Environmental Assessment for PEV Wharf Approach Deepening Sydney, NS

CBCL Project 112400.00 ● Report ● May 2012

Prepared for:

Provincial Energy Ventures

Prepared by:

CBCL LIMITED
Consulting Engineers

Stantec

Contents

Appendices

CHAPTER 1 PROJECT INFORMATION

The information on the project set-up is described here.

1.1 Project Identification

Project Title:	PEV Wharf Approach Deepening
Project Location:	Sydney Harbour, Sydney, Nova Scotia
EA Starting Date:	November 14, 2011
TC File no.:	32502
NWPP File no.:	
RDIMS no.:	7445695
CEAR File no.:	11-01-65139
NOC CEAR Date:	November 17, 2011

1.2 Project Contacts

PARTIES INVOLVED	CONTACT: Department, Name, Title, Division, Email	TELEPHONE	FAX
Federal EA Coordinator (FEAC): Transport Canada	Carl Ripley Senior Environmental Protection Officer Transport Canada Environmental Services carl.ripley@tc.gc.ca	506-851-7561	506-851-7542

Responsible Authority (RA): Transport Canada and DFO	Carl Ripley Senior Environmental Protection Officer Transport Canada Environmental Services carl.ripley@tc.gc.ca Donald Humphrey Senior Environmental Assessment Analyst Fisheries and Oceans Canada (DFO) Habitat Management Division donald.humphrey@dfo-mpo.gc.ca	506-851-7561 902-426-9740	506-851-7542 902-426-1489
Federal Authority (FA): Environment Canada; PWGSC; and Health Canada	Stephen Zwicker Environmental Assessment Coordinator Environment Canada Environmental Assessment stephen.zwicker@ec.gc.ca Don Maynard Environmental Evaluation Officer Public Works and Government Services Canada (PWGSC) Environmental Services don.maynard@pwgsc-tpsgc.gc.ca Allison Denning Regional Environmental Assessment Coordinator Health Canada Environmental Health Program allison.denning@hc-sc.gc.ca	902-426-0992 902-566-7533 902-426-5575	902-426-8373 902-566-7531 902-426-4036
Provinces or Territories: Nova Scotia Environment	Steve Sanford Environmental Assessment Officer Nova Scotia Environment (NSE) sanforsl@gov.ns.ca	902-424-7630	902-424-0503
Proponent: PEV	Jim Graham Operations Manager Provincial Energy Ventures LLC (PEV) jgraham@provincialenergy.com	902-539-5725	902-539-6663
Consultant: CBCL and Stantec	Greg Landry Principal CBCL Limited (CBCL) gregl@cbcl.ca Robert Federico Senior Project Manager Stantec Consulting Ltd. (Stantec) robert.federico@stantec.com	902-539-1330 902-468-7777	902-539-4406 902-468-9009

1.3 CEAA Trigger and Notification

Pursuant to CEAA Section 5.(1), Transport Canada

☐ 5.(1)(a) - Is the proponent of the project
☐ 5.(1)(b) - Proposes to fund all or part of a project
☐ 5.(1)(c) - Proposes to sell, lease or otherwise dispose of land for the project
☒ 5.(1)(d) - Proposes to issue a permit, approval or authorization on the *Law List Regulations:*

☒ *NWPA* subsection 5.(2)
☐ *NWPA* subsection 5.(3)
☐ *NWPA* subsection 6.(4)
☐ *NWPA* section 16
☐ *NWPA* section 20
☐ *National Energy Board Act* subsection 108(4)
☐ *National Energy Board Act* subsection 108(6)
☐ *Railway Safety Act* subsection 10(1)
☐ *Aeronautics Act* subsection 5.9(2)
☒ *Federal Real Property Regulations* paragraph 4(2)(a)

1.3.1 Notification of Federal Departments and Agencies

The following federal departments/agencies were notified in accordance with the *Federal Coordination Regulations (FCR):*

Departments/ Agencies	Notified on (dd-mm-yyyy)	FCR response (dd-mm-yyyy)	Trigger or Federal Interest	Role (RA/ FA or
Transport Canada (TC)	N/A	N/A	*Navigable Waters Protection Act* (NWPA) Federal Real Property Regulations (under *Federal Real Property and Federal Immovables Act*), Section 4(2)(a)	RA
Fisheries and Oceans Canada (DFO)	14-11-2011	18-11-2011	*Fisheries Act*, Sections 32 and 35(2) DFO has expertise in: fish and fish habitat, integrated oceans management, marine protected areas, aquatic species at risk, and commercial, recreational and aboriginal fisheries.	RA
Environment Canada (EC)	14-11-2011	18-11-2011	*Fisheries Act*, Section 36	FA

