional purposes by the Mi'kmaq. It is noted that most of the lands above high water are currently owned by XCDM, and public access is available only by company permission. Public access to the mine site will be restricted during Project operations for the protection of public safety and security. However, a certain amount of public access to the Donkin Peninsula will be maintained, in accordance with the terms of special access agreements.

The permanent loss of fish habitat within the footprint of the barge load-out facility may continue to affect Mi'kmaq fishery resources during Project operations. Marine loading and transportation operations will result in increased vessel traffic in the waters between the barge load-out facility and transshipment mooring. This increase in marine activity has potential to cause ongoing conflict with traditional Mi'kmaq fishing due to potential interference with fishing gear, obstruction of fishing vessel navigation, and/or access restrictions to traditional Mi'kmaq fishing grounds (refer to Section 5.8, Commercial and Recreational Fisheries).

Decommissioning and Reclamation

Potential Project-VEC interactions associated with site decommissioning and site reclamation received rankings of 1 in Table 5.10.5 and were therefore assessed in Section 5.10.3 above.

5.10.4.1.2 Mitigation of Project Environmental Effects

Potential adverse Project effects on the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC will be mitigated through implementation of the recommendation stated in the Project-specific MEKS report. Accordingly, "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).

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As summarized below, the remaining mitigation measures proposed for the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC are broadly the same as those prescribed for other related VECs:

- Project effects on Mi'kmaq fisheries will be reduced through implementation of the mitigation measures and accommodation outlined for the Commercial and Recreational Fisheries VEC;
- Mitigation carried out in support of the biophysical environment (*i.e.*, the Freshwater Fish and Fish Habitat, Marine Environment, Birds and Wildlife, Wetlands, and Rare Plants VECs) will protect habitats and species of traditional importance to the Mi'kmaq;
- Potential Project-related restrictions on Mi'kmaq land access will be addressed through implementation of the mitigation measures outlined for the Land Use VEC; and
- The mitigation measures proposed for the Archaeological and Heritage Resources VEC will minimize potential Project effects on sites or artifacts of archaeological or heritage importance to the Mi'kmaq.

5.10.4.1.3 Characterization of Residual Project Environmental Effects

Construction

Even with the application of mitigation measures described in Section 5.10.4.1.2, some traditionally important resources (*e.g.*, individuals of traditionally important plant and animal species, as well as some habitat supporting these species) may be lost as a result of direct and indirect environmental effects associated with Project construction. In addition, site restrictions during construction will result in a temporary loss of access for traditional Mi'kmaq use, while land development and construction of Project infrastructure will lead to permanent loss of land and resources that otherwise potentially could have been used for traditional purposes by the Mi'kmaq.

Portions of the mine site will be restored to conditions capable of supporting prior land use, equivalent uses, or other environmentally acceptable uses during the decommissioning and site reclamation phase of the Project, and mine closure activities will be carried out in consideration of natural environments that could potentially support resources traditionally used by the Mi'kmaq. While decommissioning and reclamation will restore a portion of the site to a more natural state, some facilities (*e.g.*, those associated with ongoing monitoring and maintenance, including access roads) are unlikely to be deactivated in the foreseeable future.

With the exception of American eel, all other plant and animal species identified in the MEKS as valuable for Mi'kmaq use and are considered common and abundant throughout Nova Scotia (MGS 2012). It is also anticipated that several alternative eel fishing areas are available for

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Mi'kmaq use nearby but outside of the LAA. It is therefore expected that these resources can be readily accessed by the Mi'kmaq for traditional use elsewhere nearby.

A certain degree of residual Project-related interference with pine cone gathering and brush picking within the RoW is unavoidable during construction of the power transmission line. These resources are common and abundant throughout Nova Scotia and can be gathered at alternative sites.

Traditional Mi'kmaq land use will be affected by access restrictions within the active work area during construction in the RoW for the power transmission line. However, Project construction activities and associated access restrictions within the RoW will be temporary, and the presence of the transmission line and associated poles during Project operation and maintenance will not substantively restrict land use in the surrounding area. Therefore, it is expected that level of public access to the RoW will be restored to near baseline conditions following construction and that Mi'kmaq use of the land and resources in the RoW can continue thereafter, albeit subject to certain terms and conditions related to landowner permission. It is likely that access along the currently abandoned and overgrown section of the RoW will improve after installation of the transmission line.

During Project construction, current Mi'kmaq fishing activity, including the Mi'kmaq commercial lobster fishery, will be subject to residual effects similar to those described for the Commercial and Recreational Fisheries VEC (Section 5.8). Habitat compensation work will be carried out to achieve no net loss in the productive capacity of fish habitat. Marine construction vessel activity will be mainly concentrated around the barge load-out facility during certain periods over an approximate two-year period of marine construction, and Mi'kmaq fishermen traditionally fishing within the footprint of the barge load-out facility may be displaced during construction and operation and maintenance. However, given that 47 lobster fishing areas, 11 mackerel fishing areas, and 10 crab fishing areas were identified within 5 km of the Donkin Peninsula (MGS 2012; refer to Section 5.10.2), this footprint represents a relatively small area of fishing grounds relative to the harvestable area around the peninsula. The Project will provide reasonable accommodation to Mi'kmaq fishers whose access to traditional fishing areas is demonstrably affected by Project infrastructure and activities.

Operation and Maintenance

During Project operation and maintenance, mine site infrastructure, coal waste disposal piles, mining activities and site access restrictions will preclude Mi'kmaq use of that land and associated resources for traditional purposes. The MEKS reports no traditional land-based activities on the Donkin Peninsula and land occupied for these Project activities will represent a very small proportion of land and resources available for Mi'kmaq use in the surrounding area.

During Project operation and maintenance, current Mi'kmaq fishing activity will be subject to residual effects similar to those described for the Commercial and Recreational Fisheries VEC

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(Section 5.8). The Project will work with local Mi'kmaq fishermen to accommodate those who demonstrate they will be displaced from traditional fishing grounds within the barge load-out facility and transshipment facility footprints. Ongoing consultation with the Mi'kmaq fishing community and charting of Project vessel routes will serve to minimize effects on navigation and interference with fishing gear. The Project will develop a compensation policy to address gear loss and/or damage attributable to Project activities.

Like other residents of Cape Breton and Nova Scotia in general, it is expected that Mi'kmaq will be positively socio-economically affected by the expenditures and economic spinoffs resulting from the Project and from potential employment, recruitment, and training initiatives during all phases of the Project.

In accordance with the single recommendation of the 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).

5.10.4.2 Summary of Project Residual Environmental Effects

Table 5.10.6 summarizes the residual environmental effects of the Project on Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq.

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Table 5.10.6 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	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Birds and Wildlife (Section 5.3); Wetlands (Section 5.4); Rare Plants (Section 5.5); Freshwater Fish and Fish Habitat 	A	M	S/L	ST/ LT	O	R/P	U/D	N	<ul style="list-style-type: none"> Recommended follow-up and monitoring associated with the following VECs will be implemented: <ul style="list-style-type: none"> Birds and Wildlife (Section 5.3); Wetlands (Section 5.4); Rare Plants (Section 5.5); Freshwater Fish and Fish Habitat (Section 5.6); Marine Environment (Section 5.7); Commercial and Recreational Fisheries (Section 5.8); Land Use (Section 5.9); and Archaeological and Heritage Resources (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	

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Table 5.10.6 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		
	(Section 5.6); - Marine Environment (Section 5.7); - Commercial and Recreational Fisheries (Section 5.8); - Land Use (Section 5.9); and - Archaeological and Heritage Resources (Section 5.11).								
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			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			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			

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Table 5.10.6 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		
<p>used for traditional purposes by the Mi'kmaq</p> <p>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</p> <p>Geographic Extent:</p> <p>S Site: effects restricted to within the PDA</p> <p>L Local: effects extend beyond Project footprint but remain within the LAA</p> <p>R Regional: effects extend into the RAA</p>	<p>C Continuous: effect occurs continuously</p> <p>Reversibility:</p> <p>R Reversible: effects will cease during or after the Project is complete</p> <p>I Irreversible: effects will persist after the life of the Project, even after habitat restoration and compensation works</p>								

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5.10.5 Assessment of Cumulative Environmental Effects

Table 5.10.7 presents the potential cumulative environmental effects to the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC, and ranks each interaction with other projects as 0, 1, or 2 with respect to the nature and degree to which important Project-related environmental effects overlap with those of other projects and activities.

Table 5.10.7 Potential Cumulative Environmental Effects to Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

Other Projects and Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects
	Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq
Historic Coal Mining and Remediation Activities	1
Ongoing Fishing Activity	1
KEY	
0 = Project environmental effects do not act cumulatively with those of other projects and activities.	
1 = Project environmental effects act cumulatively with those of other projects and activities, but the resulting cumulative effects are unlikely to exceed acceptable levels with the application of best management or codified practices.	
2 = Project environmental effects act cumulatively with those of other projects and activities and the resulting cumulative effects may exceed acceptable levels without implementation of project-specific or regional mitigation.	

The Donkin Export Coking Coal Project will result in residual changes to Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq. Project-related effects on access to and availability of land and resources of traditional importance to the Mi'kmaq, including traditional Mi'kmaq fishing areas, will be long-lasting and have potential to overlap with similar effects on traditional Mi'kmaq land and resource use within the RAA. In particular, historical coal mining and remediation activities and ongoing fishing activity in the RAA have potential to interact cumulatively with the Project to affect Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq. However, as indicated by the ranking of 1 in Table 5.10.7, the resulting cumulative effects are unlikely to exceed acceptable levels with the application of best management or codified practices.

The past Donkin underground exploration project involved exploratory mining work as well as care and maintenance of the project site on the Donkin Peninsula. The majority of related project activities were carried out underground and therefore had little interaction with the use of land and resources for traditional purposes by the Mi'kmaq. Aboveground project activities resulted in land disturbance and the potential loss of some species or habitats of traditional importance to the Mi'kmaq. Public access was also restricted in certain areas of the Donkin Peninsula (*i.e.*, active work areas) for safety and security reasons, thus limiting Mi'kmaq access. Because these past effects on access to and availability of land and resources for traditional Mi'kmaq use occurred in the immediate vicinity of the current Donkin Export Coking Coal Project, the effects may be perceived by the affected Mi'kmaq to be continuous. However, the

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application of Project-specific mitigation will effectively minimize potential cumulative effects. Remediation of former mines through the ECBC Mine Site Closure Program has generally had a positive effect on the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq.

Ongoing commercial and recreational fishing activity in the RAA has potential to interact cumulatively with the Project to further disrupt Mi'kmaq use of their traditional fishing grounds. Any commercial and recreational fishermen that are displaced from their customary fishing areas as a result of Project construction and operation and maintenance may be forced to relocate their fishing activities. This may put additional pressure on nearby fishing areas, potentially including traditional Mi'kmaq fishing grounds. Mi'kmaq and non-Mi'kmaq fishermen alike may be adversely affected by the resultant competition for remaining fishing areas in the LAA and RAA. These potential cumulative effects will be mitigated through fish habitat compensation, consideration of compensation for potential gear loss and accommodation for demonstrable loss of access, fisheries consultation, vessel communications, and issuance of Notices to Mariners. In general, only a small portion of the fishable grounds in the RAA will be affected by Project infrastructure and activities.

5.10.6 Determination of Significance

Construction and operation and maintenance activities for the Project will result in adverse effects which could result in a change in current use of land and resources for traditional use by the Mi'kmaq which could persist over the life of the Project. The 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. With the implementation of proposed mitigation and environmental protection measures, including the recommendation specified in the MEKS report (*i.e.*, consideration of Mi'kmaq interests and traditional use activities throughout the environmental planning process as well as during all Project work and remediation 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 predicted to be not significant. Ongoing consultation with local Mi'kmaq stakeholders will provide feedback on the effectiveness of this mitigation and confirm this effects prediction.

The potential cumulative environmental effects and associated mechanisms, combined with the proposed mitigation measures proposed in Section 5.10.4.1.2 demonstrate that the residual cumulative environmental effect of a change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq is rated not significant.

In summary, residual environmental effects and cumulative effects on the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq are rated not significant.

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5.10.7 Follow-up and Monitoring

Follow-up and monitoring programs proposed for other biophysical and socio-economic VECs will be pertinent to the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC as well (refer to Section 9 for Summary). No additional follow-up or monitoring is proposed specifically for the Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq VEC.

5.11 ARCHAEOLOGICAL AND HERITAGE RESOURCES

For the purposes 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. These resources may be from the earliest times of human occupation within the proposed project area, up to the relatively recent past and include both built and depositional 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 provincial and federal regulatory agencies assuring the effective management of these resources. In this section, the environmental effects of the Project activities on archaeological and heritage resources resulting from all Project phases will be assessed. A brief discussion of the potential for palaeontological resources is also provided in this VEC.

The current use of lands and resources for traditional purposes by the Mi'kmaq of Nova Scotia is addressed in Section 5.10.

5.11.1 Scope of Assessment**5.11.1.1 Regulatory Setting**

Archaeological resource impact assessments (ARIA) are conducted in accordance with a Heritage Research Permit issued under the Nova Scotia *Special Places Protection Act*, which is administered by Heritage Division of Nova Scotia Department of Communities, Culture and Heritage. Various ARIAs were previously conducted for the PDA under Heritage Research Permits A2006NS57, A2008NS11, A2009NS23, and A2012NS024.

5.11.1.2 Influence of Consultation and Engagement on the Assessment

During the stakeholder and public engagement process there were no specific issues raised by stakeholders and community members; however, during the review of the draft EIS Guidelines, the KMKNO requested a review of the archeological survey methods. XCDM has advised the KMKNO of the approach taken for the archaeological review of potentially submerged resources and has invited comment.

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5.11.1.3 Selection of Environmental Effects and Measurable Parameters

The environmental assessment of Archaeological and Heritage Resources is focused on the following environmental effect:

- Change to Archaeological and Heritage Resources.

This environmental effect has been selected in recognition of the requirements of the EIS Guidelines with respect to the need to assess environmental effects of the Project on archaeological and heritage resources. This requirement reflects the CEAA definition of environmental effect which includes any change of “any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance”. This effect is also important in recognition of the provincial *Special Places Protection Act* which protects important archaeological, historical and palaeontological sites and remains (including underwater).

The measurable parameters used for the assessment of the environmental effects presented above and the rationale for their selection is provided in Table 5.11.1.

Table 5.11.1 Measurable Parameters for Archaeological and Heritage Resources

Environmental Effect	Measurable Parameter	Rationale for Selection of the Measurable Parameter
Changes to Archaeological and Heritage Resources	<ul style="list-style-type: none"> • Presence or absence of an archaeological or heritage resource • Archaeological potential (as modelled by a professional archaeologist) 	The provincial <i>Special Places Protection Act</i> protects important archaeological, historical and palaeontological sites and remains (including underwater). Presence of archaeological or heritage resource or modelled medium or high archaeological potential indicates potential interaction with the Project and may require mitigation.

5.11.1.4 Temporal and Spatial Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on archaeological and heritage resources include the construction period and operation and maintenance of the Project in perpetuity. Archaeological and heritage resources are relatively permanent features of the environment; however their integrity is highly susceptible to the environmental effects of any ground disturbing activities. Project-related effects on archaeological resources are more likely to occur during the construction phase; however, environmental effects to such resources will be permanent and irreversible. Archaeological fieldwork to mitigate potential adverse environmental effects on heritage resources is more easily carried out between late spring and early autumn, when ground conditions allow for the subsurface testing required in archaeological investigations.

The spatial boundaries for the environmental effects assessment of Archaeological and Heritage Resources are defined below.

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Project Development Area (PDA): The PDA includes the area of physical disturbance (*i.e.*, “footprint” for the Project including infrastructure for the mine site as well as stockpiles, coal waste piles, conveyor system, 138 kV transmission line, and trucking routes. The PDA also includes the barge load-out facility and transshipment mooring and vessel route between the two.

Local Assessment Area (LAA): The LAA considers the locations of all Project-related activities associated with construction, operation and maintenance, and decommissioning and reclamation that could involve any ground disturbance. Archaeological and heritage resources may be affected by any surficial or subsurface Project-related disturbance of the area within which these resources are located. In particular, the LAA is defined as the PDA that is bounded by Schooner Pond Cove to the west, Schooner Pond Head to the north, Northern Head to the east, and, the north end of Morien Bay to the southwest.

Regional Assessment Area (RAA): The RAA is the area within which cumulative environmental effects for archaeological and heritage resources may occur, depending on physical and biological conditions and the type and location of other past, present, and reasonably foreseeable projects. The RAA for this VEC could be considered an area approximately 100 km² surrounding the PDA.

5.11.1.5 Residual Environmental Effects Description Criteria

Terms that will be used to characterize residual environmental effects for Archaeological and Heritage Resources are presented in Table 5.11.2.

Table 5.11.2 Characterization Criteria for Residual Environmental Effects on Archeological and Heritage Resources

Criterion	Description
Direction	<p>Positive: The discovery, mitigation and documentation of Heritage and Archaeological Resources will help advance the knowledge of them within an archeological context. Condition is improving compared to baseline status</p> <p>Neutral: no change compared to baseline status</p> <p>Adverse: negative change compared to baseline status</p>
Magnitude	<p>Negligible: no measurable adverse effects anticipated</p> <p>Low: neither disturbance to, or destruction of, an archaeological or heritage resource</p> <p>Moderate: mitigated disturbance to, or removal of, an archaeological or heritage resource</p> <p>High: unmitigated disturbance to, or destruction of an archaeological or heritage resource considered to be of major importance</p>
Geographical Extent	<p>Site-specific: effects restricted to area within the PDA</p> <p>Local: effects extend beyond Project footprint but remain within the LAA</p> <p>Regional: effects extend into the regional assessment area (approximately 100 km²),</p>

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Table 5.11.2 Characterization Criteria for Residual Environmental Effects on Archeological and Heritage Resources

Criterion	Description
Frequency	<p>Once: effect occurs once</p> <p>Sporadic: effect occurs more than once at irregular intervals</p> <p>Regular: effect occurs on a regular basis and at regular intervals</p> <p>Continuous: effect occurs continuously</p>
Duration	<p>Short-term: effects are measurable for days to a few months</p> <p>Medium-term: effects are measurable for many months to two years</p> <p>Long-term: effects are measurable for multiple years but are not permanent</p> <p>Permanent: effects are permanent</p>
Reversibility	<p>Reversible: effects will cease during or after the Project is complete</p> <p>Irreversible: effects will persist after the life of the Project</p>
Ecological Context	<p>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</p> <p>Undisturbed: effect takes place in an area that has not been adversely affected by human development</p>

5.11.1.6 Threshold for Determining the Significance of Residual Environmental Effects

A **significant adverse residual environmental effect** on Archaeological and Heritage Resources is defined as a Project-related environmental effect that results in any unmitigated Project-related disturbance to, or destruction of, archaeological or heritage resources considered by the affected First Nations, communities, or provincial heritage regulators to be of major importance due to factors such as rarity, condition, spiritual importance, or research importance.

5.11.2 Existing Conditions

Archaeological and heritage resources that are considered within this VEC consist of any standing, surface or subsurface remnants from past human activities within the area proposed to be affected by the Project. This section will briefly describe the findings of the survey and research.

Typically there are two methods for determining the existing conditions of the archaeological and heritage resources within the area of interest. These are:

- determine the known resources through a review of the provincial archives, provincial heritage records, documented archaeological sites, provincial and local museum records, local historical societies; community historians, and Aboriginal people; and
- undertake a search for those resources that exist, but of which we do not currently have knowledge.

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5.11.2.1 Archaeological and Heritage Resources

The proposed development of the Donkin mine has been the subject of numerous archaeological investigations: A2006NS57 - Donkin Mine ARIA (Davis Archaeological); A2008NS11 - Donkin Mine Transportation Corridor ARIA (Davis Archaeological); A2009NS23 - Bailey Cemetery, Donkin (Davis Archaeological); A2012NS024 Donkin Mine Barge Load-Out Archaeological Resource Impact Assessment (ARIA) (Stantec). The results of these investigations are summarized below.

A2006NS57 - Donkin Mine ARIA

This study was conducted by Davis Archaeological Consultants (DAC) in 2006. The background research found very little documented evidence for the earliest settlement history of the study area. The earliest land grants date to the second half of the nineteenth century. The Acadian Colliery was opened at Schooner Pond in the early 1860s and operated, intermittently, into the early twentieth century. More recently DEVCO drilled two exploratory tunnels near Schooner Pond Head and built access roads, a landfill, disposal pile, and settling pond. There were no recorded archaeological sites in the study area at the time.

The study area was surveyed by two DAC archaeologists in 2006 and they recorded two archeological sites at that time. Potential archaeological resources were identified at the Bailey Cemetery (see Figure 5.11.1) and mitigation was recommended if the area was to be affected by future developments. The McDonald Farm and potential associated structures (Figure 5.11.1) were also identified as potential archaeological resources, and mitigation was recommended if the area was to be affected in the future. These recommendations were accepted by Heritage Division in 2006. The report makes general statements about First Nation's potential but rates all of the Donkin Peninsula as having low potential for containing First Nations archaeological resources. As a result, no subsurface testing was conducted during this study. The proposed location of the Barge Load-Out facility is very close to the McDonald Farm (CbBw-01) recorded by DAC in 2006.

Two additional sites on the Donkin Peninsula were identified by DAC in 2006: a coastal mine at Schooner Pond; and a corduroy road at Schooner Pond area (Figure 5.11.1). Both sites were considered to have low archaeological potential and low archeological significance; neither site was documented under the Maritime Archaeological Resource Inventory (MARI) process.



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REVIEWED BY: K Keizer
CLIENT:

Donkin Export Coking Coal Project

Archaeological and Heritage Resource Sites

FIGURE NO: 5.11.1
DATE: Apr 26, 2012

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A2008NS11 - Donkin Mine Transportation Corridor

In 2008, DAC was contracted to conduct an ARIA of a proposed Donkin Mine Transportation Corridor (a proposed rail line to Victoria Junction), the north end of which is within the current PDA. The Phase I assessment, which included background research, determined that there was an elevated potential for First Nations archaeological resources within the proposed corridor, most particularly around the numerous watercourses crossings. A Phase II assessment was recommended and two DAC archaeologists conducted a pedestrian survey of the proposed corridor in April of 2008. The archaeologists found no significant evidence of historic cultural activity within the impact area and noted that much of the landscape appeared to have been disturbed by relatively recent historic activity. No subsurface testing was conducted during this study nor was any recommended because of the low potential of the area. The report recommended that no further archaeological assessment was necessary unless the project plans changed and included areas that were not part of the 2008 survey.

A2009NS23 - Bailey Cemetery

One area that was recognized as having high sensitivity in 2006 was the Bailey Cemetery, which was purported to have 28 graves dating to the nineteenth century. As this area was not to be impacted, no mitigation was necessary. However, it was decided in 2009 that Davis Archaeological would be contracted to delineate the graves so the exact dimensions of the cemetery could be marked and it could be protected. In the end a total of fourteen graves were identified and the area was demarcated with a 5 m buffer using small granite stones.

A2012NS024 - Donkin Barge Load-Out*Potential for Archaeological Potential of Submerged Lands*

In 2011, Stantec was contracted to conduct an ARIA of a proposed marine barge load-out facility in Morien Bay that would be part of the proposed Donkin Export Coking Coal Project infrastructure. The study focused on the archaeological potential of the load-out facility, specifically relating to the potential for submerged First Nation's archaeological resources dating to the early Holocene period. The study focussed on the potential for First Nations and historic submerged resources, and involved a review of the marine benthic survey videos.

The concerns for submerged First Nations archaeological resources was based on the fact that due to isostatic rebound between 12,000 and 9,000 BP, there were significant emerged areas around the PDA that could have attracted settlement of First Nations peoples. These areas would have been exposed and may have been prime areas for the hunting of large marine mammals. However, due to isostatic subsidence all of these potential shoreline occupation sites from 9,000 to 6,000 BP were submerged. Shaw (2009) argues that much of the offshore went through the Holocene transgression and that evidence of old shorelines was effaced, although estuarine deposits could be preserved in a few places. He also argues that large coastal

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embayments that were reconnected to the ocean in the late Holocene as sea level rose are the best places to find well-preserved shorelines and cites the Bras d'Or Lakes and Bedford Basin as examples in Nova Scotia. Since these conditions do not exist in the LAA it suggests that there is a low potential that the LAA contains any preserved early Holocene shoreline. This conclusion was supported by results of a site-specific benthic survey at the barge load-out facility which showed no evidence of any cultural remains.

The ARIA concluded that the potential for First Nations and historic submerged resources was low and it was recommended that the Project proceed without the need for further archaeology. XCDM has advised the KMKNO of the approach taken for the archaeological review for submerged resources and has invited comment.

Recorded Shipwrecks

The Northern Head of Morien Bay is very exposed and the presence of Wreck Point certainly speaks to the hazardous nature of the area where there have been many shipwrecks recorded over the years. The two main sources used for this background research were the Marine Heritage Database housed by the Maritime Museum of the Atlantic and the Shipwrecks of Nova Scotia site (www.nswrecks.net).

The Maritime Museum of the Atlantic has a total of 38 wrecks recorded for Port Morien between 1863 and 1904, of which 21 were recorded as total losses, 9 as partial losses, and the fate of 8 are not recorded. There were 2 wrecks recorded on Port Morien Bar between 1862 and 1882 - one partial loss and one whose fate was not recorded. There was one wreck recorded on South Head in 1906 (total loss) and one on Northern Head in 1882 (partial loss). It is interesting to note that 11 of these shipwrecks occurred on August 24, 1873 during what was to become known as the August Gale when 330 ships were wrecked and roughly 500 people died.

A partial loss usually means the ship was refloated and salvaged at the very least. A total loss should mean a sinking, but in at least one case, The Jeddo, which was listed as a total loss in 1873, the ship actually kept sailing until it was wrecked in 1891. The background research and review of the benthic video survey found no evidence of recorded shipwrecks within areas that could be affected by the Project. The marine LAA is exposed to the direct actions of the Atlantic Ocean and it is very likely that any shipwrecks that happened to be within the LAA were almost completely destroyed over the years.

5.11.2.2 Paleontological Resources

Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic

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remains. The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced.

The paleontological resources in the Donkin area are part of the Sydney Coal Field and are found in Upper Carboniferous shales and sandstones. The Carboniferous (360 to 290 million years ago) was a time when the province was located close to the equator and the warm climate resulted in lush vegetation dominated by large trees and swamp plants. This vegetation, along with many small animals, died, decayed and were buried in this deposits that became peat and, much later, coal. These Upper Carboniferous are found within the RAA but the area is not considered a Special Place under the *Special Places Protection Act*. Palaeontology is therefore not addressed further in this VEC.

5.11.3 Potential Project-VEC Interactions

Table 5.11.3 lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1, or 2 based on the level of interaction each activity or physical work will have with archaeological and heritage resources.

Table 5.11.3 Project Activities and Physical Works

	Change in Archaeological and Heritage Resources
Construction	
Site Preparation (incl. clearing, grading and excavation)	2
Construction of Mine Site Infrastructure and Underground Preparation	2
Construction of 138 kV Transmission Line	2
Construction of Barge Load-out Facility (incl. dredging, infilling and habitat compensation)	2
Installation of Transshipment Mooring	1
Operation and Maintenance	
Underground Mining	0
Coal Handling and Preparation (incl. coal washing and conveyance)	0
Water Treatment (incl. mine water and surface runoff)	0
Coal and Waste Rock Disposal	2
Marine Loading and Transportation	0
Coal Trucking	0
Decommissioning and Reclamation	
Site Decommissioning	0

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Table 5.11.3 Project Activities and Physical Works

	Change in Archaeological and Heritage Resources
Site Reclamation	1
0 = No interaction 1 = Interaction occurs; however, based on past experience and professional judgment, the resulting effect can be managed to acceptable levels through standard operating practices and/or through the application of best management or codified practices. No further assessment is warranted. 2 = Interaction occurs, and resulting effect may exceed acceptable levels without implementation of specified mitigation. Further assessment is warranted.	

Potential interactions with Archaeological and Heritage Resources would occur during activities that involve subsurface disturbance. Therefore, most interactions would occur during the construction phase. There is no predicted interaction between Project operation and maintenance activities and Archaeological and Heritage Resources with the exception of coal and waste rock disposal (discussed below).

Since there are no archaeological or heritage resources that would be below the surficial glacial till of the PDA there would be no interaction with underground mining. Other activities during operation and maintenance phase would not involve subsurface disturbance therefore would not interact with potential archaeological and heritage resources.

The installation of the transshipment mooring will result in a very localized disturbance of the seafloor. The work completed under Heritage Research Permit A2012NS024 showed that the marine section of the PDA would likely have been exposed land during the early Holocene, and that Palaeo period peoples may have settled in the area. However, the highly active ocean in the area would have adversely affected any archaeological resources that may have been present. Therefore there is no likely interaction with any remaining archaeological and heritage resources from this period. There are also no identified shipwrecks within the PDA. Therefore it is unlikely that the installation of the transshipment mooring would result in any interaction with archaeological and heritage resources.

Site reclamation will involve grading activities which could result in disturbance of previously unidentified archaeological and heritage resources although this will follow land disturbance from previous Project phases so it is unlikely that previously unidentified resources would be encountered at this stage.

Thus, in consideration of the nature of the interactions and the planned implementation of known and proven mitigation, the potential environmental effects of all Project activities and physical works that were ranked as 0 or 1 in Table 5.11.3, on archaeological and heritage resources during any phase of the Project are rated not significant, and are not considered further in the assessment. Interactions ranked as 2 are discussed further below.

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5.11.4 Assessment of Project-Related Environmental Effects**5.11.4.1 Assessment of Changes to Archaeological and Heritage Resources****5.11.4.1.1 Potential Environmental Effects**

The construction phase of the site preparation and construction of mine site infrastructure and underground preparation will cause considerable sub-surface disturbance, which could adversely affect any unrecorded archaeological resources. This area has been the subject to a previous archaeological survey but specifics about the terrain and historic disturbance have been underreported. While there have not been any archaeological resources identified within the mine site infrastructure area, it is always possible that potential unrecorded archaeological resources could be uncovered.

The work completed under HRP A2012NS024 showed that while the marine section of the PDA would have been exposed land during the early Holocene, and that Palaeo period peoples may have settled in the area, the highly active ocean would have destroyed any archaeological resources that may have been present. There are also no identified shipwrecks within the PDA. The greatest effect on potential archaeological resources during the construction phase of the barge load-out facility will be the dredging if necessary. While this area has been identified as having a low potential for containing archaeological resources, it is possible that unrecorded archaeological resources could be encountered.

The proposed location of the barge load-out facility is very close to the McDonald Farm (CbBw-01) recorded by Davis Archaeological in 2006, which was considered as having high archaeological potential. The construction phase of the terrestrial section of the barge load-out facility may have an adverse environmental effect on the archaeological resources associated with the McDonald Farm.

The installation of the transmission line could have an effect on potential archaeological resources, specifically the creation of access roads, the operation of tracked vehicles, and the installation of supports for the line. There does not appear to have been an ARIA conducted specifically for the proposed construction of the 138 kV transmission line, but its terminal end does fall within the LAA that has been studied by Davis Archaeological under HRP A2006NS57. The proposed transmission line travels just to the north of the McDonald Farm (CbBw-01) and, while the previous study concluded that there is a low probability that proposed transmission line corridor contains archaeological resources, it lacked a detailed account of the evidence to support that conclusion.

During the operation and maintenance phase, there could be some disturbance associated with the progressive development and reclamation of the coal waste disposal areas. Clearing, grading and excavation of these sites could potentially result in a disturbance of previously unidentified subsurface resources.

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5.11.4.1.2 Mitigation of Project Environmental Effects

The following mitigation is proposed to provide more information on potential archaeological and heritage resources and protect these resources during Project activities, subject to Nova Scotia Heritage Division approval.

Prior to site preparation activities, an ARIA will be undertaken by a permitted, professional archaeologist in parts of the PDA which were previously judged to be having low archaeological potential including the mine site infrastructure area. The updated ARIA will update previous ARIAs conducted, with emphasis on more detailed recording (notes, photos, *etc.*) of the evidence that was used to arrive at a determination of low potential. It is expected that some limited shovel testing will also take place to strengthen the argument for low potential.

Another ARIA will be conducted to inventory and delineate the archaeological site at CbBw-01 (McDonald Farm) relative to the conveyor infrastructure of the proposed barge load-out facility. This ARIA would also include sub-surface testing to determine the nature and extent of the archaeological resources. The preferred mitigation will be determined in consultation with the Heritage Division and could include further investigation and conservation of the resource based on proximity to final location of Project facilities (*e.g.*, level of disturbance). If feasible, the Project may have the opportunity to avoid this site during final site layout.

It is recommended that NSPI commission an ARIA for the portion of the transmission line upgrade requiring ground disturbance

If a suspected archaeological/heritage resource is encountered during construction, 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.

5.11.4.1.3 Characterization of Residual Project Environmental Effects

With the proposed mitigation, including testing, surveying, and additional fieldwork, the residual environmental effects of the site preparation, construction of mine site infrastructure, construction of the barge load-out facility, and installation of the 138 kV transmission line will be highly localized and negligible to moderate in magnitude.

Any further archaeological investigations have the potential to contribute to the overall knowledge of the site, former inhabitants and cultural context and thus could be considered positive.

5.11.4.2 Summary of Project Residual Environmental Effects

Table 5.11.4 summarizes the residual environmental effects of the Project on archaeological and heritage resources.

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Table 5.11.4 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	<ul style="list-style-type: none"> • ARIA of mine site LAA to confirm low archaeological potential. • ARIA of terrestrial barge koad-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	<ul style="list-style-type: none"> • 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	

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Table 5.11.4 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	
<p>KEY</p> <p>Direction: P Positive A Adverse</p> <p>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</p> <p>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 km²) R Regional: effects extend into the regional assessment area (e.g., 11-100 km²)</p> <p>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</p> <p>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</p> <p>Reversibility: R Reversible: effects will cease during or after the Project is complete I Irreversible: effects will persist after the life of the Project</p> <p>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</p> <p>Significance: S Significant N Not Significant</p>								

5.11.5 Assessment of Cumulative Environmental Effects

In association with the Project environmental effects discussed above, an assessment of the potential cumulative environmental effects was conducted for other projects and activities that have potential to interact with the Project. Other projects and activities which could potentially overlap with effects of the Project to result in cumulative effects are discussed in Section 4.2.4. Table 5.11.5 below presents the potential cumulative environmental effects to the Heritage and Archaeological Resources, and ranks each interaction with other projects as 1 or 2 with respect to the nature and degree to which important Project-related environmental effects overlap with

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those of other projects and activities. Projects or activities for which a 0 cumulative interaction is predicted are not discussed.

Table 5.11.5 Potential Cumulative Environmental Effects to Archaeological and Heritage Resources

Other Projects and Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects
	Changes to Archaeological and Heritage Resources
Historic Coal Mining and Remediation Activities	1
Historic Ongoing Fishing Activity	1
Port of Sydney Dredging and Infilling	1
Maritime Link Project	1
KEY	
0 = Project environmental effects do not act cumulatively with those of other projects and activities.	
1 = Project environmental effects act cumulatively with those of other projects and activities, but the resulting cumulative effects are unlikely to exceed acceptable levels with the application of best management or codified practices.	
2 = Project environmental effects act cumulatively with those of other projects and activities and the resulting cumulative effects may exceed acceptable levels without implementation of project-specific or regional mitigation.	

Coal mining was a major industry within the RAA from the eighteenth century to the recent past and there is a low probability that these activities disturbed archaeological or heritage resources.

Commercial fishing is an important economic activity for the area and has been conducted by the Mi'kmaq and Europeans for centuries. While there are concerns about submerged archaeological resources being disturbed by practices such as large-scale dragger fishing, the high energy of the marine environment has most likely resulted in the destruction of any significant archaeological resources that may have been present, particularly those dating to the early Holocene. Therefore, it is expected that no direct environmental effects to Heritage and Archaeological Resources will occur (and therefore no cumulative effects) as a result of ongoing fishing activity.

Recent and ongoing dredging and development in the Port of Sydney could also potentially affect archaeological resources. ARIAs conducted for the recent channel dredging and infill project identified one historic period shipwreck (which was recovered prior to the dredging operation) and several land-based sites that will be documented prior to disturbance associated with future container terminal development at Sydport in the future.

The proposed Maritime Link Project will involve benthic disturbance in the offshore and nearshore, and will also involve limited subsurface disturbance during construction on land.

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The recent and ongoing projects in Sydney Harbour along with the proposed Maritime Link are subject to regulatory approval processes including environmental assessment and an ARIA which would include research and mitigation to minimize project-related effects on archaeological and heritage resources. A positive cumulative effect is predicted to occur in combination with the Donkin Export Coking Coal Project due to the advancement of knowledge regarding archaeological and heritage resources in the region.

5.11.6 Determination of Significance

The residual environmental effects of the Project on Heritage and Archaeological Resources will predominantly occur during construction. If disturbance to the known archaeological resource (CbBw-01) cannot be avoided during final design, mitigation will be applied, and documentation will help advance the knowledge of Heritage and Archaeological Resources in Nova Scotia.

With the proposed mitigation, including excavation, archaeological observation and inspection by licensed archaeologists, and additional field work, the potential environmental effects of construction, operation and maintenance, and decommissioning and reclamation on Heritage and Archaeological Resources are rated not significant. Any adverse environmental effects are counterbalanced by some positive outcomes, such as the preservation of information that will result from the mitigation of CbBw-01.

The mitigation of CbBw-01 and the additional ARIAs will be carried out by a permitted professional archaeological team, and this is a generally accepted and effective mitigation strategy, conducted under permit by the regulatory agencies.

Based on the results of this analysis, it is concluded that, with planned mitigation, the residual environmental effects of the Project (including cumulative effects) during all phases are rated not significant.

5.11.7 Follow-up and Monitoring

The mitigation of CbBw-01 and the additional ARIA will be carried out by a permitted professional archaeological team. No additional follow-up or monitoring is proposed.

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6.0 Accidents and Malfunctions

CEAA requires that all screenings and comprehensive studies include consideration of the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project as well as the significance of those effects. This section provides an assessment of selected accidents and malfunctions potentially causing environmental effects for the Donkin Export Coking Coal Project.

6.1 APPROACH

6.1.1 Identification of Accidents and 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.

This EIS:

- considers the potential accidents and malfunctions that may occur during Project construction, operation, decommissioning and post-decommissioning;
- considers the probabilities and hazard associated with accidents and malfunctions;
- describes the safeguards that have been established to protect against such occurrences;
- considers the contingency/emergency response procedures if an accident or malfunction were to occur; and
- determines the residual environmental effects that may result and the significance of those effects.

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.

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6.1.2 Potential Interactions with VECs

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

Table 6.1.1 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	Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq	Archaeological and Heritage Resources	Land Use
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											✓
Failure of Water Controls		✓	✓	✓	✓	✓	✓	✓	✓		
Premature Mine Shutdown											✓

6.2 EMERGENCY RESPONSE PLANNING

An Emergency Response and Contingency Plan, completed as part of Xstrata’s SD (formerly HSEC) Management System, was developed to respond to and deal with accidents or malfunctions that may arise during the construction and operation of the Donkin Underground Exploration Project. The objectives of the plan are:

- To identify site-specific hazards to enable all site workers and emergency responders to be fully informed and to respond appropriately and safely to any emergency at the site. An emergency arises from any incident on the site that has the potential to result in a fatality, injury, property damage or adverse environmental effect. This includes, but is not limited to:
 - Personal injury or fatality;

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- Vehicle and equipment accident;
 - Breakage of or damage to utility services;
 - Spills or leaks of hazardous substances;
 - Explosion or fire;
 - Criminal activity; or
 - Disruption by weather events (lightning, ice, wind, rain, *etc.*).
- To inform emergency services of the information necessary to respond to any emergency on the site in a safe and effective manner; and
 - To provide the public with an awareness of the potential emergency situations and the expected responses.

This existing Contingency Plan will be updated to address potential accident and malfunction scenarios associated with the Donkin Export Coking Coal Project and addresses prevention, preparedness, response and recovery for these scenarios as per guidance for Environmental Emergency Plans under CEPA (Environment Canada 2003, updated 2004).

Contents will include, but not be limited to:

- the identification of any environmental emergency that can reasonably be expected to occur at the place and that would likely cause harm to the environment or constitute a danger to human life or health, and identification of the harm or danger;
- a description of the measures to be used to prevent, prepare for, respond to and recover from any environmental emergency identified above;
- a list of the individuals, identified by name and position, who are to carry into effect the plan in the event of an environmental emergency and a description of their roles and responsibilities; the identification of the training required for each of those individuals; and
- a list of the emergency response equipment included as part of the environmental emergency plan and the equipment's location; and the identification of measures to be taken to notify members of the public who may be adversely affected by an environmental emergency (Environment Canada 2003, updated 2004).

6.3 LAND-BASED HAZARDOUS MATERIAL SPILL

6.3.1 Description of Possible Event

Fuels, lubricants, hydraulic fluid, paints, and corrosion and fouling inhibitors will be used or stored in small quantities, during all Project phases. These types of materials will be most

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commonly used throughout the construction phase. However, accidental spills could occur during all Project phases, including maintenance activities, resulting in a release of the hazardous substance into the environment. There is a 10,000 litre diesel storage tank on a concrete pad near Tunnel #2 for fuelling the diesel mine equipment and a 200,000 litre diesel tank and containment berm with fuel lines in close proximity to the barge load facility to fuel marine vessels. However, both of these storage tanks have appropriate containment and inspection systems which would effectively eliminate risk for interaction with the terrestrial or aquatic environment should a leak occur. Therefore a more probable scenario for a land-based hazardous material spill would be accidental releases during materials transfer (e.g., fueling a vehicle or jerry can), rupture of a hydraulic line, or a vehicle accident. There is no predicted probable large spill scenario; any spill is likely to be small (e.g., several litres or less). Given the expected limited spill volume, spill scenarios, and anticipated effectiveness of response plans (including spill containment), it is assumed that none of these spills would result in a release to the marine environment or to adjacent properties owned by others. Spills in the marine environment are discussed in Section 6.5. The worst probable case for a land-based hazardous material spill would likely be a rupture of a hydraulic line near a wetland or watercourse.

6.3.2 Project Design Measures to Minimize Risk of a Spill of Hazardous Materials

The most likely type of Project accident or malfunction resulting in potential environmental interactions is the spill of relatively small amounts of hazardous materials such as lubricating oils, fuels or other equipment fluids. Typically these spills can be minimized through proper equipment maintenance and inspection and proper fuelling procedures. Spills, if they occur, would typically be small, localized and rapidly cleaned up. Spill prevention, preparedness, response and recovery procedures will be developed and included in the Emergency Response and Contingency Plan for the Project. These procedures may include but not be limited to those listed below.

- Construction and operations equipment will be frequently inspected for possible fuel and hydraulic system leaks and leaks detected will be repaired immediately where possible. If the repair cannot be completed immediately, drip pans or alternative containment will be put in place to prevent loss of petroleum, oils, lubricants (POLs) or other hazardous materials to the environment.
- Lubricants and other petroleum products will be stored according to provincial regulations, and waste oils will be disposed of in accordance with provincial regulations.
- Any hazardous materials will be transported in compliance with the *Transportation of Dangerous Goods Act* and Regulations, and any requiring disposal will be disposed of at an approved facility.
- Storage of all hazardous materials will comply with WHMIS requirements, and appropriate material safety data sheets will be located at the storage site.

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- Storage of hazardous materials will not occur within 30 m of wetlands or watercourses.
- Permanent storage areas for containers or drums will be clearly marked, have appropriate secondary containment, and be located on an impermeable floor that slopes to a safe collection area.
- Equipment refuelling and maintenance will be conducted at designated sites and not within 30 m of a watercourse or other areas known to be frequented by migratory birds.
- Equipment refuelling and maintenance will be conducted at designated sites and not within 30 m of a watercourse, or wetland, or other areas known to be frequented by migratory birds.

6.3.3 Emergency Response

Should a hydrocarbon spill occur, the primary goal is to ensure safety, and if safe to do so, contain the material. Actions that will be taken in the event of spills or leaks of hazardous substances will include the following measures:

- Spills or releases that occur and remain on site will generally be the responsibility of the mine operator; additional assistance from off-site resources will be available to respond to larger or more serious spills.
- Spills of materials that exceed the minimum reportable quantity as specified by the Emergency Spill Regulations under the provincial *Environment Act* will be reported to NSE via the Regional Spill Reporting Number (902) 426-6030 or 1-800-565-1633.
- All construction and operational staff will be trained to handle, store, and dispose of hazardous materials.
- Spill containment kits will be kept onsite and relevant site personnel will be trained in kit use. Only personnel with specific training in spill containment may attempt to respond to a release of a hazardous material.
- If equipment or personnel are not available on-site to contain the spill, a licensed spill responder will be called.
- The necessary personal protective equipment and other safety measures compatible with the nature of the spill will be used.
- The initial steps will involve the prevention of further spillage followed by confinement of the spilled materials.

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- If the release cannot be controlled or contained, secondary containment of the materials may be performed possibly involving the transfer of materials to other containers.
- Spills that occur along the ground surface may be controlled by the use of absorbents if the spill is fairly small.
- Larger spills may require the use of soil, sand or other relatively inert material to dam the spill. All attempts will be made to intercept and contain the spill to reduce the possibility of discharge into sensitive areas including wetlands and watercourses.
- Once the spill is under control, the spill material must be transferred to appropriate storage containers.
- Clean-up will consist of collecting as much of the spill material as possible to avoid any future contamination of the wetland or waterways.
- Absorbents used, and any contaminated soil, sand or gravel, are to be placed in appropriate labelled waste containers. Spill materials will be similarly placed in appropriate containers with the proper WHMIS labels. Care should be taken to avoid mixing spilled material with incompatible materials.

Implementation of the Emergency Response and Contingency Plan will help to reduce the spill volume and extent, should a spill occur. It is not expected that a spill would result in subsequent ignition; however, employees are trained in initial fire control techniques to be implemented until the local fire department arrives. Monitoring and follow-up activities will take place to return the environment to its previous state; for example, a spill affecting a wetland may require provision of habitat restoration or creation.

6.3.4 Potential Environmental Effects and their Significance

Depending on the location of the spill, and type and quantity of material released, hazardous material spills could potentially affect water resources, birds and wildlife, wetlands, rare plants, and freshwater fish and fish habitat.

Most spills are expected to be small and rapidly contained and cleaned up. Such spills are likely to be an occasional occurrence during the different phases of the Project. With appropriate mitigation measures in place (as outlined above), the geographic extent of a potential spill is expected to be highly localized with effects of relatively short duration. Relevant staff will be trained to respond to hazardous materials spills and will use onsite spill containment kits to prevent the spread of materials. However, even small spills can have serious effects, particularly on birds and fish and fish habitat.

Proper storage, use and containment of hazardous materials will help prevent a spill from occurring and minimize the extent of effects should a spill occur.

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In the event of a heavy equipment spill (e.g., ruptured hydraulic hose), hazardous materials will be contained and remediated as part of the Emergency Response and Contingency Plan as outlined above. Even if the spilled material came into contact with water (e.g., surface runoff), the resulting wastewater would be contained and/or directed for treatment prior to release.

If a spill damaged a wetland or watercourse, an assessment will be undertaken and remedial action proposed to restore the wetland or watercourse to pre-spill conditions; alternatively compensatory habitat would be created if the impacted site was unable to be restored. As with any alteration of wetland or fish habitat, government approval is required and no-net loss of habitat function or productivity is an obligation. Spilled material will be quickly cleaned up, and efforts will be made to exclude wildlife from the area of the spill (e.g., fencing or netting) until the product is recovered.