Public Works and Government Services Canada (PWGSC)	14-11-2011	22-11-2011	Has expertise related to local environmental setting and cumulative effects due to involvement with environmental effects monitoring (EEM) program for the adjacent Sydney Tar Ponds Remediation Project	FA
Health Canada (HC)	14-11-2011	25-11-2011	Has potentially relevant expertise in biophysical areas related to human health, including air quality, noise, and drinking/recreational water quality	FA
Enterprise Cape Breton Corporation (ECBC)	14-11-2011	Indicated in email from Transport Canada dated 25-11-2011	N/A	N/A

1.3.2 Notification of Other Jurisdictions

Have other jurisdictions been notified?	Yes ☒	No ☐
Is this a coordinated EA?	Yes ☒	No ☐

Coordinated EA with the Province/Territory of: Nova Scotia

Jurisdictions	**Notified on (date)**	**Response (date)**	**Interest or comments**
Province / Territory	14-11-2011	13-02-2012	The Environmental Assessment Branch of Nova Scotia Environment (NSE) has determined that a Provincial Class I Environmental Assessment Registration will likely be required pursuant to the Nova Scotia *Environment Act*.
Cape Breton Regional Municipality	N/A	N/A	N/A
Other	N/A	N/A	N/A

CHAPTER 2 INTRODUCTION

2.1 The Proponent

Provincial Energy Ventures LLC (PEV) is a Nova Scotia registered company (Registry ID 3063289). It operates the Atlantic Canada Bulk Terminal (ACBT) at the former Sydney Steel Corporation docks located in the Cape Breton Regional Municipality (CBRM). The terminal provides bulk commodity transhipment services to customers in North America and Europe.

2.2 The Project

PEV is proposing to deepen the approach to the ACBT wharf facility at the mouth of Sydney Harbour. There is a requirement for federal and provincial approvals.