In consideration of the mitigation and response measures to be undertaken in the event of a land-based hazardous material spill, adverse residual environmental effects of a land-based hazardous material spill are rated to be not significant for all potentially affected VECs.

6.4 COAL SPILL

6.4.1 Description of Possible Event

During transfer of coal via conveyor and/or loading barge, there could be some spillage of coal on land or in water. Spillage of coal (or coal waste) on land is not expected to result in potentially serious environmental effects unless the coal enters wetland or freshwater habitat. In this event, there is likely to be localized and temporary habitat degradation. A coal spill that resulted in adverse effects to wetlands could result in adverse effects to birds using the wetland, both due to changes in habitat quality/quantity and due to disturbance from clean-up activities.

The worst probable case for a coal spill would be loss of coal in the marine environment during marine loading and/or marine transport. Small amounts of coal can be expected to be lost to the marine environment during vessel loading and unloading and could accumulate near the wharf over time.

6.4.2 Project Design Measures to Minimize Environmental Effects

Project design will incorporate several features to minimize loss of coal product to the environment. Overland conveyors will have dust hoods to prevent dust migration. The transfer point from the overland conveyor will be totally enclosed and the stacker chute of the radial stacker used to load the barges will sit on the coal surface in the barge so there is no free fall of the coal through the air column. The loading at the transshipment site will take place with the floating crane located between the receiving vessel and the barge; coal spilled from the crane is expected to fall mainly on one of the vessels and not into the water. The risk of coal spillage will also be reduced through standard operating procedures and training of Project staff involved in marine loading and transport which will emphasize the importance of preventing coal spills into

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the marine environment. Housekeeping procedures will also be implemented at the barge load-out facility and floating crane to continuously clean spilled coal and prevent its entry to the water.

With respect to a coal or coal waste spill on land, surface drainage and water treatment systems on site will serve to minimize risk of contaminated runoff to enter watercourses or wetlands.

6.4.3 Emergency Response

All land based spills will be cleaned up by site personnel. Accidental spills of coal or coal waste into watercourses, wetlands or the marine environment will be recorded and reported to the Project's operational staff. Spill investigation will be conducted as necessary depending on spill amounts and frequency of spills. A spill affecting a wetland or watercourse may require further investigation and monitoring including provision of habitat restoration or creation. Spills into the marine environment, depending on reported volume and frequency, may also require further investigation and response to quantify any harmful alteration to the productivity of fish habitat as the basis for further action (e.g., habitat compensation). The Emergency Response and Contingency Plan will specify procedures to respond to coal spills.

6.4.4 Potential Environmental Effects and their Significance

Coal spillage on land could result in sedimentation of wetlands and watercourses and alteration of sediment or soil pH levels which could degrade habitat if left in place; however such spills are expected to be highly localized and, with implementation of procedures to clean up land-based coal spills, will be of short duration. The loss of coal in the marine environment will result in a localized and temporary reduction in marine water quality and potential localized smothering of the marine benthos, the extent of which would depend on the volume of coal spilled and dispersion by currents.

A review of coal dust dispersal around a marine coal terminal in British Columbia provides insight to the fate of coal dust in the marine environment (Johnson and Bustin 2006). That study, which examined sediments in and around the Roberts Bank coal terminal in Delta, British Columbia found that over a 22-year period, the dispersal distance of coal had not increased but the abundance of coal in the surface sediment within the dispersal area had increased. The area of greatest accumulation (>11 percent average coal content in sediment) was limited to within a 100-m radius of the loading facility with the coal concentration diminishing rapidly to less than 1 percent within 70 to 1000 m (Johnson and Bustin 2006). Although this study focused on coal dust, rather than spilled coal material, it is assumed for the purpose of this environmental effects analysis that any coal spilled would settle out quickly and likely affect sediments (and benthic flora and fauna) within a localized area of the spill (e.g., within a few hundred metres). Within this affected area, benthic flora and fauna may be subject to smothering and possible anoxic conditions.

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Project design and contingency planning will incorporate several features to minimize loss of coal product to the environment and respond to spills to minimize environmental effects. Surface drainage and water treatment systems on site will serve to minimize risk of contaminated runoff to enter watercourses or wetlands. Most of the coal handling equipment will be enclosed and the marine loading and unloading will be carefully managed through handling and housekeeping procedures and personnel training to minimize marine spills.

All land based spills will be cleaned up by site personnel with accidental spills of coal or coal waste into watercourses, wetlands recorded and reported to the Project's operational staff. Spill investigation will be conducted as necessary with follow up actions (*e.g.*, remediation, monitoring and habitat compensation) undertaken as required. Spills into the marine environment may also require further investigation and response to quantify harmful effects to fish habitat as the basis for further action (*e.g.*, habitat compensation). The Emergency Response and Contingency Plan will specify procedures to respond to coal spills.

In consideration of the mitigation and response measures to be undertaken in the event of a coal spill on land and/or in the marine environment, and the low toxicity of the coal, adverse residual environmental effects of a coal spill are rated to be not significant for all potentially affected VECs.

6.5 MARINE VESSEL ACCIDENT (NO SPILL SCENARIO)

6.5.1 Description of Possible Event

The Transportation Safety Board of Canada (TSB) maintains records of all accidents reported in Canadian waters. Table 6.5.1 presents a summary of all accidents and incidents by number and type that have occurred between 2001 and 2010 in the Maritimes Region (the annual report for 2011 was not available at the time of writing). This summary does not indicate whether a hydrocarbon spill occurred as a result of the accident. Between 2001 and 2010 there were 911 shipping accidents involving 982 vessels. Approximately three percent of these vessels were tugs or barges; fishing vessels accounted for 74 percent.

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Table 6.5.1 Marine Occurrences by Region, Occurrences, Vessels and Losses Involved 2001-2010. Maritimes Region

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Shipping Accidents	90	121	129	101	95	100	64	77	64	70
Accidents Aboard Ship	10	5	13	8	7	11	8	6	10	2
Vessels Involved in Shipping Accidents (incl By Type of Vessel)										
Total Vessels	97	128	138	108	104	107	66	88	71	75
Cargo	4	3	3	0	2	1	2	0	2	0
Bulk Carrier/OBO	0	2	1	0	1	3	1	1	0	1
Tanker	0	2	3	0	0	2	0	0	1	0
Ferry/Passenger	3	5	11	7	7	5	5	9	7	1
Tug/Barge	4	3	6	4	4	4	0	2	2	4
Fishing	75	96	99	80	79	78	50	63	50	58
Other	11	17	15	17	11	14	8	13	9	11
Vessels Lost	12	12	14	9	9	12	7	15	5	12
Fatalities	6	1	7	8	2	3	3	9	3	7
Incidents	33	26	35	28	16	21	18	16	16	7

Source: TSB (2010)

The above statistics do not include the grounding of a freighter off Scatarie Island which occurred on September 20, 2011. The MV Miner was being towed by tugboat to Turkey for scrap when the towing line broke and the freighter ran aground on a shoal off the coast of Scatarie Island. Approximately 6,000 litres of engine oil and diesel fuel have been removed from the ship. Despite being damaged by subsequent storms, according to federal government officials, there has not been any apparent environmental damage (Transport Canada 2011). Salvage operations are expected to occur in the spring of 2012.

The following information is based on a marine engineering study done for the Project (CBCL 2012). During the operation phase of the mine, coal will be transported from a barge load-out facility by marine barges to a transshipment mooring where the coal will then be transferred to a bulk coal carrier vessel. The vessels selected for transportation of the coal from the barge load-out facility to the transshipment location include four coal barges with circa 4,000 tonne capacity, a nominal 5,000 horsepower transit tug and a nominal 500 horsepower helper tug. The bulk coal carrier for the transportation of the coal from the transshipment location to international destinations is expected to be either a 70,000 dwt Panamax or 200,000 dwt Cape-Size.

To ship the desired quantity of raw coal there is a requirement to load 39 Panamax size vessels, 14 larger Cape size vessels or a combination of the two. Under favorable weather conditions it is expected that a round trip of a tug and barge from the barge load-out facility to the transshipment mooring would take approximately 4 hours resulting in approximately 7 round trips daily (CBCL 2012). Using this timeframe the loading of a Panamax size vessel is anticipated to take 3 – 4 days and the loading of a larger Cape size vessel would take 8 to 10

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days. Based on this loading rate, increased vessel traffic in Morien Bay would be present between 112 and 156 days per year. The circa 4,000 tonne barges are loaded at the barge load-out facility located off of the Donkin Peninsula and then the tug and barge crosses Morien Bay and round Cape Morien at a sufficient distance for navigational safety to the transshipment site in Mira Bay. The transshipment site is estimated to be a one-way tug travel distance of 4.75 nautical miles (nm, 8.8 km) from the barge load-out facility.

Potential scenarios for marine vessel accidents encompass Project-related accidents that could occur within the LAA, including bulk coal carriers while at the transshipment facility. Accidents that could occur between ocean going vessels before they enter or after they leave the transshipment area are outside the scope of the EA.

Shipping in the Project area is limited. Navigation in the area consists primarily of local fishery vessels.

A credible marine accident scenario associated with the Project could involve the following events:

- Barge or tug striking the wharf and/or transshipment facility (e.g., allision – striking a fixed object - during manoeuvring);
- Collision of a barge/tug with another vessel (e.g., collision with fishing vessel, or another Project-related vessel en route to transshipment mooring location); and
- Grounding of a Project-related vessel.

Any of these scenarios could occur due to human error, a mechanical malfunction (e.g., if the tug loses power or its tow line parts and/or the barge loses directional stability) or extreme weather. It is reasonable to assume that Project vessels would be manoeuvring at a low speed for any of these scenarios, and any impact would be relatively low. Therefore it is unlikely that the accident would be of sufficient force to cause a release of cargo and/or fuel, although depending on the specific scenario, ingress of water could occur. The result of any of the above scenarios would likely be limited to property damage, and/or interference with fishing or navigation. Fishing activities in the LAA include the use of submerged mobile fishing gear (e.g., dragnets, rakes) and fixed gear (e.g., lobster traps with marker buoys). Vessel accidents could occur that may result in the loss of or damage to fishing gear. Additionally, if a vessel were to wash up near cliffs where seabirds are nesting, those birds would likely be subject to disturbance, which could potentially be significant dependent on the severity of the event.

6.5.2 Project Design Measures to Minimize Environmental Effects

The Canadian Coast Guard Maritimes Region encompasses three provinces; New Brunswick, Nova Scotia and Prince Edward Island. The Canadian Coast Guard supplies the services provided by the Marine Communications and Traffic Services (MCTS). Their responsibilities

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

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

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

The Canadian Coast Guard MCTS has established health and safety emergency response plans, protocols and procedures. In addition, there are several controls in place to promote safe and efficient marine transport.

- Tugboats have anti-collision navigational systems and competent crews who are trained in operation of the vessels.
- Tugs will operate at slow speeds.

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- Marine forecasts and conditions will be monitored regularly and operations will be suspended in the event of inclement weather.
- Vessel operators will be certified and licensed and will be familiar with the current, tidal, weather, and vessel traffic patterns in the area.
- The marine load-out facility and transshipment mooring will be constructed and operated in accordance with authorization conditions under the NWPA (e.g., on Canadian Hydrographic Service (CHS) charts, hazard lighting).
- During construction, operation and decommissioning of marine infrastructure, notices will be issued and any restrictions to navigation will be noted in the Notices to Mariners or Notices to Shipping.
- There will be continued discussion with the commercial fishermen on construction and operation marine traffic and activities including use of a fisheries liaison committee and development of a gear loss policy.
- To the extent practical, marine vessel routes will be established in consultation with local fishermen to minimize risk of interaction with established fishing locations.
- The Project is investigating the practicality of employing global positioning technology as a further safety prevention against vessel collisions.
- The International Maritime Organization has established specific lighting, warning and safety rules under a protocol commonly referred to as COLREGS 72 for marine vessels. This protocol provides guidance for lights displayed by power-driven vessels under a variety of operating conditions including those proposed for this Project.
- Standard safety procedures will be established for workers on the crane and coal barges including procedures for search and rescue, evacuation of injured personnel, and collision avoidance. Standard safety equipment such as flotation devices, signalling equipment and protective coverings will be carried as mandated along with a training program for the work force.
- Offering information and training to local fishers and boaters to prevent incursions into the safety zones and potential collisions is also being considered by the Project.

6.5.3 Emergency Response

If a Project vessel is disabled or grounded, emergency response procedures will be implemented as per the Emergency Response and Contingency Plan. Following initial response, reclamation tasks will be undertaken as necessary to restore damaged habitats.

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Habitat compensation works will be implemented for all harmful loss or alteration to fish habitat where required.

6.5.4 Potential Environmental Effects and their Significance

Any of the potential vessel accident scenarios has the potential to interrupt Project schedule. Allision with the load-out facility or transshipment mooring is probably the most likely vessel accident scenario, although the one with the least predicted effect. Allision could result in property damage but is not likely to result in damage to the marine environment (assuming no hydrocarbon spill scenario).

A ship to ship collision involving no release of hydrocarbons may result in damage to vessels and potentially fishery gear. The accident could potentially become an obstruction to local navigation. These outcomes could result in effects on commercial and recreational fisheries as well as current use of lands and resources for traditional purposes by the Mi'kmaq. Based on the planned mitigation including navigational aids maintained by vessels, following good practices of seamanship, communication between the Project and fishers regarding any changes to shipping routes and activities and posting Notices to Shipping and Notices to Mariners as required, the potential environmental effects of a ship to ship collision during all phases of the Project are rated not significant for all potentially affected VECs.

The grounding of a Project vessel, although extremely unlikely to occur, has the potential to cause environmental damage to the sea floor, including damage to marine benthic flora and fauna. The grounded vessel could become an obstruction to local navigation including fishery vessels and pose a risk of contamination of marine waters and sediment, thereby potentially also affecting fishery resources.

It is expected that, in general, a vessel accident (allision, collision or grounding) is not likely to occur given the implementation and adherence to the policies, practices and procedures described in Sections 6.5.1 and 6.5.3. A Project-related vessel accident resulting damage to the environment or fishing gear would be addressed through emergency response and include compensation as required. These and other measures will help ensure that, should a vessel accident occur, the resulting environmental effects on all VECs will not be significant.

6.6 HYDROCARBON SPILL IN THE MARINE ENVIRONMENT**6.6.1 Description of Possible Event**

Diesel engines will be used for the floating crane, transit tug, and helper tug. Additional minor fuel consumption for power generation and auxiliary barge equipment (e.g., line handling winches and small skip-loaders) is also expected. The size of the bulk carrier will determine the number of tug and scow round trips and operating hours and therefore will influence fuel consumption. An onsite fuel storage tank with a minimum capacity of 200,000 L will be located

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in the load-out area for refuelling of marine equipment. The tank will be filled from tanker trucks accessing the tank via the road corridor.

A hydrocarbon spill in the marine environment has the potential to occur primarily due one of the following scenarios:

- Fuel storage tank spill at the barge load-out facility;
- Fuel spillage during refuelling of tugs and the floating at the barge load-out facility; and/or
- Marine accident (*i.e.*, collision, grounding of a tug/crane/Cape-size vessel) involving fuel spill.

Vessels associated with transshipment of coal for the Project include tugs, coal barges of circa 4,000 dwt, a floating crane and bulk coal carriers (expected to be up to 200,000 dwt). Fuel capacity of Project vessels and bulk coal carriers is expected to be no more than 6,000 m³ for Cape size bulk coal carriers (IMO 2004). Other vessels that can be expected within the RAA include bulk carriers and tankers, commercial fishing vessels, passenger ferries, pleasure craft, military and Canadian Coast Guard vessels. A substantial amount of fuel could be released in the event that a fuel tank is ruptured releasing a portion of its fuel tank.

6.6.2 Project Design Measures to Minimize Environmental Effects

Procedures to promote navigation safety and avoid marine accidents (potentially involving spills) are described in Section 6.5.

The prevention of and response to oil spills in the marine environment are very strictly regulated in Canada to prevent and minimize their consequences. Transport Canada continues to strictly enforce pollution prevention regulations through the inspection of ships for compliance with pollution prevention provisions and through the investigation of pollution incidents. Various design features will be incorporated to minimize risk and resulting effect of a marine spill.

- At the load out area the surrounding tank area will include a containment berm with a capacity of 110 percent of full tank capacity and comply with all other provisions of the Petroleum Management Regulations under the Nova Scotia *Environment Act*.
- Fuel lines from the tank to the dock area will be above grade to allow for continuous inspection but will have protective barriers to prevent any damage from vehicles operating on the wharf.
- Vessel fuelling will be conducted by trained competent staff following specific procedures for marine refuelling.

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- An Emergency Response and Contingency Plan will include spill response protocols to address concerns related to sensitive marine species including birds, as well as measures that would be taken to keep birds away from a spilled substance and for dealing with accidents where birds are oiled and/or sensitive habitats are contaminated.
- Spill response equipment will be kept on-site.
- Equipment will be properly maintained and inspected regularly.

6.6.3 Emergency Response

Marine spill response procedures are regulated under the *Canada Shipping Act, 2001*. Any incident involving the spillage of oil or petroleum lubricating products into the marine environment must be reported immediately to the 24-hour Spill Report Centre (1-800-565-1633). All Project-related vessels will have a Shipboard Oil Pollution Emergency Plan (OPEP) and the capability to respond to small spills. The OPEP will identify the person authorized to implement the plan and will also confirm that the vessel has an arrangement with a Canadian Coast Guard certified response organization.

Should a hydrocarbon spill occur, the primary goal is to ensure safety, and if safe to do so, contain the material. At any time if a hydrocarbon spill from a Project vessel is detected, the OPEP will be initiated. Emergency response and clean-up will be implemented as per the OPEP. If a hydrocarbon spill is detected from the onsite fuel storage tank in the load-out area, spill response procedures will be implemented as per the Emergency Response and Contingency Plan. Oil spill response and clean-up procedures will be developed in consideration of Environment Canada's *CWS Oil Response Procedures Manual* and *Oil Response Plan*.

Following initial response and spill containment, clean up and reclamation tasks will be undertaken as necessary to restore damaged habitats. Habitat compensation works will be implemented for all harmful loss or alteration to fish habitat where required. An on-site monitor will be present during all clean-up and reclamation work to monitor the success of any clean-up and reclamation work.

6.6.4 Potential Environmental Effects and their Significance

The behavior of hydrocarbon spills is dependent on a number of factors including the size of the spill, the type of oil spilled (diesel versus gasoline), the location of the spill, the time of year, the wind speed and direction, the air temperature, the tidal cycle and the timing and level of emergency response and clean-up.

A hydrocarbon spill in the marine environment would cause a temporary degradation in water quality and could have subsequent lethal and/or sublethal environmental effects on marine life in the local area. Crude and diesel oils contain acutely toxic petroleum hydrocarbons and

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contact with them has been shown to induce mortality in a variety of marine vertebrate and invertebrate species (Peterson 2001; Fuller *et al.* 2004). Following a release, oil will spread out and form a sheen on the surface of the water. It is during this stage that oil presents the greatest risk to marine mammals, turtles and fish due to inhaling, ingestion or dermal contact with the oil potentially resulting in a variety of potential physiological effects. Sub-lethal environmental effects could include avoidance behaviour and disruption of feeding, spawning and migration patterns. Adverse effects on highly mobile marine mammals and fish are unlikely since these species are likely to avoid the affected area of a small spill and larger spills are considered unlikely.

Plankton, fish eggs and larvae will be affected to different degrees, depending on the severity, timing and location of the spill. Exposure to oil could cause direct mortality of fish eggs or larvae, although exposure would be limited spatially and temporally. Sublethal physiological effects leading to reduced breeding success that might be attributable are also unlikely to be significant. The frequency of such an event is extremely low, and the effects would be restricted to the immediate vicinity of the accidental event, in contrast to the dispersed nature of fish populations. Effects on plankton and zooplankton are short-lived, because their life cycles are short and they reproduce frequently. In consideration of the worst probable event, effects of a spill would not be expected to affect population recruitment levels of fish species.

Shellfish can be tainted from small diesel spills in shallow nearshore areas. These organisms bioaccumulate the oil but will also depurate the oil over a period of several weeks following exposure.

In the unlikely event of a hydrocarbon spill in the marine environment, direct or indirect mortalities of birds by contaminating water or food resources may occur. Marine birds are at risk of oiling and thermal stress and can be affected by even relatively small spills (Wiese *et al.* 2001). In the event of a spill, contact between marine birds and spilled hydrocarbons at the surface would be highly probable. Given the high productivity of marine bird species in Morien and Mira Bays (including breeding colonies on the Donkin Peninsula), it is possible that a large spill, while highly unlikely, could result in oiling of a large number of birds, potentially resulting in a significant adverse environmental effect on marine birds. However, the likelihood of a large spill is extremely low and all efforts will be made to contain and clean up the spill should it occur.

A hydrocarbon spill in the marine environment could also affect fisheries and use of resources for traditional purposes by the Mi'kmaq as access to fishing and/or traditional use areas could be limited during the spill event and cleanup activities, even if the resource itself is not affected. Depending on the nature of the spill, fishing equipment could be affected and there is potential for tainting or perceived tainting of fishery resources.

Given the mitigation measures to prevent and respond to marine spills, a large spill scenario in the marine environment is highly unlikely. However, a large spill (*e.g.*, breach of fuel storage tank and containment system; vessel fuel tank spill) could potentially result in a significant

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adverse residual effect on marine birds. In consideration of mitigation and emergency response procedures, residual effects on other VECs are not rated as significant.

6.7 TRUCKING ACCIDENT**6.7.1 Description of Possible Event**

Trucking of coal will occur if marine transportation becomes impractical at any time (e.g., unfavourable weather or to serve local markets). A vehicle accident involving a coal truck has the potential to cause temporary delays to road traffic, damage to property, or injury or death to individuals involved. Hazardous material spills and coal spills as a result of trucking accidents are addressed in Section 6.3 and 6.4, respectively.

A Traffic Impact Study conducted for the Donkin Coal Mine in 2009 reviewed the collision history for all sections of the proposed haul road between 2002 and 2006. This study concluded that the collision record and site review did not suggest any existing safety problems, although the report recommends several upgrades to improve roadway and traffic control (e.g., widening and thickening of pavement and widening of shoulders in some areas, installation of overhead illuminated crosswalk signs, replacement of timber bridge). The bridge at Great Glace Bay has subsequently been replaced but other roadway upgrades (including traffic signals) would be required even for occasional use by heavy coal trucks to maintain the required service standards.

6.7.2 Project Design Measures to Minimize Environmental Effects

Project design measures to minimize risk of trucking accidents are derived from the Traffic Impact Study (AR&TM 2009). These measures include but are not limited to the following:

- Coal trucks will be driven by trained and competent drivers who will use approved haul routes.
- Improvements and upgrades to the road network along the haul route will be implemented to maintain an acceptable level of performance and safety.
- The Project will work with the School Bus Conveyance officials to ensure that coal trucks do not operate on road sections at the same time as loaded school buses are using those road sections.
- All highway laws will be obeyed, including seasonal weight restrictions, traffic signage and requirements for permit for any oversized loads.
- The Project will work with CBRM and NSTIR to incorporate recommendations from NSTIR's Road Safety Improvement Report and the Donkin Mine Traffic Impact Study (AR&TM 2009),

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as appropriate. It is assumed that the necessary upgrades will be made by NSTIR and CBRM to accommodate the occasional coal truck traffic.

6.7.3 Emergency Response

Local emergency and response officials will attend to any traffic accident to provide emergency and first aid response as required. The Project will cooperate with local officials in any incident investigation process and conduct an internal incident investigation for any accident. Remedial action will be taken by the Project in accordance with the results of the investigations.

6.7.4 Potential Environmental Effects and their Significance

A Project-related vehicular accident not resulting in a spill is not expected to result in any adverse environmental effects with the exception of potential property damage – the extent of which depends on the severity of the accident. Although public injury or mortality as a result of a trucking accident cannot be ruled out, the likelihood is very low given the mitigation and emergency response prescribed above. In consideration of the current safety performance of the haul route as well as the mitigation and emergency response discussed above, it is predicted that no significant adverse residual effect on land use will occur as a result of a Project-related vehicle accident.

6.8 FAILURE OF WATER CONTROLS**6.8.1 Description of Possible Event**

During construction, and to a lesser extent during operation or decommissioning and reclamation, failure of erosion and sediment control measures could occur if these measures are not properly designed, installed or maintained. A breach of water treatment systems could occur during Project operation resulting in release of untreated effluent including acid rock drainage. Discharge of silty water or acidified water could potentially result in effects on Water Resources, Birds and Wildlife, Wetlands, Rare Plants, Freshwater Fish and Fish Habitat, Marine Environment, Commercial and Recreational Fisheries, and Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq.

6.8.2 Project Design Measures to Minimize Environmental Effects

Design features and methods will be used to control surface runoff, reduce the potential for erosion and prevent offsite siltation of any receiving waters. Erosion and sediment control details will be specified in Project design details. Site inspections will be conducted to monitor the effectiveness of and maintain/repair sediment and erosion control measures (e.g., remove accumulated sediment at pre-determined levels). In particular, inspections will be undertaken before and after forecasted heavy precipitation events. Site runoff will be directed to the DEVCO settling pond. Failure of erosion and sediment controls (*i.e.*, breaches) will be identified and rapidly repaired. Repair materials will be kept on site to allow immediate response and repair.

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Coal waste will have a strong potential to generate acid rock drainage; the acidified water will be contained in seepage and runoff from the coal reject piles. Section 2.7.1.4 contains details on the waste coal containment berm conceptual design which includes an HDPE liner and a drainage system to collect acid runoff and convey it to a treatment facility where it will be neutralized prior to discharge. These systems will be engineered and constructed to be robust and function under a range of operating conditions. These systems will be inspected and kept in good repair to inhibit the chance of malfunction. Treated effluent will be monitored to ensure compliance with all discharge limits.

6.8.3 Emergency Response

Failure of erosion and sediment and water controls (*i.e.*, breaches) will be identified and rapidly repaired. Repair materials will be kept on site to allow immediate response and repair. An onsite environmental professional would supervise emergency response and reclamation as required. Water treatment systems will be monitored in several ways including regular testing of treated effluent. Any off specification performance of the system will be rapidly corrected.

6.8.4 Potential Environmental Effects and their Significance

Damage or failure of erosion and sediment control measures are unlikely to cause a significant adverse effect on habitats as frequent inspection will reduce length of time a breach is left undetected and unrepaired. In the event of a damaged or malfunctioning sediment and erosion control structure, the effects are expected to be localized, of short duration, and reversible. The time required for ecological systems to recover would depend on several factors including the type of habitat affected and the amount of material that breached the structure. Close monitoring and inspection of treatment systems for the runoff from waste coal storage piles will also prevent the introduction of acidified water into watercourses or wetlands. In a worst case, fish habitat or wetlands could be damaged during a malfunction of water treatment and would require remedial action and/or habitat compensation.

With implementation of mitigation as described above, significant residual environmental effects due to failure of water control measures on potentially affected VECs are not likely.

6.9 PREMATURE MINE SHUTDOWN**6.9.1 Description of Possible Event**

Premature mine shutdown (temporary or permanent) could occur as a result of a mine accident, change in market conditions, labour issues, and/or equipment malfunction. In the event of premature mine shutdown, procedures would be required to suspend or end mine operations in an environmentally and socially responsible manner to minimize effects on the local environment and community.

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6.9.2 Project Design Measures to Minimize Environmental Effects

Different procedures will be implemented in consideration of the anticipated duration of the closure. A permanent mine shutdown would essentially result in early implementation of decommissioning and reclamation activities (refer to Section 2.5.3).

In the event of a temporary mine shutdown, ongoing care and maintenance of the facilities, site and equipment would be required to maintain the required environmental control and monitoring systems and maintain a safe working environment for returning workers. Staffing levels would likely be reduced with a leaner crew involved in care and maintenance activities (e.g., mine dewatering, water treatment) until operations resumed.

6.9.3 Emergency Response

In the event of a mine accident, appropriate emergency response will be carried out by site staff and local emergency responders as relevant. A permanent or temporary shutdown would be communicated to site staff and the general public. The Contingency Plan for the Export Coking Coal Project will be updated to include procedures for care and maintenance of the mine facilities during temporary shutdowns, including labour interruptions. These will include but not be limited to, care and maintenance activities to maintain mine dewatering and water management of the site.

Assuming environmental controls are maintained, there should be no adverse biophysical effect associated with premature mine shutdown, therefore no specific emergency response would be required.

6.9.4 Potential Environmental Effects and their Significance

Implementation of decommissioning and reclamation procedures or care and maintenance procedures, depending on the nature of the mine shutdown, are not likely to result in adverse residual biophysical effects if properly implemented. Premature mine shutdown is more likely to result in socio-economic effects to Cape Breton communities and potential change in land use of the site. In particular, the permanent loss of mining jobs would likely have serious consequences for the local economy. This job loss, if not mitigated through alternative sources of employment, could be considered significant. However, this loss of employment and effects on land use would not be worse than the current baseline employment conditions in the local area. Residual environmental adverse effects therefore on employment and land use as a result of premature mine shutdown are not likely to be significant.

ENVIRONMENTAL IMPACT STATEMENT FOR THE DONKIN EXPORT COKING COAL PROJECT**7.0 Capacity of Renewable Resources**

Section 16(2)(d) of 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”.

Potential adverse effects of the Project on 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 Land and Resources for Traditional Purposes by the Mi'kmaq of Nova Scotia, and Archaeological and Heritage Resources were assessed in Section 5. 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. An adverse effect on these resources could result in a reduced capacity to provide drinking water resources and support sustainable fishing. The Project's potential effect on renewable resources that support the Mi'kmaq of Nova Scotia is addressed in Section 5.10.

After consideration of the Project's design and mitigation measures (including 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.

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8.0 Effects of the Environment on the Project

Section 2(1) of CEAA defines effects of the environment as any change to the project that may be caused by the environment. Typically, potential effects of the environment on a project are a function of project or infrastructure design and the risks of natural hazards and influences of nature. These effects may result from physical conditions, land forms, and general site characteristics that may act on the Project and result in adverse environmental effects.

In general, environmental conditions that can affect the Project infrastructure or operations will be addressed through engineering design and industry standards. Good engineering design involves the consideration of environmental effects and loadings or stresses from the environment on the Project. Long term environmental management and Project longevity are inherent considerations of project design and development. Responsible and viable engineering designs consistently account for possible forces of the environment.

The environmental attributes that were considered for the potential to have an effect on the Project were determined based on the EIS Guidelines, regulatory consultation, a review of the known past and existing conditions, and knowledge gained through projections of potential future conditions (e.g., potential effects of climate change). Based on the issues and concerns identified, the following environmental attributes were selected for consideration:

- Climate conditions
 - Air temperature and precipitation
 - Fog and visibility
 - Wind
 - Severe weather events (tropical cyclones)
- Tidal conditions and waves
- Sea ice
- Climate change and sea level rise
- Seismic events and tsunamis
- Rockslides/landslides
- Forest fire

8.1 RESIDUAL ENVIRONMENTAL EFFECTS RATING CRITERIA

A significant adverse residual effect of the environment on the Project is defined as one that results in the following:

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- A substantial loss of the Project schedule (e.g., a delay resulting in the construction period being extended by one season);
- Damage to the Project infrastructure resulting in a substantial increase in public health and safety risk;
- Damage to the Project infrastructure resulting in repairs that cannot be technically or economically implemented; and/or
- Failed mitigation causing environmental damage that cannot be technically or economically corrected or compensated in a feasible manner.

8.2 CLIMATE**8.2.1 Climatological Background**

The Donkin site, located approximately 12 km northeast of the Sydney Airport, is within a cool, temperate climatic zone. As part of Cape Breton Island, this area is subjected to low pressure systems that have tracked across the continent or up the eastern seaboard. These systems are responsible for northern Cape Breton having the highest annual precipitation levels (average annual precipitation of 1,504.9 mm at Sydney Airport) in Nova Scotia. In late spring and summer, the coastline of Cape Breton experiences fog. Sea- and land-breezes occur along the coastline and up to several kilometres inland. Winters are usually cold with frequent snowfall and freezing precipitation. Spring comes typically in May, and is cool and cloudy. Summers are short in duration, warm, and are characterized by less precipitation than other seasons (CBCL 2008).

The Fundy and Atlantic coasts of Nova Scotia frequently experience sea fog, a phenomenon that occurs when warm, moist air moves over cooler surfaces. These coasts experience fog 15 to 25 percent of the year (Nova Scotia Museum of Natural History 1996). Other parts of Nova Scotia experience radiation fog caused by the cooling of the land under clear skies. The average annual frequency of this fog is 10 to 15 percent, and occurs most often in November (Nova Scotia Museum of Natural History 1996).

In winter, when cold air from the north descends over the Atlantic Ocean, snow squalls and very strong winds can occur offshore. Freezing spray occurs when a strong flow of cold air passes over coastal waters; this can occur from November to April in offshore areas (Nova Scotia Museum of Natural History 1996). The Gulf Stream, which passes 200 to 250 nautical miles south of Nova Scotia, has the greatest influence on offshore weather. Storm tracks are affected by the presence of the warm water, and can intensify storms, leading to stronger winds (Nova Scotia Museum of Natural History 1996).

The description of the climate for the region is based on climate normals from 1971-2000 for the Sydney weather station, operated by Environment Canada, as well as the weather extremes

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observed since 1946, where applicable. The Sydney Airport weather data are considered to be an accurate representation of average weather conditions on the Donkin Peninsula. A selected summary of monthly climate normals and extremes at the Sydney Airport (Environment Canada 2012a) is provided in Table 8.2.1.

The climate normals shown in Table 8.2.1 are based on data availability characterized as follows (Environment Canada 2012b):

- Temperature - No more than three consecutive and no more than five total months missing during the period (1971 to 2000).
- Precipitation - No more than three consecutive and no more than five total months missing during the period (1971 to 2000).
- Wind - No more than three consecutive and no more than five total months missing during the period (1971 to 2000).
- Visibility - Based on at least 20 years of observations.

Table 8.2.1 Summary of Climate Normal Data – 1971 to 2000 – Sydney Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature												
Daily Mean (°C)	-5.7	-6.5	-2.7	2.1	7.8	13.3	17.7	17.7	13.4	8	3.3	-2.1
Daily Maximum (°C)	-1.3	-1.9	1.5	6.1	12.9	18.9	23	22.7	18.3	12.2	6.8	1.6
Daily Minimum (°C)	-10	-11.1	-6.9	-1.9	2.6	7.6	12.3	12.6	8.5	3.8	-0.2	-5.8
Extreme Maximum (°C)	16.9	18	17.8	27.2	31.1	34.4	33.9	35.5	32.3	25	22.2	16.7
Date of Occurrence (yyyy/dd)	1995/16	2000/28	1945/29	1942/25	1960/31	1944/29	1975/19	2001/10	2001/10	1950/03	1961/05	1951/06
Extreme Minimum (°C)	-26.2	-27.3	-25.6	-14.6	-7.8	-3.9	2.2	2.8	-1.7	-5.6	-12	-22.2
Date of Occurrence (yyyy/dd)	1994/26	1994/08	2001/02	1995/05	1972/02	1956/09	1961/15	1965/31	1971/29	1944/31	1999/19	1993/29
Precipitation												
Rainfall (mm)	82.4	66.7	88.4	103.7	100.1	92.6	86.8	93.1	113.4	143.8	134.4	107.6
Snowfall (cm)	70.8	66.8	51.4	26.1	2.7	0	0	0	0	2	15.7	62.8
Precipitation (mm)	151.5	132.1	138.9	130.4	102.9	92.6	86.8	93.1	113.4	146	149.7	167.5

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Table 8.2.1 Summary of Climate Normal Data – 1971 to 2000 – Sydney Airport

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Extreme Daily Precipitation (mm)	57.2	62.2	73	73.4	93.5	84	68.2	128.8	90.9	96.4	97.3	95
Date of Occurrence	1948/ 14	1996/ 17	1992/ 08	1982/ 29	1967/ 26	1998/ 17	1998/ 09	1981/ 17	1947/ 30	1992/ 19	1944/ 05	1979/ 26
Days with:												
Maximum Temperature > 0 °C	0.97	0.6	1.5	6.9	23.8	29.7	31	31	29.8	25.7	12.5	3.8
Measureable Rainfall (≥ 0.2 mm)	8.6	6.7	10.1	12.3	13.4	13.3	11.9	12.8	13.7	15.4	14.7	10.4
Measureable Snowfall (≥ 0.2 mm)	16.4	12.9	11.1	6.6	0.9	0.03	0	0	0	0.73	6.3	15.7
Measurable Precipitation (≥ 0.2 mm)	20.3	16.3	16.9	15.7	13.8	13.3	11.9	12.8	13.7	15.6	18.3	21.3
Wind												
Mean Wind Speed (km/h)	21.3	20.6	20.8	19.5	17.9	16.9	15.8	15.1	16.2	18.2	19.8	21
Most Frequent Wind Direction	W	W	SW	N	S	S	S	S	SW	SW	W	W
Extreme Wind Gust Speed (km/h)	121	124	129	115	109	114	87	89	129	138	129	161
Date of Occurrence (yyyy/dd)	1960/ 03	1976/ 03	1959/ 13	1986/ 10	1961/ 23	1973/ 17	1975/ 28	1963/ 14	1958/ 29	1974/ 20	1959/ 25	1964/ 01
Days with winds ≥ 52 km/h	4.1	2.3	2.7	1.2	0.6	0.3	0.1	0.1	0.5	1.4	2.3	3.7
Days with winds ≥ 63 km/h	1.6	0.5	0.8	0.2	0.1	0.1	0	0	0.2	0.4	0.8	1.3
Visibility												
Less than 1 km (hours)	29.8	26.2	46.8	61.1	60.2	38.9	28.9	17.5	8	11.8	17.4	24.7
1 km to 9 km (hours)	136.4	119.4	137.7	144.2	123.6	106.4	119.1	110.5	85.4	85.2	92.4	139.9
Greater than 9 km (hours)	577.7	532	559.5	514.7	560.2	574.7	596	616	626.6	647.1	610.1	579.4

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The discussion that follows is based on selected observations from the climate normals and extremes presented in Table 8.2.1. During the winter, the air mass is cold with a February daily mean temperature of -6.5 °C. In the summer, the air mass is predominantly warm with July and August daily mean temperatures of 17.7°C. The extreme maximum and minimum temperatures recorded are 35.5 °C and -27.3 °C, recorded during August and February, respectively. The average annual precipitation is 1,505 mm, of which 81 percent is in the form of rain. The extreme daily precipitation occurred in August with 128.8 mm. The average annual wind speed computed for the Sydney Airport weather station is 18.6 km/h. The maximum wind speeds occurred in January with average speeds of 21.3 km/h and the minimum speeds occurred in August at an average of 15.1 km/h. The average monthly wind speeds were higher in the winter than the summer. The prevailing winds were from the south or southwest in summer and from the west in winter. Maximum gusts ranged from 87 km/h to 138 km/h. Occurrences of extreme winds are not common at Sydney, as over the last three decades there has been an average of 3.7 and 1.3 days per year with winds \geq 52 km/h and 63 km/h respectively (Environment Canada 2012a).

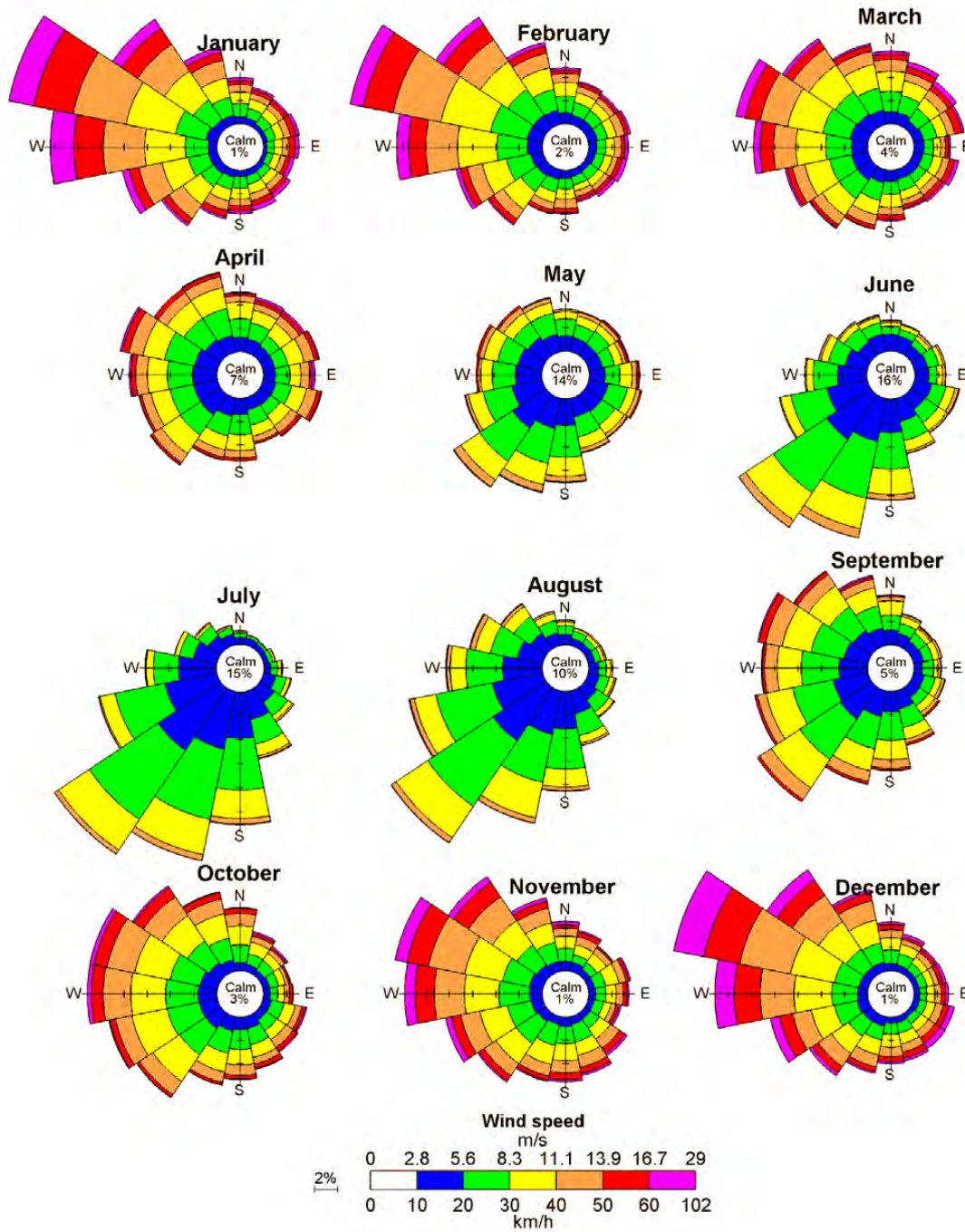
Climate normals for Louisbourg, located approximately 40 km south of Donkin on the Atlantic coast, are nearly identical to those at Sydney. Louisbourg receives more precipitation in the form of rain than snow, but overall receives the similar amounts of precipitation annually. Wind speed records were not available online for this station (Environment Canada 2012c).

Offshore winds and water levels were reported by CBCL (CBCL 2012), for a point east of the site based on a 56-year hindcast of Environment Canada wind information by Oceanweather Inc. The Oceanweather analysis as tabulated by CBCL is reproduced here.

Prevailing winds are from the southwest in the summer and from the west-northwest in the winter and fall seasons. Summer winds are generally below 30 km/h, whereas winter winds are much stronger (generally below 60 km/h). Monthly wind rose plots are provided in Figure 8.2.1. A frequency of exceedance table for hourly wind speed by direction is provided in Table 8.2.2.

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Figure 8.2.1 Monthly Offshore Wind Directional Statistics (CBCL 2012)



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Table 8.2.2 Wind Speed Frequency Analysis

Wind Speed		Direction																Total Exceedance (%)	
m/s	km/hr	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5		
30	108	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27.5	99	0	0	0	0	0	0	0	0.0002	0.0002	0	0	0	0	0.0002	0	0	0.0006	
25	90	0	0.0008	0.0002	0.0002	0	0.0008	0.0002	0.0004	0.0002	0	0.0002	0	0.0012	0.0024	0.0002	0	0.007	
22.5	81	0.007	0.006	0.005	0.006	0.004	0.006	0.002	0.001	0.001	0.001	0.002	0.008	0.017	0.024	0.012	0.005	0.106	
20	72	0.036	0.030	0.022	0.020	0.020	0.038	0.029	0.016	0.006	0.006	0.016	0.043	0.126	0.152	0.054	0.031	0.6	
17.5	63	0.087	0.094	0.083	0.075	0.088	0.122	0.114	0.070	0.049	0.035	0.059	0.163	0.403	0.505	0.209	0.100	2.3	
15	54	0.231	0.234	0.212	0.235	0.236	0.301	0.303	0.231	0.206	0.152	0.209	0.410	1.053	1.370	0.717	0.337	6.4	
12.5	45	0.586	0.491	0.483	0.547	0.526	0.611	0.646	0.561	0.605	0.584	0.723	1.057	2.209	2.940	1.701	0.902	15.2	
10	36	1.20	0.98	0.95	1.03	1.00	1.14	1.20	1.15	1.48	1.63	2.09	2.27	3.84	5.04	3.25	1.94	30.2	
7.5	27	2.21	1.72	1.64	1.71	1.66	1.87	1.99	2.12	3.08	3.70	4.68	4.36	5.94	7.29	5.03	3.36	52.3	
5	18	3.25	2.57	2.38	2.48	2.40	2.79	2.96	3.47	5.00	6.06	7.77	6.93	8.11	9.27	6.72	4.74	76.9	
2.5	9	4.06	3.29	2.99	3.11	3.06	3.55	3.77	4.47	6.35	7.69	9.89	8.77	9.70	10.60	7.82	5.68	94.8	
0	0	4.31	3.51	3.22	3.33	3.28	3.79	4.02	4.76	6.68	8.13	10.41	9.30	10.17	11.00	8.13	5.96	100	

Note: Entries in the table indicate the percent of time that the given wind speed is equaled or exceeded when the wind is from the direction sector indicated. (CBCL 2012)

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Tropical cyclones are intense low pressure systems that form in tropical or sub-tropical waters and can affect weather in areas from the Caribbean to Newfoundland. Nova Scotia experiences tropical cyclones from June to November, with the most active months being September, August, and October (Environment Canada 2009a). In the decade 1991 to 2000, Nova Scotia experienced five tropical cyclones, one of which was a Category 1 hurricane (1996, Hurricane Hortense), and the others were tropical storms (Environment Canada 2009b). Since 2000, five hurricanes have made land landfall in Nova Scotia or have passed close to shore. The most notable of these are Hurricane Juan (2003), Hurricane Gustav (2002), and Hurricane Earl (2010). Hurricane Gustave tracked over southern Cape Breton, and quickly became a tropical storm. The impact this storm had on Cape Breton included power outages, winds over 100 km/h, road washouts, and coastal flooding (Environment Canada 2010b).

8.2.2 Effects on the Project

8.2.2.1 Air Temperature and Precipitation

Normal local temperature and precipitation conditions will not have a substantive effect on the Project such that there will be any resulting environmental effect. Design, construction and planning of operation and maintenance of the Project consider the potential normal and extreme conditions that might be encountered in the Cape Breton coastal setting of the Donkin Peninsula. Air temperature and precipitation conditions of greatest concern of causing a significant adverse effect on the Project are heavy precipitation events (heavy rain or snow melt), which could result in erosion and flooding.

Extreme temperature is not anticipated to bring about significant adverse residual effects of the environment on the Project. Extreme low temperatures have the potential to reduce the ductility of materials used to construct the Project components (e.g., CHPP, barge load-out facility, transshipment facility, ancillary components), and increase susceptibility to brittle fracture. Snow and ice accumulation have the potential to increase loadings on buildings and structures.