2.2.1 Project name

The proposed project is called **PEV Wharf Approach Deepening.**

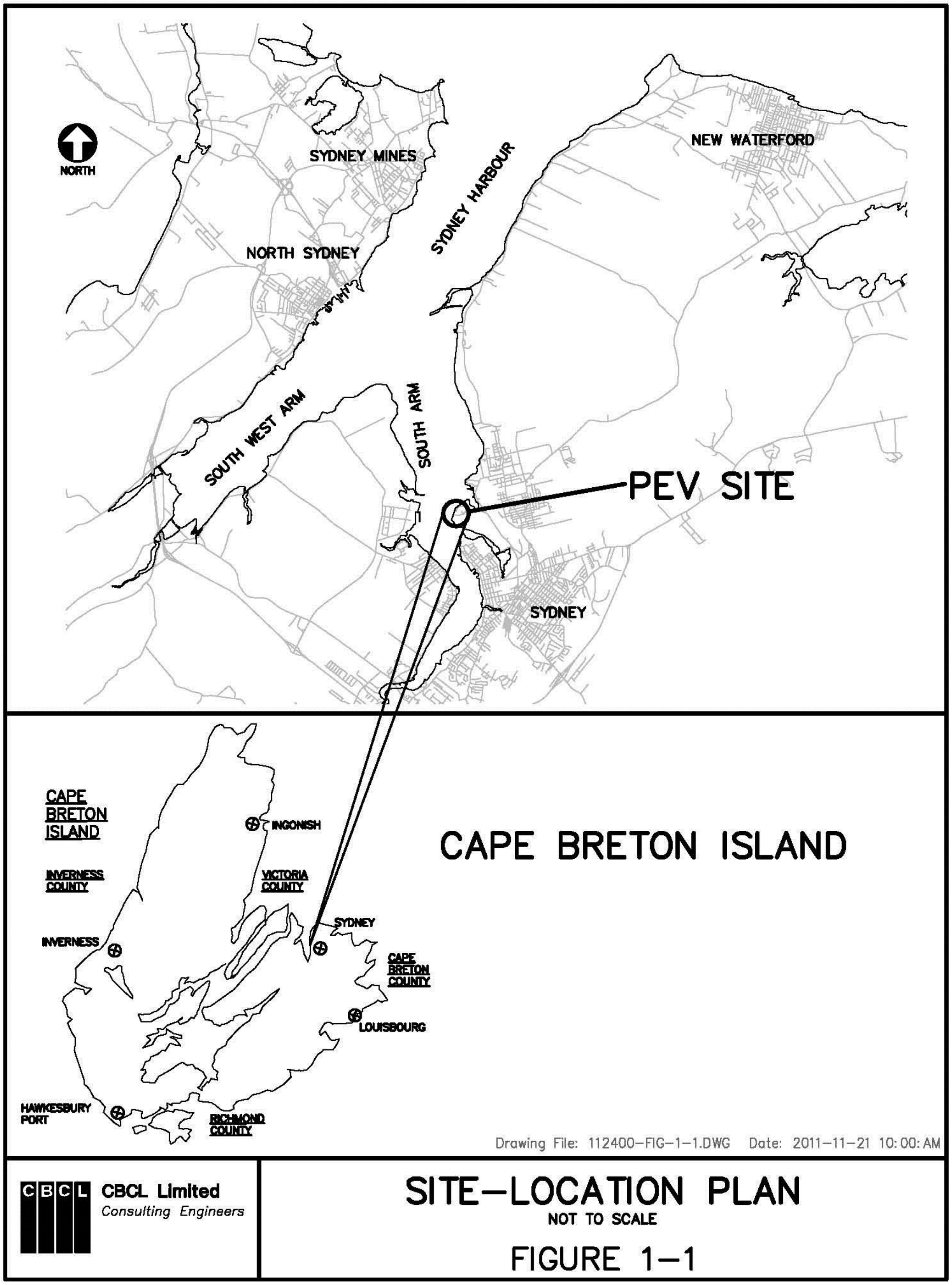
2.2.2 Project Location

The proposed PEV Wharf Approach Deepening project (hereafter the Project) is in Sydney Harbour in an area immediately adjacent to the ACBT facility at the former Sydney Steel Corporation docks. The location is shown in Figure 1.

2.2.3 Project Components

This document is intended to fulfil the screening-level environmental assessment (EA) reporting requirements under the Canadian Environmental Assessment Act (CEAA) and the Class 1 Undertaking reporting requirements for the Environmental Assessment Regulations pursuant to the Nova Scotia Environment Act. As provided under Section 24 of CEAA, the scope of the EA relies substantially on a closely related and previously approved joint federal and provincial EA, the Environmental Assessment for the Sydney Harbour Access Channel Deepening and Sydport Container Terminal (Jacques Whitford 2009; hereafter Access Channel Deepening EA).

Figure 1 PEV Site Location Plan



2.3 Project Overview and Rationale