Heavy precipitation events can cause delays in onshore construction activities and increase the risk of erosion and sedimentation (e.g., on fish habitat or wetlands) particularly when site soils are exposed and have not been fully stabilized. Heavy rains or snow can temporarily restrict construction activities. Heavy precipitation events, however, are an expected work condition and the construction schedule allows for weather conditions typical for the region. These delays could have short term implications for Project schedule, but are not expected to cause environmental effects. The risk from erosion and sedimentation during extreme weather will be greatly reduced once site soils have been stabilized through revegetation and/or through installation of stormwater management systems.

Heavy precipitation events may cause short-term delays during operation of the Project, but these short-term delays are not anticipated to result in any environmental effects. Heavy

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precipitation will result in increases in stormwater runoff in the Project development Area, resulting in increased loadings to the stormwater collection and treatment system.

8.2.2.2 Fog and Visibility

Reduced visibility due to fog is likely to occur in late spring and early summer. During winter poor visibility is often caused by snow. Reduced visibility due to fog could make manoeuvring of equipment and vessels difficult in the early part of the day, and could result in an accidental event such as a marine vessel accident or coal spill into the marine environment. The potential environmental effects of such accidental events are described and assessed in Section 6.

8.2.2.3 Winds and Severe Weather Events (Hurricanes, Cyclones)

The location of the Project on the Donkin Peninsula, with the load-out facility in Morien Bay and the transshipment loading site in Mira Bay, will be exposed to storms, wind and ice generated in the Atlantic Ocean (Ausenco Sandwell 2010). Extreme wind can produce high waves, dense blowing sea foam, heavy tumbling of the sea and poor visibility. Severe weather events will cause delays and have the potential to damage the surface infrastructure of the Project, as well as barges and vessels at the load-out facility and the transshipment site. There is seasonal variation between winter storms and calmer summers. Downtime is estimated to be an average of 3 to 5 percent of the time during the summer and 24 to 29 percent of the time during the winter months due to heavy wind and wave conditions (CBCL 2012).

High winds and heavy seas at reduced temperatures can cause freezing spray conditions. Freezing spray can occur between November and April however the potential for moderate or greater vessel icing from freezing spray is greatest in February. Safe work aboard a vessel can be impeded by freezing spray. The rate of ice build-up is strongly influenced by the vessel design, speed and direction of travel.

It has been estimated that in an average year there are a total of 300 days available for vessel loading due to weather conditions and 200 days available for vessel loading as a worst case weather scenario; at 80 percent normal bulk carrier berth occupancy a maximum of 240 operation days and 160 operating days, respectively, could be expected (CBCL 2012).

8.2.3 Mitigation

The materials specified for the Project will be in compliance with all applicable codes and will maintain structural integrity at the anticipated minimum and ambient temperatures in the region to prevent adverse effects of the environment on the Project. Most construction equipment that would typically be in use at the Project site is fully weather proofed and can operate in a range of conditions.

Erodible soils on the construction sites will be mitigated using appropriate site drainage and sedimentation control measures, as will be described in the Environmental Management Plan.

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As described in Section 2, site runoff will be collected and directed towards the treatment system. Collection ditches, culverts and the treatment system are designed with sufficient capacity to handle site runoff generated during severe weather events.

Short delays due to reduced visibility are anticipated and can be predicted. Disruption of activities and accidental events can be avoided by scheduling tasks that require precise movements (e.g., berthing, loading and transportation of coal) for periods when the fog has lifted.

The load-out facility and the transshipment site and all related equipment will be fully weather proofed and designed for a full range of climatic conditions including severe rain, wind and waves. Container vessels are designed to be seaworthy in all types of weather. Vessels operating in the area will follow the directions of the Canadian Coast Guard Marine Communications and Traffic Services during severe weather events. Container vessels will not dock and, if docked, will undock and depart should the weather exceed the design criteria. The scheduling and completion of a product coal transfer, even after it has been initiated, can be halted at any time in the interests of safety for the personnel and equipment. Accidental events that could result from severe weather causing interruptions in product coal transfer will be prevented such that minimal if any spills would result in such events.

8.3 TIDAL CONDITIONS AND WAVES

With only minor shelter from local islands and headlands, the barge load-out facility, navigation route and transshipment site is exposed to wind and waves that originate from the northeast to southeast sectors (Ausenco Sandwell 2010).

Local tides are semi-diurnal, with a tidal range in North Sydney of 1.4 m for large tides and 1.1 m for mean tides. Along the coastline, the tide propagates as a progressive wave (CBCL 2012). The tides in nearby Louisbourg for large tides are high water 1.8 m above chart datum and low water 0.2 m (Canadian Chart 4375, CHS). The mean tides are high water 1.5 m and low water 0.4 m with a mean water level of 0.9 m (Canadian Chart 4375 CHS).

Currents within the Project area are extremely variable in time and space, and the weakness of the tidal contribution, 30 percent in the summer and even less in the winter, can make the currents difficult to predict (CBCL 2012). Based on the Danish Hydraulic Institute's MIKE3 model performed by CBCL, current speed around the breakwater site is 0.05 m/s (0.1 knots) (CBCL 2012). Currents between the breakwater site off the Donkin Peninsula and the transshipment mooring range from 0-0.3 m/s (0-0.6 knots).

In the summer the prevailing wave climate consists of long-period swells from the south, with wave heights typically under 2 m. During the winter months there are extended periods of calm created by ice cover. The months with the largest waves are from November to January, when

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there are more frequent storms coming from a northerly direction, resulting in waves with heights ranging from 2 m to 10 m.

The results of extreme storm surge modeling in Atlantic Canada are available from Environment Canada (www.hazards.ca). The 10-, 50-, and 100-year return period storm surge values at Donkin are approximately 0.5, 0.7, and 0.8 m, respectively (CBCL 2012). This means that water levels can rise due to tidal influence and be further increased due to storm surges and reach the combined heights at the return periods given. On top of these increments, changes in sea level can influence the extreme water levels.

8.3.1 Effects on the Project

During construction, there may be extreme conditions (*e.g.*, winds, waves) that may not be optimal for dredging and could result in temporary delays in dredging operations. Significant waves over three metres have the potential to shut down the dredging operations. Temporary delays in the dredging schedule are not anticipated to result in any environmental effects.

Generally, tidal conditions and waves are not anticipated to have an effect on the Project land-based infrastructure and subsurface mines. Due to its situation on the Donkin Peninsula and the elevation of the surrounding landscape, the Project land-based infrastructure is protected from large waves and storm surges. The section of the peninsula in the vicinity of Schooner Pond may be particularly susceptible to erosion from large waves and storm surges during the winter months when northerly winds and storms produce very large waves and in fact, there has been erosion reported in this area already. However, there is not expected to be any interaction with Project infrastructure.

8.3.2 Mitigation

As previously discussed, the load-out facility and the transshipment site and all related equipment will be fully weather proofed and designed for a full range of climatic conditions including tidal conditions and waves. The effects from maximum current speeds and shear stresses on the sea bed as a result of the interaction of tidal currents and waves will be incorporated into the design and construction of marine infrastructure.

8.4 SEA ICE

Based on data recorded by Environment Canada (Environment Canada 2010), ice cover may be present between January 1 and May 14 in the Project area. New ice is seldom thick but onshore winds can cause the development of pressure ridges. During winter months ice conditions may affect navigation from January 29 until April 2 for a period of nine weeks (Ausenco Sandwell 2010).

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8.4.1 Effects on the Project

The load-out facility and the transshipment site will be designed for the anticipated sea ice conditions. Sea ice may result in shipping delays during operation of the Project. However, ice accumulation is seldom long lived and causes few delays to vessels. Results of an ice study in Sydney Harbour (C Core 2007) indicate that the expected delay based on the last 10 years of ice data is less than seven days, once in approximately four years. Downtime is estimated to be an average of 8 percent of the time, with a peak of 14.3 percent during the winter months due to sea ice (Ausenco Sandwell 2010).

8.4.2 Mitigation

The effects of sea ice on Project marine infrastructure will be assessed on a regular basis and maintenance and repairs will be implemented as needed. Ice breaking is provided by the Canadian Coast Guard and vessels using the facility will be of a class rated for operating in sea ice.

For example, the design of the single point mooring buoy for resistance to ice flow will be determined on agreed risk factor for ice events - e.g., the decision to be made to design the buoy such that it could withstand a 1 – 30 year return event on Arctic ice flow. If this was the case then when a greater event was predicted, through monitoring of the Arctic ice flow information as it travels south in the North Atlantic, the buoy would have to be removed. It is anticipated the design of the single point mooring buoy would have a permanent anchor drilled into the seabed, and the floating buoy would be attached to the anchor via a chain. The chain would be shackled to the anchor. For the removal, drivers would open the shackle, a crane barge would be employed to lift the buoy and chain, transport to shore and store at the dock. After the ice event; the procedure reversed and buoy reinstalled for operation.

8.5 CLIMATE CHANGE AND SEA LEVEL RISE

The climate as a “natural” phenomenon is extremely complex. Weather observations are perhaps the oldest and most reliable form of environmental monitoring. Typical and extreme weather events are well documented with reasonably good spatial coverage existing in Canada with a combination of fully instrumented, manned or automated, observation stations supplemented by a wider coverage of climatological stations. This monitoring forms the basis for the historic, current and, predicted climate conditions and trends.

The effects of climate change are becoming better understood. Since it is not possible to conduct experiments on the climate or to reproduce its intricacies in the laboratory, climate models facilitate increased understanding of climate change (Natural Environment Research Council 2008). Climate models are based on the laws of physics to describe how temperature, pressure, winds, currents and other variables interact and change over time (Natural Environment Research Council 2008). There are many assumptions and uncertainties

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associated with modeling. Climate models are, thus, mathematical approximations of the climate system (Natural Environment Research Council 2008), tools to assist in decision making, but not sufficiently accurate to specifically describe future events and conditions.

Numerous climate change-related effects have been observed globally. Many of these effects are anticipated to intensify over the next century, including increased temperatures, receding glaciers, melting of permafrost, rising sea levels and coastal flooding, changing of precipitation patterns and temperatures.

Predicting future environmental effects of climate change for a specific area using global data sets can be problematic due to generic data that do not take into account local climate forcing (climate forcing represents natural mechanisms, such as variations in ocean circulation and changes in the atmospheric composition, and others, which “force” the climate to change by upsetting the energy balance). Accurate regional and local projections require the development of specific regional and local climate variables and climate change scenarios (Lines *et al.* 2005). As a result, downscaling techniques have emerged over the last decade as an important advancement in climate modelling. Downscaling techniques are particularly important for Atlantic Canada due to the inherent variability associated with this predominantly coastal climate. Downscaling techniques use a regional climate model or statistical technique to predict climate change scenarios.

Using a Statistical Downscaling Model (SDSM) based on two global climate models (CGCM2 and HadCM3), Lines *et al.* (2008) predicted future climate change scenarios for 14 sites in Atlantic Canada. Table 8.5.1 shows the results from both models for the site closest to the Project (Sydney, Cape Breton). As Lines *et al.* (2008) concludes, the variation in results demonstrate that more than one model output should be used to determine appropriate views of future climate.

Table 8.5.1 Annual Projected Increases in Mean Annual Maximum and Minimum Temperature, and Percent Precipitation, for Sydney, Nova Scotia with Respect to 1961-1990 Baseline Period

Years	T max		T min		% Precipitation	
	CGCM2	HadCM3	CGCM2	HadCM3	CGCM2	HadCM3
2010-2039	1.06	0.92	1.12	1.03	3	3
2040-2069	1.42	1.15	1.49	1.39	3	-3
2070-2099	2.12	2.17	2.21	2.40	4	4

Source: Lines *et al.* 2008.

Both models agree that temperatures are projected to increase in all seasons. This average temperature change will be gradual over the period and will change precipitation types and patterns. The warmer fall and winter temperatures could mean later freeze up; wetter, heavier snow; more liquid precipitation occurring later into the fall; and possibly more freezing

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precipitation during both seasons. There is less agreement among the global circulation and regional downscaling models regarding changes in precipitation as shown in Table 8.5.1.

There is a great deal of variability and inconsistencies in predictions from climate models, but regardless of the differences in the projected temperature and precipitation changes between models, there is a consensus in the climatological community concerning the overall anticipated environmental effects of climate change. This is especially true since many of the changes are documented as already occurring. For example, over the next 100 years, Atlantic Canada will likely experience warmer temperatures, more storm events, increasing storm intensity, rising sea level, storm surges, coastal erosion and flooding (Vasseur and Catto 2008).

Sea level rise in the Maritimes has been occurring since the end of the last ice age, about 10,000 years ago. During the 20th century the sea level at Charlottetown, Halifax, and Sydney has risen at a rate of approximately 0.3 m/century, which included 0.2 m/century of crustal subsidence (Forbes *et al.* 1997). The rate of global mean sea level is accelerating in the 21st century due to global warming impacts, notably the melting of polar ice caps. The future global mean sea level rise will likely be greater than 1 m per century, well above 2007 projections from the Intergovernmental Panel on Climate Change (which were up to 0.59 m/century) (Solomon *et al.* 2007). The 2011 report from the Arctic Monitoring and Assessment Program (Arctic Monitoring and Assessment Program 2011) raised the potential global mean sea level rise at a range of 0.9 m to 1.6 m by 2100 if the melting of polar ice caps continues as predicted. In Sydney, crustal subsidence may slightly increase the rate of relative sea level rise, but only by a relatively small amount (approximately 10 percent or less of the mean sea level rise due to global warming) (CBCL 2012). A minimum sea level rise rate of 1 m per century should be assumed which equates to 0.4 m rise over the life of the Project.

8.5.1.1 Effects on the Project

The period of construction of even a large project is generally not considered as a period over which the effects of climate change can be considered. Projected climate changes may affect operation of the Project in many different ways, ranging from positive to negative, and from negligible to extreme effects. Those which could potentially have an adverse residual environmental effect include increased frequency and intensity of storm surges, increased frequency of extreme storms accompanied by strong winds, increased incidence of flooding and erosion, sea level rise and increased frequency of heavy precipitation events. Each of these, if not engineered and designed for, could result in damages to infrastructure that are not feasible to fix or failure of mitigation, which may in turn result in environmental effects.

Climate change and sea level rise could result in the following effects on the Project:

- Delays and inability for ships to dock;
- Reduced access to infrastructure and equipment;

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- Increased structural loading;
- Flooding and erosion;
- Increased need for storm and wastewater management;
- Increased pressure on water supply;
- Reduced energy demand for heating, and increased demand for cooling, due to warmer and fewer cold days and nights;
- Loss of electrical power resulting in potential loss of production;
- Reduction in air quality resulting in more stringent emission reduction targets; and
- Damages to infrastructure that are not feasible to fix or that result in environmental damage.

It is important that the residual effects of climate change, and their anticipated resulting adverse effects on the Project, be carefully taken into account in the planning, design, and construction activities; the selection of materials to be used; and the operating plans for the Project to ensure the long-term viability and sustainability of the Project.

All but sea level rise are difficult to predict in advance. While sea level rise is already occurring and continuing at a steady rate, the magnitude, timing and duration of the other climate effects are highly variable. As a result, sea level rise is at a lower level of sensitivity due to the ease with which it can be accounted for in engineering designs, relative to other climate effects. The timing, magnitude and duration of storm surges, extreme storms, flooding/erosion, and heavy precipitation are influenced by local conditions and compounded by tropical storms. As a result, these are difficult to predict more than a few days in advance.

8.5.2 Mitigation

Potential effects of climate change and sea level rise, on construction and operation will be considered and incorporated in the planning and design of Project infrastructure to minimize the potential for long-term damage to infrastructure, taking into account the existing climate conditions and the reasonably foreseeable future climate conditions. Inspection and maintenance programs will prevent the deterioration of the infrastructure and will help to maintain it in compliance with applicable building codes.

The following mitigation measures will reduce potential effects of climate change on the Project, as well as potential environmental effects.

- Vulnerable infrastructure will be identified and designed for strength against potential damage

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- Stormwater infrastructure will be designed to withstand predicted increases in precipitation
- Access will be designed to account for flooding
- Control structures will be designed to reduce sensitivity to storm surge, erosion and flooding damage
- Clear guidelines will be established for the delay of docking due to severe weather
- Emergency response plans will be developed
- Backup power generation will be installed in case of long term power outages

Because the effects of climate change are difficult to predict in advance, the following adaptive management measures will be applied:

- Develop program to monitor early warning signs for structural weakness
- Develop program to monitor early warning signs for risk associated with sea level rise
- Increase research and feasibility studies of flooding and erosion mitigation measures and implementation of controls to reduce sensitivity to heavy precipitation structures (*i.e.*, heating systems or covers for sensitive structures or mechanisms to protect against freezing rain)
- Increase consideration, feasibility study and implementation of alternative energy sources
- Develop strategies to conserve water
- Develop and publish company mandate for water conservation

8.6 SEISMIC EVENTS, LANDSLIDES AND TSUNAMIS

Seismic events (earthquakes) can result in ground vibration, landslides and tsunamis (huge ocean waves). Landslides and tsunamis can be generated by mechanisms other than seismic activity: landslides are influenced by local geological and topographic conditions; tsunamis can be caused by submarine activities such as earthquakes and landslides.

Minor faulting and folds occur along the southern boundary of the Sydney coal basin (MBGS 2007). The Donkin Fault and Donkin Anticline have both been identified within the resource boundary.

The Geological Survey of Canada maintains a National Earthquake Database containing historical information, including location (*i.e.*, epicentres) and magnitude, on Canadian earthquakes. The Project is located within an area identified by NRCan (2008) as relatively low

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seismic hazard. Areas with clusters of earthquake activity have been identified by NRCan (2011) as the Northern Appalachians Seismic Zone, west and south of the Project, and the Laurentian Slope Zone, east of the Project. Although earthquakes of magnitude 4.0 or less have been recorded in the Cape Breton region, no significant earthquakes have been recorded in Nova Scotia (NRCan 2011). A “significant earthquake” is defined by Lamontagne *et al.* (2007) as an earthquake “that caused some minimal damage, or could have caused damage had they occurred close to inhabited regions” and included those of magnitude 6.0 or greater and/or those that had some impact on the built or natural environment.

Earthquake activity of magnitude 6.0 and 7.2 was recorded in 1929 with epicentres in the Laurentian Slope, offshore of Nova Scotia. Vibration from this earthquake resulted in minor damage in Cape Breton Island (*i.e.*, fallen or cracked chimneys, minor landslides, blocked highways). A massive submarine landslide and a tsunami were generated by this earthquake. The effects of the tsunami were felt in Newfoundland and are described later in this section.

Landslides are defined as the movement of rock or sediment down a slope (NRCan 2009) and can be land-based or submarine. Although landslides occur across Canada, several regions are more susceptible: the Canadian Cordillera; cretaceous bedrock in the prairies; glaciomarine deposits (*e.g.*, Champlain Sea in Ontario and Quebec); glaciolacustrine sediments; and permafrost (NRCan 2009). Major landslides occur less frequently in the Atlantic Provinces than in other regions of Canada; however, landslides do occur in Nova Scotia, with the Cape Breton Highlands being the most susceptible area with deep gorges and steep cliffs (Wahl *et al.* 2007, Liverman *et al.* 2004). The topography of the Project Development Area is generally flat and bedrock is at or near the surface (MBGS 2007).

The continental shelf along Canada’s east coast is considered to be stable; submarine landslides in this region are typically generated by seismic activity (Mosher 2008). The 1929 earthquake in the Laurentian Slope generated a submarine landslide and a tsunami that struck the Burin Peninsula of Newfoundland and resulted in loss of life, damage/destruction to infrastructure (homes, wharves, telegraph cables) (Fine *et al.* 2005). The tsunami had wave heights 3 to 7 m in Newfoundland, and may have reached wave heights of more than 1 m in Nova Scotia (Ruffman 2001). While a tsunami may occur due to seismic activity on the Laurentian Slope, it would be rare, and the distance to Nova Scotia will reduce the wave energy (Ruffman 2001).

8.6.1 Effects on the Project

Faults can result in water and gas inflow to the subsurface mine. Unmapped faulting may be encountered during mining, and may disrupt mining sequences. Faults, geological structures, and discontinuities have been considered in the mine layout, pillar design, roof control design, and infrastructure designs for water and gas management systems.

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The Project, and all related facilities, will be designed to the applicable standard for earthquakes in this area. The intent of these design standards is to maintain the integrity of the facilities based on the level of risk for an earthquake in the area. An earthquake with a magnitude substantively greater than the design-base earthquake could result in damage to the Project facilities. However, design-base earthquake magnitude values are elected based on probability, and it would therefore be very unlikely that the design-base earthquake would be exceeded during the life of the Project.

It is not likely that a landslide on land will have a significant effect on the Project. Most of the Project facilities will be located in areas that are low risk for landslides. Landslides and rockslides may occur along sections of the Donkin Peninsula with steep coastlines, potentially resulting in damage to Project infrastructure in these areas. A submarine landslide is not anticipated to have any direct effect on the Project, due to the design and depth of the mine shafts.

A tsunami, however generated, could affect the Project through damage to marine infrastructure or infrastructure in low-lying areas. Most of the Project facilities will be located at elevations that are not likely to be affected by a tsunami.

8.6.2 Mitigation

New data acquired on faulting will be considered in the Project design, as appropriate. Horizontal drilling ahead of development will take place so that mitigation procedures and equipment can be positioned and appropriate work force training provided prior to fault intersection. During any future horizontal drill programs, fault identification should be one of the program objectives. The potential environmental effects resulting from infrastructure damage due to seismic events, landslides or tsunamis will be mitigated through Project design, as well as development and implementation of emergency response and contingency plans for accidental events.

8.7 FOREST FIRE

The mean danger of forest fire in the Donkin Peninsula for July, when risk of forest fire is typically the greatest, is rated as moderate (for years 1971-2000); where moderate is defined as creeping or gentle surface fires that are easily contained by ground crews with pumps and hand tools (NR Can 2012).

8.7.1 Effects on the Project

While there is potential for natural forest fire to occur in or near the Local Assessment Area, it is not likely to have a substantive effect on construction or operation of the Project. Nova Scotia has a forest fire control program in place to identify and control fires, minimizing the potential magnitude and extent of any forest fire, and their effects on the Project.

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The facility structures will be constructed primarily of concrete and stainless steel, which are not typically affected by fire. In the event that a forest fire did occur in close proximity of the Project, while Project-related infrastructure is not likely to be substantively affected by the fire, there is potential risk of contact with coal products which are flammable and, if ignited, could result in environmental effects on air quality.

8.7.2 Mitigation

Emergency response capability, emergency response plans, and fire trained individuals and response equipment is planned in readiness for, and in response to, such accidental events. If fire were to break out in direct proximity to the Project, emergency measures would be in place to quickly control and extinguish the flames prior to contact with flammable materials.

8.8 SUMMARY OF RESIDUAL EFFECTS

The environment could potentially have an effect on the Project, specifically during construction and operation, but this will be mitigated through careful design in accordance with factors of safety, best engineering practice, and adherence with standards and codes. The mitigation measures and strategies described in this EIS and the selection of materials that are able to withstand the environmental conditions that can be reasonably expected in the Project Development Area will more than adequately address these concerns. Mitigation measures include, among other things, designing structures to relevant codes and standards and applying conservative factors of safety to mitigate the potential effects of the environment (e.g., seismic activity, climate change, sea level rise, extreme weather, and other environmental phenomena), and scheduling of activities to allow for weather disruptions. Planning, design, and construction strategies intended to minimize the potential effects of the environment on the Project reduce the risk of serious damage or interruption of schedule to acceptable levels.

Therefore, based on a consideration of the various mitigation measures and strategies described in the Project Description and other sections of this EIS, and the significance criteria described in Section 8.1, 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 by responsible design. Similarly, the effects of the environment on the Project are cumulatively rated not significant.

ENVIRONMENTAL IMPACT STATEMENT FOR THE DONKIN EXPORT COKING COAL PROJECT**9.0 Follow-up and Monitoring**

The Project is committed to the effective implementation of environmental design and mitigation measures specified in the EIS. An Environmental Management Plan (EMP) will be prepared to manage these commitments for mitigation including follow-up and monitoring programs.

Section 16(2)(c) of CEEA 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 ensure compliance with all regulatory requirements and self-imposed environmental commitments.

ECM can consist of regulatory environmental surveillance which is carried out by regulatory authorities and/or self-regulatory ECM in which the proponent undertakes to monitor its own activities. Self-regulatory ECM overlaps with regulatory environmental surveillance where the external standards which are being monitored are regulatory in nature (e.g., water quality monitoring to meet water quality guidelines and/or regulatory approval conditions). Self-regulatory ECM is an important tool for the implementation of mitigation and/or self-imposed commitments.

In addition to verification of effects prediction and effectiveness of mitigation measures, a follow-up program is also used to support the implementation of adaptive management measures to address previous unanticipated adverse environmental effects and support environmental management systems used to manage the environmental effects of projects. Follow-up programs have the added benefit of providing information on environmental effects and mitigation that can be used to support or improve future environmental assessments (CEA Agency 2011b).

EEM and ECM programs are discussed generally in Section 5 for each VEC as applicable. This section describes the specific follow-up programs to be implemented and includes detail on the proposed framework for each program, as required by the EIS Guidelines.

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9.1 ATMOSPHERIC ENVIRONMENT

<p>Program Title: Follow-Up Air and Noise Monitoring Program</p>	
<p>Program Objectives:</p> <ul style="list-style-type: none"> • To verify the accuracy of EA predictions and determine the effectiveness of mitigation measures • To confirm compliance with federal and provincial air quality and noise guidelines/criteria • To signal the need for further monitoring and/or enhanced mitigation to address potential dust and noise-related complaints • To reduce Project-related GHG emissions as much as is economically feasible and to recover energy from the coal-bed methane resource where it is technically and economically feasible to do so • To comply with federal GHG reporting requirements 	
<p>Program Components:</p> <ul style="list-style-type: none"> • Development of Project-specific GHG Management Plan • Dust and noise-related complaint reporting and response <p><u>Environmental Compliance Monitoring (ECM)</u></p> <ul style="list-style-type: none"> • Particulate monitoring • Sound pressure level monitoring • GHG emissions monitoring 	<p>Monitoring Activity:</p> <p>Activities associated with particulate monitoring and sound pressure level monitoring will consist of:</p> <ul style="list-style-type: none"> • Desktop reviews; • Field measurements using specialized monitoring equipment; and • Documentation. <p>Specific particulate and sound pressure level monitoring activities, if required, will be developed in consultation with NSE and Health Canada and will be described in a detailed Air and Noise Monitoring Plan.</p> <p>Activities associated with GHG emissions monitoring will consist of:</p> <ul style="list-style-type: none"> • Desktop reviews; • Use of approved methods (e.g., monitoring and direct measurement, mass balance, emissions factors, and/or engineering estimates) to calculate estimated quantities of GHG emissions based on emission sources occurring at the facility; and • Reporting and documentation. <p>GHG emissions monitoring will be undertaken in accordance with applicable GHG Emissions Reporting Program requirements prescribed by EC for the corresponding calendar year. Specific monitoring/reporting activities will be developed in consultation with EC and described in a detailed GHG Monitoring Plan.</p>

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<p>Workplan Structure:</p> <ul style="list-style-type: none"> • Dust and noise-related complaints will be logged, investigated, addressed where necessary and practical through further monitoring and/or enhanced mitigation, and reported as per complaint resolution procedures outlined in Project EMP • Particulate and sound pressure level monitoring as per details of Air and Noise Monitoring Plan • GHG emissions monitoring as per details of GHG Monitoring Plan, GHG Management Plan, and requirements of EC's GHG Emissions Reporting Program • In accordance with any other applicable environmental permitting requirements
<p>Schedule:</p> <ul style="list-style-type: none"> • Particulate monitoring and sound pressure monitoring programs will be implemented during Project construction and operation (subject to permitting requirements) • GHG emissions will be monitored and quantified on an annual basis throughout the operational phase of the Project
<p>Roles and Responsibilities:</p> <ul style="list-style-type: none"> • The Project personnel will undertake dust and noise complaint reporting and initial response in accordance with the Project EMP, with any required follow-up assessments and mitigation planning carried out by qualified air quality and noise specialists as required • Qualified air quality and noise specialist(s) will undertake particulate and sound pressure level monitoring under contract with the Project and in accordance with Air and Noise Monitoring Plan and any applicable environmental permitting requirements • Qualified air quality specialist(s) will undertake GHG management planning and GHG monitoring/reporting under contract with the Project and in accordance with GHG Management Plan, GHG Monitoring Plan, and any applicable environmental permitting requirements
<p>Review Process:</p> <ul style="list-style-type: none"> • Air and Noise Monitoring Plan will be submitted to NSE and Health Canada for review and approval • GHG Monitoring Plan will be submitted to NSE and EC for review and approval
<p>Stakeholder Involvement:</p> <p>Any air quality or noise complaints received by stakeholders and/or through the CLC will be recorded and responded to as appropriate in accordance with complaint resolution procedures outlined in Project EMP</p>
<p>Funding Sources:</p> <p>Planning, monitoring, reporting, and complaint resolution activities will be funded by the Project</p>
<p>Information Management and Reporting:</p> <ul style="list-style-type: none"> • Dust and noise-related complaints will be recorded and tracked in a log that documents the date and time of the complaint; contact information for the individual lodging the complaint; details of the complaint; any action(s) taken to correct the problem; and the need for follow-up (if applicable) • Complaint records will be maintained for a minimum of two years and made available to NSE upon request • Particulate and sound pressure level monitoring results will be provided to NSE on an annual basis • GHG emissions will be reported to Environment Canada annually through their GHG Emissions

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<p>Reporting Program</p> <ul style="list-style-type: none"> • Relevant monitoring results will be reported to the CLC on an ongoing basis
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9.2 WATER RESOURCES

<p>Program Title: Surface and Groundwater Monitoring Program</p>	
<p>Program Objectives:</p> <ul style="list-style-type: none"> • To gather pre-disturbance information on local domestic wells on Long Beach Road • To verify the accuracy of EA predictions and determine the effectiveness of mitigation measures (including water treatment and hydrological mitigation) 	
<p>Program Components:</p> <ul style="list-style-type: none"> • Pre-Disturbance Well Survey to locate and characterize wells on Long Beach Road which could potentially be affected by the Phase III coal waste disposal pile <p><u>Environmental Effects Monitoring (EEM)</u></p> <ul style="list-style-type: none"> • Surface water quality and quantity monitoring (including toxicity testing) • Groundwater quality and quantity monitoring <p><u>Environmental Compliance Monitoring (ECM)</u></p> <ul style="list-style-type: none"> • Surface water and groundwater monitoring to ensure compliance with pertinent regulations and guidelines (e.g., Canadian Council of Ministers of the Environment (CCME) guidelines, and Industrial Approval requirements) 	<p>Monitoring Activity:</p> <p>Surface water quality monitoring will include <i>in situ</i> measurements (pH, temperature, conductivity/salinity, dissolved oxygen, redox potential, and flow) as well as laboratory testing (general chemistry, metals, total suspended solids, Polycyclic Aromatic Hydrocarbons (PAHs) and BTEX analyses).</p> <p>Groundwater monitoring will include monitoring of water levels and laboratory testing (as above).</p> <p>Specific monitoring program including testing parameters, sample locations, and testing frequency to be determined in consultation with NSE and described in a Surface Water and Groundwater Monitoring Plan. Plan expected to be an extension of existing groundwater and surface water sampling program.</p>
<p>Workplan Structure:</p> <ul style="list-style-type: none"> • As per details of Surface Water and Groundwater Monitoring Plan and terms and conditions of provincial Industrial Approval 	
<p>Schedule:</p> <p>The current surface water and groundwater monitoring program at the site will continue until a new Industrial Approval is in place. Frequency of testing will be determined in consultation with NSE as per the Industrial Approval conditions but is expected to be similar to existing monitoring program which includes a combination of daily, weekly, monthly, quarterly, semi-annual, and annual testing for various parameters.</p> <p>The Pre-disturbance well survey for Long Beach Road will be undertaken at least two years prior to the construction of the Phase III coal waste disposal pile (expected to be constructed Year 13 of operation).</p>	

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<p>Roles and Responsibilities:</p> <p>Environmental Professional will undertake surface water and groundwater monitoring on behalf of the Project and in accordance with Industrial Approval requirements</p>
<p>Review Process:</p> <p>Reporting will be conducted to NSE as per the conditions of the Industrial Approval.</p>
<p>Stakeholder Involvement:</p> <p>The CLC will be consulted for input and review during the development of the Surface Water and Groundwater Monitoring Plan.</p>
<p>Funding Sources:</p> <p>Work will be funded by the Project.</p>
<p>Information Management and Reporting:</p> <p>Surface Water and Groundwater Monitoring Plan and monitoring results will be provided to NSE (annual report) and the CLC for review.</p>

9.3 BIRDS AND WILDLIFE

<p>Program Title:</p> <p>Follow-Up Bird Survey and Monitoring Program</p>	
<p>Program Objectives:</p> <ul style="list-style-type: none"> • To supplement the results of previously completed baseline breeding bird surveys • To verify the accuracy of EA predictions and determine the effectiveness of mitigation measures • To guide mitigation measures (e.g., refinements of design for Phase III coal waste disposal area; setbacks for seabird colonies) • To ensure that measures are taken to monitor potential adverse effects of the Project on SARA listed wildlife species 	
<p>Program Components:</p> <p><u>Pre-Disturbance Surveys</u></p> <ul style="list-style-type: none"> • Breeding bird surveys in the Phase III waste coal disposal area to determine if Canada Warbler and Olive-sided Flycatcher or other species of conservation concern nest there <p><u>Environmental Effects Monitoring (EEM)</u></p> <ul style="list-style-type: none"> • Monitoring of the abundance and distribution of seabirds at the Northern Head seabird colony to determine the efficacy of the setbacks around the colony, including monitoring of the abundance and distribution of Black Guillemots at the western end of the colony where the 	<p>Monitoring Activity:</p> <p>Activities associated with follow-up pre-disturbance surveys and EEM will consist of:</p> <ul style="list-style-type: none"> • Desktop reviews; • Field surveys; and • Documentation. <p>Specific monitoring activities will be developed in consultation with NSDNR and CWS and will be described in a Bird Monitoring Plan.</p> <p>In accordance with the EIS Guidelines, because potential adverse effects on SARA listed wildlife species (i.e., Canada Warbler and Olive-sided Flycatcher) have been identified, the Bird Monitoring</p>

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<p>seaward setback is narrow</p> <ul style="list-style-type: none"> Monitoring of structures where light attraction may occur to determine if any mortality events occur Identify additional post-construction bird monitoring requirements in consultation with the CWS, based on final design details. 	<p>Plan will identify the circumstances under which corrective measures may be needed to address any issue or problem identified through the monitoring (<i>i.e.</i>, if unanticipated effects occur or the importance of effects is greater than anticipated). The Plan will also clearly describe how government departments responsible for the listed species at risk would be engaged in reviewing proposed adaptive management measures, in the event that mitigation measures are not effective.</p>
<p>Workplan Structure: As per details of Bird Monitoring Plan and in accordance with any applicable environmental permitting requirements</p>	
<p>Schedule:</p> <ul style="list-style-type: none"> Elements of work may proceed in 2012 Follow-up breeding bird surveys to determine if the Phase III coal waste disposal area provides habitat for species at risk or of conservation concern will be conducted prior to the commencement of Project construction of this component (scheduled for year 13) Abundance and distribution of seabirds at the colony will be monitored during the construction and operation and maintenance phases of the Project (schedule and duration subject to discussion with applicable regulators) Monitoring program to determine if site lighting results in bird mortality events will be carried out during the operation and maintenance phase of the Project (schedule and duration subject to discussion with applicable regulators) Areas having elevated potential for light attraction will be visited following weather events conducive to light attraction such as foggy nights or nights with low cloud cover (duration to be determined in consultation with applicable regulators) 	
<p>Roles and Responsibilities: Qualified birder(s) experienced in conducting auditory breeding bird surveys will undertake follow-up surveys and monitoring on behalf of the Project and in accordance with Bird Monitoring Plan and any applicable environmental permitting requirements</p>	
<p>Review Process: Bird Monitoring Plan will be submitted to NSDNR and CWS for review, and to NSE for approval</p>	
<p>Stakeholder Involvement: Local birders may be engaged to assist with surveys and/or monitoring</p>	
<p>Funding Sources: Planning, surveys, and monitoring will be funded by XCDM</p>	
<p>Information Management and Reporting:</p> <ul style="list-style-type: none"> Follow-up pre-disturbance survey results and the Bird Monitoring Plan will be provided to NSDNR, NSE and CWS 	

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- EEM results will be provided to NSDNR, NSE and CWS as required
- Relevant monitoring results will be reported to the CLC on an ongoing basis

9.4 WETLANDS

<p>Program Title: Follow-Up Wetland Monitoring Program</p>	
<p>Program Objectives:</p> <ul style="list-style-type: none"> • To confirm the extent of wetland alteration (for both site infrastructure and coal waste disposal), the effectiveness of mitigative measures, and the successful completion of compensatory wetland restoration and creation • To assess the status of ecological and hydrological parameters • To guide adaptive management initiatives 	
<p>Program Components:</p> <ul style="list-style-type: none"> • Development of Project-specific Wetland Compensation Plan <p><u>Follow-up Pre-disturbance Surveys</u></p> <ul style="list-style-type: none"> • Field surveys to obtain additional 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 <p><u>Environmental Effects Monitoring (EEM)</u></p> <ul style="list-style-type: none"> • Monitoring to confirm the extent of wetland alteration on the Donkin Peninsula for both site infrastructure and coal waste disposal areas • Vegetation monitoring within wetlands of the Donkin Peninsula which have potential for indirect hydrological effects • Monitoring of wetland compensation project to confirm success for no net loss of wetland 	<p>Monitoring Activity:</p> <p>Activities associated with follow-up surveys, EEM, and ECM and will consist of:</p> <ul style="list-style-type: none"> • Desktop reviews; • Field surveys; and • Documentation. <p>Specific monitoring activities (for both EEM and ECM) will be developed in consultation with NSDNR, NSE, and EC and will be described in a Wetland Monitoring Plan.</p> <p>Monitoring efforts will be directed at existing wetlands on the Donkin Peninsula as well as those enhanced, restored, or created as a result of compensatory obligations.</p> <p>Aspects of the Wetland Monitoring Plan and the Rare Plant Monitoring Plan (refer to Section 9.5) will be closely related.</p>
<p>Workplan Structure:</p> <ul style="list-style-type: none"> • As per details of Wetland Monitoring Plan, Wetland Compensation Plan, and terms and conditions of provincial Wetland Alteration Approval • In accordance with any other applicable environmental permitting requirements 	
<p>Schedule:</p> <ul style="list-style-type: none"> • Elements of work may proceed in 2012 • EEM will begin during Project construction and continue into operational phase, the duration of which will depend on discussions with applicable regulators 	

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<ul style="list-style-type: none"> • Period of five years is recommended for the initial monitoring phase of the wetland compensation project monitoring, after which the data will be used to assess whether ongoing efforts are required to meet objectives of mitigative and compensation initiatives
<p>Roles and Responsibilities:</p> <p>Qualified wetland biologist(s) will undertake wetland monitoring, compensation planning, and surveys on behalf of the Project and in accordance with Wetland Monitoring Plan, Wetland Compensation Plan, and applicable environmental permitting requirements</p>
<p>Review Process:</p> <p>Wetland Monitoring Plan and Wetland Compensation Plan will be submitted to NSE, NSDNR, and EC for review, and to NSE for approval</p>
<p>Stakeholder Involvement:</p> <p>Data on the known distribution of wetlands within the transmission line corridor will be communicated to NSPI for their use during construction and maintenance activities</p>
<p>Funding Sources:</p> <p>Planning, surveys, and monitoring will be funded by the Project</p>
<p>Information Management and Reporting:</p> <ul style="list-style-type: none"> • Wetland Monitoring Plan and Wetland Compensation Plan will be provided to NSE, NSDNR, and EC • Monitoring results will be provided to NSE, NSDNR and EC as required • Relevant monitoring results will be reported to the CLC on an ongoing basis

9.5 VEGETATION

<p>Program Title:</p> <p>Follow-Up Rare Plant Survey and Monitoring Program</p>	
<p>Program Objectives:</p> <ul style="list-style-type: none"> • To supplement the results of previously completed baseline plant surveys • To facilitate avoidance of rare plants and uncommon communities as a mitigation measure (where practical) • To verify the accuracy of EA predictions and determine the effectiveness of mitigation measures • To signal the occurrence of indirect environmental effects on wetlands (if applicable), and guide adaptive management if required • To support wetland alteration applications (e.g., Baileys Wetland) and inform wetland habitat compensation planning 	
<p>Program Components:</p> <p><u>Follow-up Pre-disturbance Surveys</u></p> <ul style="list-style-type: none"> • Rare plant and uncommon community surveys within the PDA on the Donkin Peninsula to address areas not previously 	<p>Monitoring Activity:</p> <p>Activities associated with follow-up surveys, EEM, and ECM and will consist of:</p> <ul style="list-style-type: none"> • Desktop reviews;

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<p>surveyed and to capture seasonal windows not previously surveyed</p> <ul style="list-style-type: none"> Rare plant and uncommon community surveys within Baileys Wetland and other wetlands to be subject to direct effects by the Project (including directed surveys for southern twayblade) <p><u>Environmental Effects Monitoring (EEM)</u></p> <ul style="list-style-type: none"> Vegetation monitoring within wetlands that have potential to be subject to indirect hydrological or chemical effects 	<ul style="list-style-type: none"> Field surveys; and Documentation. <p>Specific monitoring activities will be developed in consultation with NSDNR and NSE and described in a Rare Plant Monitoring Plan.</p> <p>Aspects of the Rare Plant Monitoring Plan and Wetland Monitoring Plan (refer to Section 9.4) will be closely related.</p>
<p>Workplan Structure:</p> <p>As per details of Rare Plant Monitoring Plan and in accordance with any applicable environmental permitting requirements</p>	
<p>Schedule:</p> <ul style="list-style-type: none"> Elements of work may proceed in 2012 Follow-up pre-disturbance surveys will be conducted prior to construction activities during appropriate times to capture rare species with specific survey windows EEM will begin during Project construction and continue into the operational phase of the Project 	
<p>Roles and Responsibilities:</p> <p>Qualified botanist(s) will undertake rare plant surveys and monitoring on behalf of the Project and in accordance with Rare Plant Monitoring Plan and any applicable environmental permitting requirements</p>	
<p>Review Process:</p> <p>Rare Plant Monitoring Plan will be submitted to NSDNR and NSE for review and approval</p>	
<p>Stakeholder Involvement:</p> <p>Data on the known distribution of rare plants within the transmission line corridor will be communicated to NSPI for their use during construction and maintenance activities</p>	
<p>Funding Sources:</p> <p>Planning, surveys, and monitoring will be funded by the Project</p>	
<p>Information Management and Reporting:</p> <ul style="list-style-type: none"> Follow-up pre-disturbance survey results and the Rare Plant Monitoring Plan will be provided to NSDNR EEM results will be provided to NSDNR and NSE as required Relevant monitoring results will be reported to the CLC on an ongoing basis 	

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9.6 FRESHWATER FISH AND FISH HABITAT

<p>Program Title: Follow-Up Freshwater Fish and Fish Habitat Monitoring Program</p>	
<p>Program Objectives:</p> <ul style="list-style-type: none"> • To supplement the results of previously completed baseline watercourse surveys • To verify the accuracy of EA predictions and determine the effectiveness of mitigation measures • To confirm compliance with Sections 32, 35(2), and 36 of the <i>Fisheries Act</i> and the terms and conditions of federal and provincial environmental approvals • To confirm the success of fish habitat compensation efforts to achieve no net loss of the productive capacity of fish habitat 	
<p>Program Components:</p> <ul style="list-style-type: none"> • Development of Project-specific Freshwater Fish Habitat Compensation Plan (for Stream 2 and Stream B) <p><u>Follow-up Pre-disturbance Surveys</u></p> <ul style="list-style-type: none"> • Follow-up pre-disturbance freshwater fish habitat surveys focusing on watercourses with potential to be directly affected by the proposed land-based disposal of coal waste on the Donkin Peninsula (to verify the number of watercourses present within the Schooner Pond LAA and to characterize the presence or absence of fish habitat within those watercourses) <p><u>Environmental Effects Monitoring (EEM)</u></p> <ul style="list-style-type: none"> • Benthic invertebrate monitoring to monitor the biological activity within the sediments of watercourses within the PDA • Freshwater fish habitat monitoring and fish community survey to monitor the biological activity surrounding the HADD compensation project for Stream 2 and Stream B, to ensure viability and productivity of artificial habitats • Continued fish toxicity testing of treated wastewater prior to discharge into fish bearing watercourses and marine environment. • Water quality monitoring, including TSS to monitor effectiveness of sedimentation and erosion control mitigation within the natural watercourses of the PDA 	<p>Monitoring Activity:</p> <p>Activities associated with follow-up surveys, EEM, and ECM and will consist of:</p> <ul style="list-style-type: none"> • Desktop reviews; • Field surveys; and • Documentation. <p>Specific monitoring activities will be developed in consultation with DFO, EC and NSE, and will be described in a detailed Freshwater Fish and Fish Habitat Monitoring Plan.</p> <p>Aspects of the Freshwater Fish and Fish Habitat Monitoring Plan will be closely related to the Water Resources Monitoring Plan (refer to Section 9.2).</p>

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<p>Workplan Structure:</p> <ul style="list-style-type: none"> • As per details of Freshwater Fish and Fish Habitat Monitoring Plan, Fish Habitat Compensation Plan, and terms and conditions of provincial Division 1 Water Approval and federal HADD authorization • In accordance with any other applicable environmental permitting requirements
<p>Schedule:</p> <ul style="list-style-type: none"> • Elements of work may proceed in 2012 • Follow-up pre-disturbance surveys in the Schooner Pond LAA will be conducted prior to the start of the Phase III coal waste disposal pile activities (scheduled for year 13 of the Project) • Benthic invertebrate EEM will be undertaken during the initial stages of Project operation • Freshwater fish habitat ECM and fish community surveys will be conducted following physical completion of HADD compensation works and at a schedule to be determined in accordance with Fish Habitat Compensation Monitoring Plan • Water quality ECM will be carried out during pre-construction, construction, operation, and reclamation phases of the Project • Fish toxicity testing as determined by the conditions of approval
<p>Roles and Responsibilities:</p> <p>Qualified aquatic specialist(s) will undertake freshwater fish and fish habitat surveys and monitoring on behalf of the Project and in accordance with Freshwater Fish and Fish Habitat Monitoring Plan and applicable environmental permitting requirements</p>
<p>Review Process:</p> <p>Freshwater Fish and Fish Habitat Monitoring Plan will be submitted to DFO and NSE for review and approval</p>
<p>Stakeholder Involvement:</p> <p>Anecdotal information on presence of fish in the freshwater systems will be solicited from mine staff and local recreational fishers.</p>
<p>Funding Sources:</p> <p>Planning, surveys, and monitoring will be funded by the Project</p>
<p>Information Management and Reporting:</p> <ul style="list-style-type: none"> • Freshwater Fish and Fish Habitat Monitoring Plan will be provided to DFO and NSE • Follow-up pre-disturbance survey results will be provided to DFO • Benthic invertebrate EEM results will be provided to DFO as required • Compensatory fish habitat ECM results will be provided to DFO at a schedule to be determined in accordance with Fish Habitat Compensation Monitoring Plan (refer to Section 9.7) • Water quality ECM results will be provided to NSE as determined by conditions of approval • Relevant monitoring results will be reported to the CLC on an ongoing basis