The proposed Project will enable PEV to use the ACBT facility for larger vessels than can presently be accommodated. The conditions leading to this development opportunity for the ACBT facility are described here.

2.3.1 Background/Context

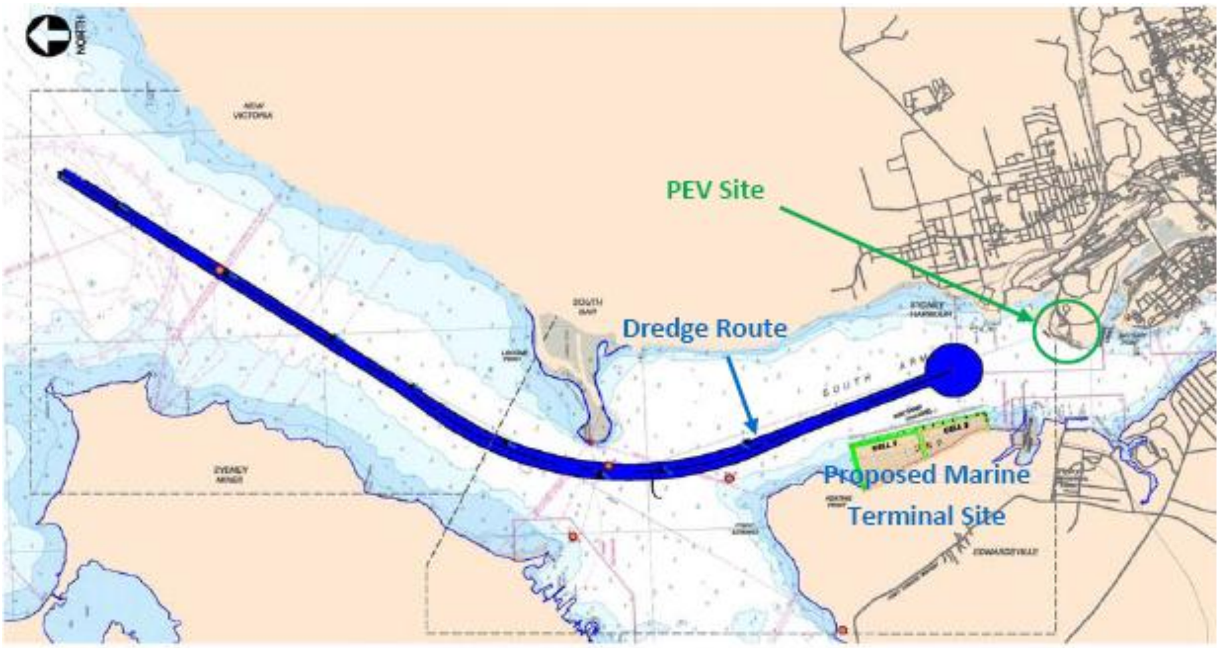
The PEV wharf was originally constructed for the Sydney Steel Corporation (Sysco) and consists of two contiguous docks. The Sysco No.3 Dock was constructed in 1967-68 on the edge of a large slag infill area. It was constructed of 3 ballasted concrete caissons with 2 concrete caisson mooring dolphins. The No.4 Dock was constructed in 1975-76 using steel pipe piles and a concrete deck and forms a continuous berthing face with No.3 Dock. The mooring dolphin at the southwest end of No.3 Dock (Crib #1) was incorporated into No.4 Dock. These docks served as the main bulk shipping and receiving location for the Sysco operations until its closure in 2000. They have a design draft of 13.7 m and a usable depth of about 12 m. The total berthage length of the two docks is 370 m. Figure 2 shows the site as it currently appears.