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9.7 MARINE ENVIRONMENT

Program Title: Marine Benthic Habitat Monitoring Program	
Program Objectives:	
<ul style="list-style-type: none"> To verify the accuracy of EA predictions and determine the effectiveness of mitigation measures To confirm successful completion of a marine fish habitat compensation project to achieve no net loss of fish habitat 	
Program Components: <ul style="list-style-type: none"> Development of a Marine Fish Habitat Compensation Project (in accordance with HADD Authorization) Geotechnical engineering investigation as part of wharf and breakwater construction to refine design <u>Environmental Effects Monitoring (EEM)</u> <ul style="list-style-type: none"> Marine Sediment Sampling Program to monitor sediment chemistry within the PDA Marine Benthic Habitat Monitoring Program to monitor colonization of intertidal and subtidal marine infrastructure Marine Benthic Habitat Monitoring Program to monitor effectiveness of HADD fish compensation project 	Monitoring Activity: Activities associated with EEM will consist of: <ul style="list-style-type: none"> Field surveys; and Documentation. Specific monitoring activities will be developed in consultation with DFO and will be described in a Marine Benthic Habitat Monitoring Plan.
Workplan Structure:	
As per the details of the HADD Compensation Project	
Schedule:	
Consultations with DFO and local fishers regarding HADD compensation project will begin in 2012. Geotechnical investigation is expected to begin in 2012 or 2013. Monitoring of colonization of marine infrastructure will begin no earlier than 2 years following construction.	
Roles and Responsibilities:	
Qualified professionals will work with the Project to design and implement a habitat compensation project and conduct ongoing monitoring as required. Professional engineers will be employed to conduct the geotechnical investigation and refine engineering design on behalf of the Project.	
Review Process:	
The Marine Benthic Monitoring Plan and Habitat Compensation Plan will be submitted to DFO for review and approval as part of the application for a HADD authorization under the <i>Fisheries Act</i>	
Stakeholder Involvement:	
Local fishers (as represented by the Fisheries Advisory Committee to be established for the Project)	

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and DFO will be engaged to provide input for development of HADD compensation project
Funding Sources: Work will be funded by the Project
Information Management and Reporting: HADD Compensation Plan and monitoring reports will be provided to DFO and the Fisheries Advisory Committee (to be established) for review

9.8 ARCHAEOLOGICAL AND HERITAGE RESOURCES

Program Title: Follow-Up Archaeological Resource Impact Assessment Program	
Program Objectives: <ul style="list-style-type: none"> To update and provide additional survey detail to work conducted previously on the Donkin Peninsula by Davis Archaeological Consultants in 2006 To conduct a new assessment along the power transmission corridor 	
Program Components: Archaeological Resource Impact Assessments (ARIAs) conducted for the following areas: <ul style="list-style-type: none"> Site preparation area Terrestrial infrastructure area for barge load-out facility (including McDonald Farm (CbBw-01)) 	Monitoring Activity: Field reconnaissance and documentation, including selective shovel testing in accordance with Heritage Research Permit from the Heritage Division of the Department of Tourism, Culture and Heritage
Workplan Structure: As per requirements of Heritage Research Permit and professional judgment of qualified archaeologist	
Schedule: Elements of work may proceed in 2012	
Roles and Responsibilities: Permitted professional archaeologist(s) will undertake survey on behalf of the Proponent and in accordance with terms and conditions of provincial Heritage Research Permit	
Review Process: ARIAs will be submitted to the Heritage Division for review and approval	
Stakeholder Involvement: The Heritage Division will distribute the ARIA reports to the KMKNO for comment	
Funding Sources: Work conducted in support of the ARIAs will be funded by the Project	

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Information Management and Reporting:

ARIA reports will be provided to the Heritage Division and KMKNO and results communicated to the CLC

ENVIRONMENTAL IMPACT STATEMENT FOR THE DONKIN EXPORT COKING COAL PROJECT**10.0 Benefits to Canadians**

This EIS has been prepared to fulfill the requirements of both the federal and provincial governments' environmental assessment processes under CEAA and under the Nova Scotia *Environment Act*. This EIS documents XCDM's completion of the following through the environmental assessment process including:

- Consideration and evaluation of alternatives;
- Consultation activities;
- Identification of Project environmental effects and measures to mitigate adverse environmental effects; and
- Prediction of whether there are likely significant adverse environmental effects after mitigation measures are implemented.

This EIS provides a statement of XCDM's commitment to sustainable development, as outlined in Section 2.11, details the results of the results of the environmental assessment, and environmental commitments related to the Project.

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 itself have also derived benefit from the EA process as the resulting consequence of consultation, engagement and technical studies which have fed into the EIS have resulted in a stronger, more feasible, and environmentally sustainable project. In particular, the EA process has created opportunities to maximize environmental and community and social benefits and has increased scientific knowledge and technological innovation.

The following describes various examples of how the EA process has benefitted Canadians through various means.

Contribution to the Concept of Sustainable Development

Originally planned for supplying thermal coal markets, XCDM redesigned the Donkin Mine Project to be a coking coal export operation in light of changing legislation and declining thermal coal markets. By supplying primarily international coking coal markets, mining operation becomes more economically feasible and the life of the operation more sustainable, providing long term employment to the region.

Evaluation of alternative means of carrying out the Project (Section 2.9.2) allowed the selection of alternative methods that were technically and economically feasible and considered the environmental and socio-economic effects of those alternative means. The selection of Project

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design, construction and operation included not only engineering and economic factors, but also considered ecological and social factors: Specific examples of the benefits of this analysis are provided below.

Maximized Environmental Benefits

The EA process has prompted evaluation of Project alternatives deemed to be technically and economically feasible from an environmental perspective, allowing for optimization of environmental benefit and minimization of environmental effects. For example, an analysis of coal waste disposal options was undertaken to determine technically and economically feasible options. These options were then reviewed for environmental effects which determined the preferred option (*i.e.*, surface disposal) which would have less environmental (including socio-economic) effects. As detailed design is undertaken for the surface disposal option, environmental considerations will be taken into account including buffer zones for cliff nesting birds and watercourses and wetland effects.

Public Participation

As described in Section 3 of this EIS, XCDM has been actively engaging the public in consultation around the Donkin Mine since 2005. Issues raised during consultations around the Export Coking Coal Project were used in EA scoping to focus the EIS on issues of interest and concern.

The EIS Guidelines, which guided the preparation of the EIS, were developed 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. To this end, stakeholders are already influencing the EA process and outcome.

Public participation in the environmental assessment of the Project has informed the identification and resolution or mitigation of potential issues or concerns, and has allowed for the exchange of information in respect of the Project. A summary of the consultation and engagement activities carried out for the Project is provided in Section 3, along with a summary of key issues raised.

One example of how stakeholder consultation has already influenced the Project is the decision to stockpile coal product during the exploration phase rather than trucking as was previously planned. Consultations with various stakeholders, most notably CBRM indicated concern regarding volume and schedule of trucking during the exploration phase, before the marine transportation infrastructure was commissioned. As a result, XCDM has decided to stockpile coal product during this phase and will only use trucking as a transportation option to supply domestic customers or at any time should marine transportation prove impractical.

Pending EA approval the Project will enter into the permitting phase which will include, among other things, the development and implementation of habitat compensation programs. Although

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conceptual compensation plans have been introduced in this EIS, it is assumed that these plans would involve further discussion with interested stakeholders to maximize environmental and social benefits.

Technological Innovations

Disposal of coal waste and rock, and methane management are two Project components that require special consideration and technological innovation during detailed design to manage potentially adverse effects to acceptable levels. XCDM will continue to work with technical specialists to design technically and economically feasible solutions to manage these emissions. Since this Project is subject to a comprehensive study level of assessment at a federal level, the Project will have a relatively high profile, facilitating opportunities for transfer of technological innovation to other parts of Canada and internationally.

Increases in Scientific Knowledge

Studies undertaken in support of this EIS have served to increase the scientific knowledge of the natural and cultural environment of the Donkin Peninsula and its environs. In particular, wetland surveys on the peninsula have resulted in the identification of several wetlands not previously mapped by provincial databases. Marine surveys have provided site specific data on marine habitat in Morien Bay and Mira Bay. Terrestrial field surveys resulted in a new recorded observation on the Donkin Peninsula for occurrence of spurred gentian, which is considered "Sensitive" by NSDNR and is ranked as "S2S3" by the ACCDC indicating that it is rare to uncommon within the province. From a socio-economic perspective, the archaeological studies have revealed additional cultural resources on the peninsula and allowed opportunity for salvage and preservation of these resources. The MEKS conducted for the Project will help to increase public awareness and appreciation of resources used by the Mi'kmaq of Nova Scotia for traditional uses. Furthermore, proposed follow-up and monitoring studies (refer to Section 9) will serve to further increase scientific knowledge of natural resources on the Donkin Peninsula and effects of anthropogenic activities.

Community and Social Benefits

As indicated in Section 3.2.2, XCDM is committed to building a constructive working relationship in the community and in 2006 established a CLC to facilitate community engagement. The guiding principle of the CLC is to place the interests of the community and the surrounding environment above any personal interest or gain. The committee will strive to ensure a balance between the interests of the community including the environment and those of the Project is achieved.

CLC members have been helping XCDM define critical issues, shape aspects of the operating mine's design and execution and identify other community engagement opportunities as part of XCDM's corporate social involvement policy. In addition to investment in the local community,

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XCDM is making Project decisions with community and social benefits in mind. For instance, one of the Project alternatives included wharf design options. Concrete caisson or timber crib designs were considered. Although both were economically and technically feasible and both would have the same environmental footprint, the timber crib design, which was selected as the preferred option, could be built using local labour and supplies, whereas the concrete caisson design would require specialized skills and labour that would likely be sourced from outside the region.

The EA process has also helped to identify community needs and concerns that could benefit from XCDM support. Local recreational users of the Donkin Peninsula have expressed interest in continued access to the Donkin Peninsula for informal recreational activities. The Project will work with these stakeholders to find a way to continue access while respecting safety and security issues.

Indirect benefits to the community as a result of the Project include infrastructure upgrades (e.g., local road improvements along the haul route), and enhanced marine emergency response planning which could benefit local fishers.

Summary

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 scientific knowledge improvements.

ENVIRONMENTAL IMPACT STATEMENT FOR THE DONKIN EXPORT COKING COAL PROJECT

11.0 Summary and Conclusions

11.1 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 CBRM, Nova Scotia. The Project proposes to mine approximately 3.6 Mtpa of coal that is subsequently washed to provide approximately 2.75 Mtpa of product coal that is primarily suitable for coking coal markets, but may also supply thermal coal markets. Product coal will be loaded onto circa 4,000 dwt barges which will be tugged an estimated 8.8 km to a transshipment facility in deeper waters in Mira Bay where it will be loaded onto bulk carriers up to Cape Size vessels for transport to international markets. While the primary method of product coal transportation for the Project is marine transportation, trucking of coal may occur should marine transportation prove impractical at any time. Pending regulatory approval, construction is anticipated to start in 2013 and, following an exploration phase, the Project is expected to achieve full production by the end of 2017. The life of the Project is estimated to be 30 years.

This EIS has been prepared to fulfill the requirements for a comprehensive study level of assessment under CEAA and environmental registration under the Nova Scotia *Environment Act*.

11.2 SCOPING AND ENVIRONMENTAL ASSESSMENT METHODS

The EIS has been prepared to comply with EIS Guidelines prepared for the Project by the CEA 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.

VECs specified in the EIS Guidelines for assessment and evaluated in this EIS are included in Table 11.2.1, along with potential effects which formed the basis for the effects analysis.

Table 11.2.1 Scoping of VECs and Potential Effects

VEC	Potential Effect
Atmospheric Resources	<ul style="list-style-type: none"> • Change in Climate and GHG Emissions • Change in Ambient Air Quality • Change in Acoustic Environment
Water Resources	<ul style="list-style-type: none"> • Change in Surface Water Resources • Change to Groundwater Resources
Birds and Wildlife	<ul style="list-style-type: none"> • Change in Wildlife Habitat • Change in Mortality Risk

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Table 11.2.1 Scoping of VECs and Potential Effects

VEC	Potential Effect
Wetlands	<ul style="list-style-type: none"> • Change in Wetland Area or Function
Rare Plants	<ul style="list-style-type: none"> • Change in Rare Species and Uncommon Communities
Freshwater Fish and Fish Habitat	<ul style="list-style-type: none"> • Change in Fish Habitat • Change in Mortality Risk
Marine Environment	<ul style="list-style-type: none"> • Change in Marine Habitat • Change in Mortality Risk
Commercial and Recreational Fisheries	<ul style="list-style-type: none"> • Change in Net Income of Local Commercial Fishers
Land Use	<ul style="list-style-type: none"> • Change in Land Use
Current Use of Land and Resources by Mi'kmaq	<ul style="list-style-type: none"> • Change in Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq
Archaeological and Heritage Resources	<ul style="list-style-type: none"> • Change to Archaeological and Heritage Resources

The methods and approach used to prepare this EIS were developed to satisfy the factors to be considered in accordance with Sections 16(1) and 16(2) of CEAA and the specific requirements for a Comprehensive Study under Section 21 of CEAA. The assessment methods included an evaluation of the potential environmental effects for each VEC that may arise during each Project phase (construction, operation and maintenance, and decommissioning and reclamation) as well as malfunctions and accidental events. Project-related effects were assessed within the context of temporal and spatial boundaries established for each VEC. The evaluation of potential cumulative effects with regard to other projects and activities included past, existing, approved and proposed activities that could potentially have spatially or temporally overlapping effects with Project effects.

Applicable federal and provincial policies, guidelines and standards which were consulted during the preparation of the EIS are included in Table 11.2.2.

Table 11.2.2 Key Relevant Federal and Provincial Policies, Guidelines and Standards

Issue	Federal Policies Guidelines and Standards	Provincial Guidelines and Standards
Environmental Assessment Methods	<ul style="list-style-type: none"> • Guidelines for the Preparation of an Environmental Impact Statement for the Comprehensive Study Process Pursuant to the <i>Canadian Environmental Assessment Act</i> (CEA Agency 2011a) • Canadian Environmental Assessment Agency - Policy & Guidance - Cumulative Effects Assessment Practitioners' Guide (CEA Agency 1999b) • Addressing "Need for", "Purpose of", "Alternatives to" and "Alternative Means" under 	<ul style="list-style-type: none"> • Guide to Preparing an EA Registration for Mining Developments in Nova Scotia (NSE 2002, revised 2009)

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Table 11.2.2 Key Relevant Federal and Provincial Policies, Guidelines and Standards

Issue	Federal Policies Guidelines and Standards	Provincial Guidelines and Standards
	<ul style="list-style-type: none"> the <i>Canadian Environmental Assessment Act (CEA Agency 2007)</i> Operational Policy Statement: Addressing Cumulative Environmental Effects under the <i>Canadian Environmental Assessment Act (CEA Agency 2007) Cumulative Effects Assessment Practitioners Guide</i>. 	
Climate Change	<ul style="list-style-type: none"> Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (CEA Agency 2003) 	<ul style="list-style-type: none"> Guide to Considering Climate Change in Environmental Assessments in Nova (NSE 2010a) Guide to Considering Climate Change in Project Development in Nova Scotia (NSE 2010b).
Wildlife and Species at Risk	<ul style="list-style-type: none"> Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada (Environment Canada 2004) The <i>Species at Risk Act</i> Environmental Assessment Checklists for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada – (Environment Canada –Parks Canada 2010) 	<ul style="list-style-type: none"> Guide for Addressing Wildlife Species and Habitat in an EA Registration Document (NSE 2005, updated 2009)
Wetlands	<ul style="list-style-type: none"> The Federal Policy on Wetland Conservation (Environment Canada 1991) 	<ul style="list-style-type: none"> Nova Scotia Wetland Conservation Policy (Government of Nova Scotia 2011)
Fish Habitat	<ul style="list-style-type: none"> Policy of the Management of Fish Habitat (DFO 1986) 	

11.3 SUMMARY OF STAKEHOLDER AND MI'KMAQ ENGAGEMENT

XCDM and consultants on its behalf have been engaging stakeholders and the Mi'kmaq regarding their activities at the Donkin Mine, Cape Breton since 2005. The purpose of community engagement and consultation is to inform stakeholders and the community about existing and proposed activities and to identify any issues of concern raised by stakeholders during the planning and design of the Project and continuing into operation. The public consultation and engagement program as well as the Mi'kmaq engagement activities conducted as part of the environmental assessment process to date has been an important vehicle for the identification, scoping, and resolution or mitigation of potential issues or concerns, and for the exchange of information in respect of the Project.

XCDM is committed to a public and stakeholder consultation and Aboriginal engagement program based on open, forthright and responsive communication with the public, regulatory agencies, the Mi'kmaq of Nova Scotia, and other stakeholders. Section 3 of this EIS describes the consultation and engagement activities conducted to date. Consultation and engagement will continue as the Project proceeds through the regulatory review process and throughout the life of the Project. Table 11.3.1 identifies a summary of key issues raised during stakeholder consultation and Mi'kmaq engagement. The influence of stakeholder consultation and Mi'kmaq

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engagement on specific VECs is provided in the scoping discussion in each VEC as applicable (refer to Section 5).

Table 11.3.1 Summary of Key Issues Raised During Stakeholder Consultation and Mi'kmaq Engagement

Key Issues Raised	Response and/or Action Taken
<ul style="list-style-type: none"> What is the treatment process for the mine water? 	<p>Section 2.7.2 describes the current and future treatment processes to treat mine water and runoff.</p>
<ul style="list-style-type: none"> Will methane and radon be produced at the mine site? If so, how will they be monitored and controlled? 	<p>Sections 2.7.7 and 5.1 describes air emissions predicted for the Project including release and management of methane.</p>
<ul style="list-style-type: none"> Will there be a tailings pond on the mine site? 	<p>Tailings will be handled through a “dry disposal system” and will not require a tailings pond. Section 2.7.1 provides more information on coal waste disposal.</p>
<ul style="list-style-type: none"> Why are Rainbow Trout used as a testing species for effluent testing? 	<p>Trout were added to the serpentine pond to demonstrate acceptable conditions. Quarterly toxicity testing is ongoing during the care and maintenance phase as part of the water quality monitoring program.</p>
<ul style="list-style-type: none"> How often does monitoring occur on site? 	<p>Section 2.7.2.1 provides background on the current monitoring program at the site.</p>
<ul style="list-style-type: none"> How is the coal transported on the mine site? 	<p>Coal will be transported primarily on covered conveyor belts.</p>
<ul style="list-style-type: none"> Will coal dust enter the marine environment while being loaded on barges? 	<p>Coal dust will be minimized through implementation of various mitigation measures. Refer to Section 5.1 for more information on coal dust dispersion and mitigation.</p>
<ul style="list-style-type: none"> Concern regarding the amount of coal dust from transportation and stockpiling of the coal. 	<p>Coal dust will be minimized through implementation of various mitigation measures. Refer to Section 5.1 for more information on coal dust dispersion and mitigation.</p>
<ul style="list-style-type: none"> What will be the size of coal stockpiles? 	<p>Figure 2.4.1 in Section 2.4 shows the footprint of the coal stockpiles.</p>
<ul style="list-style-type: none"> Will there be certain periods when coal will not be loaded and transported? 	<p>Approximately 95 operating days a year is required to attain the expected annual export tonnage of 2.75 million tonnes. It is assumed that approximately 20 percent of available days during the months of February and March will be lost due to excessive sea ice, and 200 days per year available for operating in the worst case weather scenario..</p>
<ul style="list-style-type: none"> How is the water used to wash the coal contained and treated? 	<p>There is no water effluent discharged from the CHPP as the water is continuously recycled through the process. Water is gradually spent and disposed as moisture on product and reject matter. Section 2.7.2 describes the overall water treatment process employed on site for mine water and site runoff.</p>
<ul style="list-style-type: none"> What methods will be used to dispose of the coal waste? 	<p>Section 2.7.1 describes coal waste disposal. Additional information, including analysis of the various disposal alternatives is provided in Appendix E, Coal Waste Disposal Study.</p>
<ul style="list-style-type: none"> How will accidents on land be addressed? 	<p>Refer to Section 6 for a discussion of accidents and malfunctions.</p>

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Table 11.3.1 Summary of Key Issues Raised During Stakeholder Consultation and Mi'kmaq Engagement

Key Issues Raised	Response and/or Action Taken
<ul style="list-style-type: none"> What measures will be in place to prevent the introduction of invasive species resulting from the ballast water? 	<p>Any dumping of ballast water is to be conducted in accordance with the Ballast Water Control and Management Regulations under the <i>Canada Shipping Act, 2001</i>, which includes measures to protect against harmful aquatic organisms and pathogens. All vessels must comply with these regulations as part of normal operations. To prevent the possible introduction of invasive species from ballast water, all vessels going to the transshipment location will be required to follow internationally accepted standards and guidelines, and be subject to audits of the vessel's ballast water by Transport Canada.</p>
<ul style="list-style-type: none"> Concern that the construction of the breakwater that a backwash will be created preventing fishing in the near shore. 	<p>Several marine engineering studies have been conducted to determine the most suitable design and location of the breakwater from a technical and environmental perspective. Presence of the breakwater will result in localized displacement of fishers. Section 5.8 provides more information on the effects of the Project on commercial fisheries.</p>
<ul style="list-style-type: none"> Will there be specific studies conducted to determine the impacts on fish health? 	<p>Section 5.7 of this EIS assesses Project effects on marine fish and includes a discussion on follow-up and monitoring. No marine outfall (<i>i.e.</i>, no additional to the existing outfall) is anticipated for the Project and spillage of coal during barge loading and offloading on bulk vessels will be mitigated. Mined coal is not a chemical of concern in its raw form.</p> <p>An environmental effects monitoring program on sediment quality is proposed adjacent to the barge load-out facility and at the transshipment site to assess potential environmental effects of coal deposition in the marine environment.</p>
<p>What will be the impact on the local commercial fishery?</p>	<p>Section 5.8 contains an assessment of Project-related effects on commercial fisheries including predicted effects and proposed mitigation. Construction of the barge load-out facility will result in a permanent displacement of fishing activity within the barge load-out facility footprint. Commercial fishing activities and practices may be slightly altered in Morien Bay along the barge transportation route.</p>
<ul style="list-style-type: none"> Will a buffer zone be required to prevent fishing in certain areas? 	<p>An exclusion zone will not be established although Project infrastructure locations and construction activity will be communicated via Notices to Mariners and Notices to Shipping. XCDM will continue to liaise with the fishers to understand implications of these interactions and mitigate the situation (refer to Section 5.8).</p>
<ul style="list-style-type: none"> Concern that gear will be damaged when the transshipment vessels enter Morien Bay. 	<p>The Project will maintain ongoing consultation with local fishers during all project phases and will develop a policy to address gear loss and/or damage attributable to Project activities (refer to Section 5.8).</p>
<ul style="list-style-type: none"> Concern expressed that fishers will be displaced from current fishing grounds, leading to pressure in other regions. 	<p>Section 5.8 assesses effects of the Project on commercial fisheries including potential displacement.</p>
<ul style="list-style-type: none"> How does XCDM intend to deal with effects on marine wildlife (particularly whales and sea turtles)? 	<p>Section 5.7 provides a discussion of Project effects on the marine environment (including marine mammals and sea turtles).</p>

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Table 11.3.1 Summary of Key Issues Raised During Stakeholder Consultation and Mi'kmaq Engagement

Key Issues Raised	Response and/or Action Taken
<ul style="list-style-type: none"> How will accidents in the marine environment be prevented? Will an emergency response plan be developed prior to construction and operation? 	Section 6 contains an analysis of potential accidental events including marine incidents. The Emergency Response and Contingency Plan will be updated prior to construction and operation to include prevention and response measures for marine accidental events.
<ul style="list-style-type: none"> Concern expressed with respect to ceremonial lobster fishing that takes place around Donkin. 	Mi'kmaq fishery representatives from relevant Mi'kmaq fishing associations will be engaged through ongoing fisheries liaison efforts to minimize any potential effects on ceremonial fishing in the Project area.
<ul style="list-style-type: none"> Concern expressed about trucking volume and schedule. 	In response to concerns raised about the anticipated level of trucking activity during the exploration phase, XCDM has decided to stockpile product until the marine facilities are constructed. Section 2.5.2.3 provides information on trucking activity.
<ul style="list-style-type: none"> Could the coal be transported to Sydney instead of constructing a transshipment loading facility? 	Section 2.9.2.3 describes the analysis of coal transportation options.
<ul style="list-style-type: none"> Was rail considered as a transportation option? 	Section 2.9.2.3 describes the analysis of coal transportation options (including rail).
<ul style="list-style-type: none"> Will the peninsula still be accessible to the public for hiking and birdwatching? 	Effects on land use (including public access to XCDM property) are addressed in Section 5.9.
<ul style="list-style-type: none"> Will the original MEKS be updated? 	The original MEKS has been updated and is included in Appendix C.
<ul style="list-style-type: none"> Interest in developing training, employment and procurement opportunities for First Nations people and firms as a result of the Project 	XCDM will develop a Memorandum of Understanding and Benefits Agreement with the Mi'kmaq of Nova Scotia.
<ul style="list-style-type: none"> Consideration should be given to involving the Unama'ki Institute of Natural Resources (UNIR) in the fisheries studies. 	The Commercial Fisheries Liaison Officer for the Unama'ki Institute of Natural Resources was contacted as a resource to provide information on Mi'kmaq commercial fisheries. This request was directed to the Consultation Liaison Officer for the KMKNO.
<ul style="list-style-type: none"> Will employment be available to First Nations people and firms? 	The goal is to include as much First Nations employment as possible.
<ul style="list-style-type: none"> Will an agreement be developed with local unions to employ miners from the region? 	Xstrata will deal with individuals. All positions for Donkin Mine will be advertised, the company will be looking for the best people. Xstrata has their own training courses and development plans for employees

11.4 RESIDUAL AND CUMULATIVE EFFECTS SUMMARY

Section 5 of this EIS presents the residual and cumulative effects evaluation for each VEC. Effects predictions, including potential environmental effects, mitigation, and residual effects are summarized for each VEC in the respective VEC sections. Table 11.4.1 summarizes the significance of residual (including cumulative) effects for each VEC for Project construction, operation and maintenance, and decommissioning and reclamation, as well as for malfunctions and accidental events and cumulative effects.

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With the implementation of the proposed mitigation measures (summarized in Table 11.4.1), adverse residual environmental effects of routine Project activities are predicted to be not significant for all VECs.

Table 11.4.1 Summary of Residual Environmental Effects

VEC	Significance				
	Construction	Operation	Decommissioning and Reclamation	Malfunctions and Accidental Events	Cumulative Effects
Atmospheric Resources	N	N	N	N	N
Water Resources	N	N	N	N	N
Birds and Wildlife	N	N	N	S	N
Wetlands	N	N	N	N	N
Rare Plants	N	N	N	N	N
Freshwater Fish and Fish Habitat	N	N	N	N	N
Marine Environment	N	N	N	N	N
Commercial and Recreational Fisheries	N	N	N	N	N
Land Use	N	N	N	N	N
Current Use of Land and Resources by Mi'kmaq	N	N	N	N	N
Archaeological and Heritage Resources	N	N	N	N	N
Key: N=Not significant residual effect (adverse) S = Significant residual effect (adverse)					

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 as a result of Project-related accidents and malfunctions, with the exception of the extremely unlikely event of a Project-related vessel collision or grounding resulting in the release of a large amount of oil or fuel, which could have a potential significant effect on birds. However an event of this scale is not likely to occur.

Projects and activities identified as having potential to act in combination with the Project to result in cumulative environmental effects were evaluated in the context of each VEC. Predicted cumulative effects were generally of low magnitude, local in extent and reversible. It is predicted therefore, that Project-related environmental effects (including cumulative effects) are not significant.

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.,

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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 all relevant engineering codes and standards with the full 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 employee training.

11.5 SUMMARY OF DESIGN, MITIGATION, MONITORING AND FOLLOW-UP COMMITMENTS

The Project is being designed to meet applicable codes, standards and specifications that define loads, performance, materials and quality requirements. Environmental design features and Best Management Practices (BMPs) will help to minimize potential adverse environmental effects from the Project. Best Available Technology Economically Achievable (BATEA) will be used wherever possible to reduce release of dust and greenhouse gas emissions. Buffer zones and scheduling of construction activities to avoid sensitive ecological periods (breeding birds) will also reduce environmental effects. An EMP will be developed for the Project which will include BMPs and specific mitigative commitments made by the Project during the regulatory approval process (including those contained in this EIS). The Project will monitor compliance with the EMP and implement follow-up monitoring according to approvals received and the permitting process.

Monitoring and follow-up programs have been proposed in some cases to verify the accuracy of effects predictions or effectiveness of mitigation (refer to Section 9). Habitat compensation is being proposed to mitigate effects on wetlands and fish habitat as a result of Project activities. Habitat compensation monitoring will be conducted as required to confirm the effectiveness of compensation projects. The Project will adaptively manage adverse environmental effects identified through monitoring. Table 11.5.1 summarizes environmental design features and VEC-specific mitigation and monitoring commitments made by the Project to manage potential adverse environmental effects of the Project. These proposed mitigation measures will also become part of the EMP.

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Commitments	Timing of Implementation
Atmospheric Resources (Section 5.1)	
Mitigation	
Dust suppression program including Rain Bird-type system at open coal stockpiles.	C, O/M
Equipment maintenance program.	C, O/M
Enclosed conveyor and transfer points; dust hoods on radial stackers.	O/M
Misting sprays at outlet of raw and product coal conveyors.	O/M
Use of mufflers on all applicable equipment.	C, O/M
Most construction activities (including construction of coal waste disposal sites during operation phase) limited to daytime.	C,O/M
Enclosure of all coal washing activities in CHPP building.	O/M
Adherence to equipment maintenance programs.	C, O/M
Maintaining a vegetation buffer between the Project and the nearest residents.	C, O/M
Covered trucks (if coal trucking required) and use of barges with movable covers or higher coamings around cargo to control dust and protect coal cargo.	O/M
Good management practices and sound operator training to reduce operator error and promote careful cargo loading.	O/M
Implementation of GHG Management Plan, including capture and oxidation of methane gas from mine.	O/M
Monitoring and Follow-up	
Particulate monitoring program for Project construction and operation as per conditions of approval.	C, O/M
Sound pressure level monitoring during construction and operation as per conditions of approval.	C, O/M
Annual monitoring of GHG emissions and reporting to Environment Canada.	O/M
Water Resources (Section 5.2)	
Mitigation	
Erosion and sedimentation controls, and collection of site runoff for direction to the passive treatment system.	C, O/M
Collection of all mine water pumped from the tunnels, with direction to the passive treatment system.	C, O/M
Truck wash system in the active yard.	C, O/M
Coal waste piles lined to collect precipitation infiltration with direction of flows to the active treatment system.	C, O/M
Re-direction of a portion of the actively treated water, once the Phase III coal waste disposal pile is constructed, in order to replace the volume of surface water flowing into	C,O/M

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Commitments	Timing of Implementation
Baileys Wetland. Watercourses in the footprint of at the Phase III coal waste disposal pile will be avoided where possible; flows will be redirected around the pile toward Baileys Wetland if avoidance is not possible.	
Capping of coal waste disposal piles to minimize infiltration and runoff.	O/M, D/R
Replacement of domestic wells that are demonstrated (e.g., from well surveys) as being affected by the Project (i.e., caused by a drop in the groundwater level available).	C, O/M, D/R
Monitoring and Follow-up	
Continuation of existing monthly and semi-annual monitoring program.	C, O/M, D/R
Pre-disturbance well survey will be conducted to identify all domestic wells that might be affected.	C
Installation of a shallow groundwater monitoring network between the Phase III coal waste disposal pile, and monitoring prior to the installation of the pile.	C, O/M
Monitoring of the shallow groundwater network after disposal starts at the Phase III (west) coal waste disposal pile, to determine if there are any effects on Baileys Wetland.	C, O/M
Monitoring of the shallow groundwater network near residential wells after capping to confirm that conditions return to background.	O/M, D/R,
Birds and Wildlife (Section 5.3)	
Mitigation	
Establish a corridor of undisturbed habitat at least 150 m wide around the periphery of the Donkin Peninsula.	C, O/M
The corridor for the coal conveyor should be as narrow as practical.	C
Minimize damage to wetland habitat along the transmission line route.	C, O/M
Establish a setback on the seaward and landward side of the Northern Head seabird colony.	C, O/M
Noisy or startling activities should be scheduled outside of the sensitive seabird colony establishment period (early April to late May).	C
Site specific mitigation at Phase III coal waste disposal area developed in consultation with CWS and NSDNR if Canada Warbler or Olive-sided Flycatcher are confirmed breeding there.	C, O/M
Final design of Phase III coal waste disposal area to reduce loss of interior forest habitat on the Donkin Peninsula, if possible.	P/D
Maintain connectivity of terrestrial habitats around the margin of the Donkin Peninsula.	C, P/D
Where possible, phase-in the development of coal waste disposal areas (avoid clearing large areas) and employ progressive reclamation.	C, O/M, D/R
Vegetation maintenance on the transmission line RoW scheduled to avoid breeding season for most birds (April 1 to August 15).	O/M
Schedule clearing outside of the breeding season for most birds (April 1 to August 15)	C
Establish setbacks around ground nesting species if required (mid-April to August).	C, O/M
Store food waste in appropriate receptacles and train employees and contractors regarding wildlife encounters.	C, O/M

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Commitments	Timing of Implementation
Site lighting design to minimize light spill over and attraction to birds.	C, O/M
Marine travel will take place at steady speeds, moving parallel to the shore, rather than approaching the seabird colony directly.	O/M
Marine vessels and equipment as well as vehicles and machinery on the barge load-out facility/breakwater will avoid any sharp or loud noises to the extent possible (including horns or whistles) and will maintain constant engine noise levels.	O/M
Marine vessels will not pursue seabirds/waterbirds swimming on the water surface, and avoid concentrations of birds on the water.	O/M
Oil or waste will not be dumped overboard.	C, O/M
Minimize lag time between retirement of buildings or structures and their disassembly; keep retired buildings closed to discourage colonization by wildlife.	D/R
Minimize lag time between completion of coal waste deposition and commencement of reclamation.	D/R
Consult CWS in a timely manner in advance of any proposed decommissioning activities that may affect buildings or structures used for nesting Barn Swallows, or other species of migratory birds.	D/R
Monitoring and Follow-up	
Monitor the abundance and distribution of seabirds at the Northern Head seabird colony to confirm that the setback developed to minimize sensory disturbance of the Northern Head seabird colony is effective.	C, O/M
Conduct breeding bird surveys in the Phase III waste coal disposal area.	C, O/M
Monitor structures where light attraction may occur to determine if mortality events occur.	C, O/M
Identify additional post-construction bird monitoring requirements in consultation with the CWS, based on final design details	C, O/M
Communication with NSPI regarding occurrence of bird species of conservation concern along the transmission line route.	C, O/M
Wetlands (Section 5.4)	
Mitigation	
Compensation for loss of wetland habitat.	C, O/M
Avoid placing power poles within wetlands along transmission line, where possible.	C
Avoid operation of machinery in wetlands along transmission line, where possible.	C, O/M
Vegetation clearing to be performed outside the breeding bird season.	C, O/M
Implementation of erosion and sedimentation control plan to reduce siltation of wetlands.	C, O/M
Adherence to "Environmental Protection Procedures for Transmission and Distribution Facilities" (NSPI 2009) during construction and operation/maintenance of the transmission line.	C, O/M
Maintenance of hydrological connectivity to Baileys Wetland through final selection of Phase III coal waste pile location, avoidance of streams and redirection of flows to Baileys Wetland.	C, O/M, D/R

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Table 11.5.1 Summary of Design, Mitigation, Monitoring and Follow-up Commitments

Commitments	Timing of Implementation
Treatment of wastewater from mine discharge and surface runoff.	C, O/M, D/R
Salt management procedures for site roadways.	C, O/M
Use of seed mixtures free of noxious weeds and use of native species (where available) during site reclamation.	D/R
Monitoring and Follow-up	
Develop wetland compensation plan in consultation with NSE and NSDNR.	P/D, C
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.	P/D
If required, perform pre-disturbance surveys of the heathland and grassland communities to document the location, extent, and composition of the coastal grasslands; broom crowberry, and soil types.	C, O/M
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.	C, O/M
Vegetation monitoring within wetlands of the Donkin Peninsula which have potential for indirect hydrological effects.	C, O/M
Communication with NSPI regarding occurrence of wetlands along the transmission line route.	C, O/M
Monitoring to confirm success of wetland compensation projects.	C, O/M
Rare Plants (Section 5.5)	
Mitigation	
Avoidance of direct effects to habitats known to support rare plants on Donkin Peninsula (i.e., coastal barrens).	C, O/M
Maintain a 150 m buffer along the coast in which no habitat alterations or mining activities will occur.	C, O/M
Compensation for loss of wetland habitat.	C, O/M
Avoidance of rare plants along transmission line.	C, O/M
Implementation of a erosion and sediment control plan to prevent siltation of wetlands.	C, O/M
Maintenance of hydrological connectivity to Baileys Wetland through final selection of Phase III coal waste pile location, avoidance of streams and redirection of flows to Baileys Wetland.	C, P/D, O/M
Treatment of wastewater from mine discharge and surface runoff.	C, O/M, D/R
Salt management procedures for site roadways.	C, O/M
Use of seed mixtures free of noxious weeds and use of native species (where available) during site reclamation.	D/R

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Commitments	Timing of Implementation
Monitoring and Follow-up	
Rare plant and uncommon vegetation community surveys within Baileys Wetland and other wetlands which are proposed for direct effects by the Project (including directed surveys for southern twayblade).	C, O/M
Vegetation monitoring within wetlands which have potential for indirect hydrological effects.	C, O/M
Communication with NSPI regarding occurrence of rare plants along the transmission line route.	C, O/M
Monitoring to confirm success of wetland compensation projects.	C, O/M
Freshwater Fish and Fish Habitat (Section 5.6)	
Mitigation	
Avoidance of streams where possible during final siting of the Phase III coal waste pile.	C, O/M
No unnecessary activities within 30 m buffer from watercourses.	C, O/M
Implementation of sediment and erosion control plan to prevent siltation of watercourses.	C, O/M
Lining and capping of coal waste disposal piles.	C, O/M, D/R
Water treatment system to capture and contain site and coal waste disposal pile runoff; system will avoid direct interaction with all natural watercourses. Active water treatment system will neutralize acid waters from coal waste runoff	C, P/D, O/M
HADD compensation.	C
Watercourse alterations will be completed in the dry.	C
Fish salvage will be completed within alteration areas.	C
Watercourse alterations will avoid spawning periods of sensitive freshwater fish groups (<i>i.e.</i> , salmonids) unless authorized.	C
Implementation of sediment and erosion control plan to prevent siltation of watercourses	C, O/M
Dust-control measures to reduce particulate inputs to watercourses.	C, O/M
Monitoring and Follow-up	
Pre-disturbance freshwater fish habitat survey for watercourses with potential to be affected by disposal of coal waste.	C, O/M
Benthic invertebrate monitoring program to survey health of watercourses in the PDA.	C, O/M
Fish habitat and fish community monitoring program (including <i>in situ</i> water quality and detailed physical habitat assessment) for the HADD compensation project.	C, O/M
Ongoing water quality and fish toxicity monitoring program.	C, O/M, D/R

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Table 11.5.1 Summary of Design, Mitigation, Monitoring and Follow-up Commitments

Commitments	Timing of Implementation
Marine Environment (Section 5.7)	
Mitigation	
Geotechnical/Engineering investigations for barge construction methods to reduce the quantity of materials placed in the marine environment (<i>i.e.</i> , marine footprint).	P/D, C
Barges will have appropriate freeboard design and efficient material handling to reduce product losses to the environment. (<i>i.e.</i> , no barge overloading, avoiding transiting in high sea states).	P/D
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 <i>Shipping Act</i> to reduce risk of introduction of marine invasive species.	C, O/M
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.	C
Vessels will travel at reduced speeds near the barge load-out facility, the transhipment facility and points between which will reduce underwater noise and potential for strikes on marine mammals and sea turtles.	C, O/M
Compliance with stipulations in the <i>Fisheries Act</i> authorizations for HADD and Section 32 approval. Fish habitat compensation project to offset the net loss of productive capacity due to the footprint of the barge load-out facility.	C
Monitoring and Follow-up	
Marine Sediment Sampling Program to monitor sediment chemistry in the PDA during initial stages of operation.	O/M
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.	O/M
Commercial and Recreational Fisheries (Section 5.8)	
Mitigation	
HADD authorization and habitat compensation program.	C
Regulatory compliance for shipping operations including proper navigation markings.	C,O/M
Ongoing liaison with local fishers including use of Fisheries Advisory Committee.	C,O/M
Compensation for loss and/or damage to fishing gear.	C,O/M
Reasonable accommodation for lost access.	C, O/M
Monitoring and Follow-up	
Monitoring as required for habitat compensation plan.	C, O/M
The Project will continue to liaise with local fishers and develop reasonable accommodation measures to mitigate demonstrated gear damage/loss and loss of access.	C, O/M

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Commitments	Timing of Implementation
Land Use (Section 5.9)	
Mitigation	
Acoustic and dust mitigation measures.	C, O/M
Recommended mitigation identified within the Traffic Impact Study for the Underground Exploration Phase (e.g., road upgrades) remain valid for the current Project.	C, O/M
Adherence to NSPI transmission line standards.	C, O/M
Develop terms for public access to Donkin Peninsula based on consultation with recreation users. Signage and fencing and public communication as required to protect public safety.	P/D, C, O/M
Current Use of Lands and Resources for Traditional Purposes by the Mi'kmaq of Nova Scotia (Section 5.10)	
Mitigation	
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).	C, O/M
Archaeological and Heritage Resources (Section 5.11)	
Mitigation	
Cessation of construction activities if archeological resources are discovered and contacting the provincial regulating agency and other relevant stakeholders.	C
Monitoring and Follow-up	
More detailed Archeological Resource Impact Assessment (ARIA) of site preparation area to confirm previous assessment's conclusion of low archeological potential.	P/D
New ARIA of terrestrial infrastructure associated with barge load-out facility with the emphasis on CbBw-01 (McDonald Farm site).	P/D
Effects of the Environment on the Project	
The materials specified for the Project will be in compliance with all applicable codes and will maintain structural integrity at the anticipated minimum and ambient temperatures in the region to prevent adverse effects of the environment on the Project.	C, O/M
The load-out facility and the transshipment site and related equipment will be fully weather proofed and designed for a full range of climatic conditions including severe rain, wind and waves.	P/D, C
Vessels operating in the area will follow the directions of the Canadian Coast Guard Marine Communications and Traffic Services during severe weather events.	O/M
The effects of sea ice on Project marine infrastructure will be assessed on a regular basis and maintenance and repairs will be implemented as needed.	O/M
Accidents and Malfunctions	
Construction and operations equipment will be frequently inspected for possible fuel and hydraulic system leaks and leaks detected will be repaired immediately where possible.	C, O/M

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Commitments	Timing of Implementation
Lubricants and other petroleum products will be stored according to provincial regulations, and waste oils will be disposed of in accordance with provincial regulations.	C, O/M
Any hazardous materials will be transported in compliance with the <i>Transportation of Dangerous Goods Act</i> and Regulations, and any requiring disposal will be disposed of at an approved facility.	C, O/M
Storage of all hazardous materials will comply with WHMIS requirements, and appropriate material safety data sheets will be located at the storage site.	C, O/M
Storage of hazardous materials will not occur within 30 m of watercourses.	C, O/M
Permanent storage areas for containers or drums will be clearly marked, have appropriate secondary containment, and be located on an impermeable floor that slopes to a safe collection area.	C, O/M
Equipment refuelling and maintenance will be conducted at designated sites and not within 30 m of a watercourse or other areas known to be frequented by migratory birds.	C, O/M
The risk of coal spillage will also be reduced through standard operating procedures and training of Project staff involved in marine loading and transport which will emphasize the importance of preventing coal spills into the marine environment.	O/M
Housekeeping procedures will be implemented at the barge load-out facility and floating crane to continuously clean spilled coal and prevent its entry to the water.	O/M
With respect to a coal or coal waste spill on land, surface drainage and water treatment systems on site will serve to minimize risk of contaminated runoff to enter watercourses or wetlands.	C, O/M
Tugboats have anti-collision navigational systems and competent crews who are trained in operation of the vessels.	O/M
Tugs will operate at appropriate speeds to avoid marine mammal and sea turtle strikes.	O/M
Marine forecasts and conditions will be monitored regularly and operations will be suspended in the event of inclement weather.	C, O/M
The International Maritime Organization has established specific lighting, warning and safety rules under a protocol commonly referred to as COLREGS 72 for marine vessels. This protocol provides guidance for lights displayed by power-driven vessels under a variety of operating conditions including those proposed for this Project.	O/M
Standard safety procedures will be established for workers on the crane and coal barges including procedures for search and rescue, evacuation of injured personnel, and collision avoidance. Standard safety equipment such as flotation devices, signalling equipment and protective coverings will be carried as mandated along with a training program for the work force.	O/M
Offering information and training to local fishers and boaters to prevent incursions into the safety zones and potential collisions is also being considered by the Project.	O/M
Vessel operators will be certified and licensed and will be familiar with the current, tidal, weather, and vessel traffic patterns in the area.	O/M
The marine load-out facility and transshipment mooring will be constructed and operated in accordance with authorization conditions under the NWPA (e.g., on CHS charts, hazard lighting).	P/D, C
During construction, operation and decommissioning of marine infrastructure, notices will be issued and any restrictions to navigation will be noted in the Notices to Mariners and/or Notices to Shipping.	C, O/M, D/R
There will be continued discussion with the commercial fishermen on construction and operation marine traffic and activities including use of a fisheries advisory group and development of a fisheries compensation policy.	C, O/M
To the extent practical, marine vessel routes will be established in consultation with local fishermen to minimize risk of interaction with established fishing locations.	C, O/M
At the load-out area the fuel storage tank will include a containment berm with a capacity of 110 percent of full tank capacity and comply with all other provisions of the Petroleum	C, O/M

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Commitments	Timing of Implementation
Management Regulations under the Nova Scotia <i>Environment Act</i> .	
Fuel lines from the tank to the dock area will be above grade to allow for continuous inspection but will have protective barriers to prevent any damage from vehicles operating on the wharf.	C, O/M
Vessel fuelling will be conducted by trained competent staff following specific procedures for marine refuelling.	C, O/M
An Emergency Response and Contingency Plan will include spill response protocols to address concerns related to sensitive marine species including birds, as well as measures that would be taken to keep birds away from a spilled substance and for dealing with accidents where birds are oiled and/or sensitive habitats are contaminated.	C, O/M
Spill response equipment will be kept on-site.	C, O/M
Coal trucks will be driven by trained and competent drivers who will use approved haul routes.	C, O/M
Improvements and upgrades to the road network along the haul route will be implemented to maintain an acceptable level of performance and safety.	C, O/M
The Project will work with the School Bus Conveyance officials to ensure that coal trucks do not operate on road sections at the same time as loaded school buses are using those road sections.	C, O/M
All highway laws will be obeyed, including seasonal weight restrictions, traffic signage and requirements for permit for any oversized loads.	C, O/M
The Project will work with CBRM and NSTIR to incorporate recommendations from NSTIR's Road Safety Improvement Report and the Donkin Mine Traffic Impact Study (AR&TM 2009), as appropriate. It is assumed that the necessary upgrades will be made by NSTIR and CBRM to accommodate the occasional coal truck traffic.	C, O/M
Key P/D = Preconstruction/Design C = Construction O/M = Operation and Maintenance D/M = Decommissioning and Reclamation	

11.6 CONCLUSIONS

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. The Donkin Export Coking Coal Project will result in a substantial economic benefit, particularly for Cape Breton, providing quality opportunities to generate employment and income in the province.

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