Figure 2. The PEV Site – Current Condition

PEV has operated the site, under the name Atlantic Canada Bulk Terminals (ACBT), since 2003 pursuant to a lease arrangement with the land owner, Nova Scotia Lands Inc. (NS Lands). The ACBT is a transhipment facility for bulk commodities; it handles mostly coal, but also stores and ships petroleum coke, construction aggregates, slag, limestone, salt, and scrap steel.

PEV recently renewed its lease with NS Lands and is now looking at opportunities to expand its business at its location in Sydney Harbour. A key component for this expansion is the ability of larger capacity vessels to access the wharf. The depth limitation of the outer harbour is removed by the Access Channel Deepening Project, but there is now a limitation in the area of the wharf itself. The proposed deepening of the approach to the PEV wharf facility will provide the access needed for the larger capacity vessels. The location of the PEV facility in relation to the Access Channel Deepening Project is shown in Figure 3.

Figure 3 Location of the PEV Facility Relative to the Access Channel Deepening Project

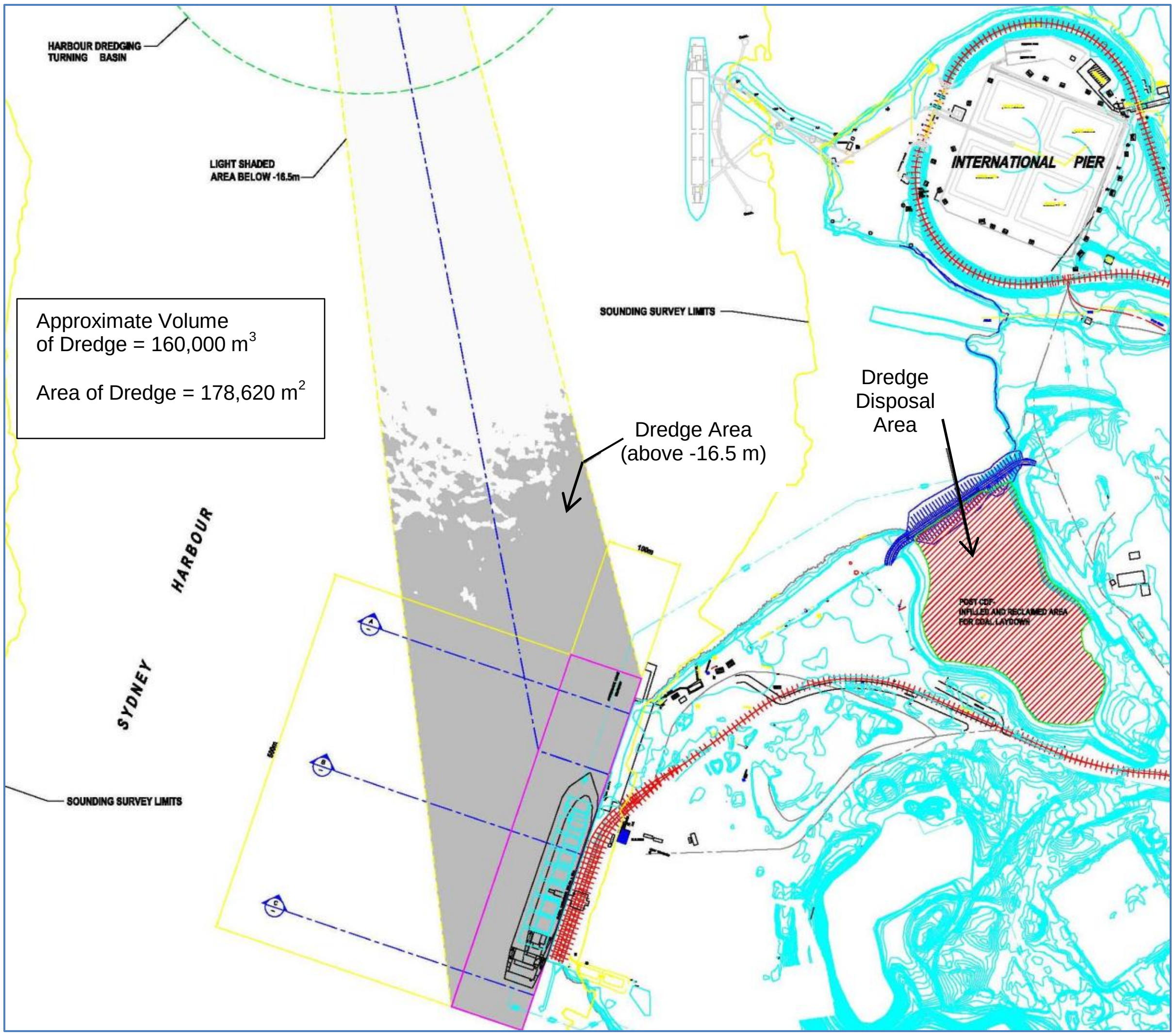


2.3.2 Overview of the Project

The Project work involves the removal of bottom sediments to -16.5 m elevation in a 178,620 m^2 area in front of the PEV wharf in Sydney Harbour as shown in Figure 4. The estimated volume to be dredged is 160,000 m^3, with an over-dredge allowance of up to 40,000 m^3. The 178,620 m^2 footprint of area to be disturbed by dredging (i.e., above -16.5 – the dark shaded area in Figure 4) is used for the purpose of calculating requirements for habitat compensation. Other areas of the project, described later, will also factor into the calculations for habitat compensation.

Dredging will be by marine-based dredge equipment and two options were evaluated; a suction dredge and a barge-assisted crane with environmental bucket. The latter was selected as the preferred method. All the dredged sediment will be transferred to and disposed within a newly constructed Confined Disposal Facility (CDF) in Blast Furnace Cove on the PEV leased property (see Figure 4 for location).

Figure 4 PEV Site Layout



2.3.3 Rationale for the Project

The Sydney Ports Master Port Plan (TEC Inc. 2007) identified dredging of Sydney Harbour's access channel as the key enabling event to the commercialization of Sydney Harbour. This dredging was completed in January 2012. It involved the removal and placement of approximately 4.5 million m^3 of dredge material over a four month period. The primary objective was to provide access to the deepwater of the South Arm and thereby leverage the port's strategic location, superb physical attributes, existing infrastructure, including on-dock rail service that links into Canadian National's intercontinental network, and the significant tracts of water-side land available for development.

Immediately adjacent to some of the world's most active shipping lanes, Sydney is the first mainland North American port of call from the Suez Canal. The South Arm has a uniquely protected inner harbour that provides shelter for dock facilities including those currently operated by PEV.

Deepening the approach to the PEV wharf facility for consistency with the new access channel draft will substantially enhance the marketability of the site and thereby improve the port's overall competitive advantage. The project management team directly involved with the Access Channel Deepening EA has been engaged by PEV to lead the regulatory process and obtain the necessary permits associated with the Project.

2.3.4 Project Benefits

The PEV bulk handling terminal has been operating since 2003. Vessels accessing the site were restricted to 11.5 m draft due to the depth of water in the harbour's access channel. The recently completed Sydney Harbour Access Channel Deepening Project increased the access channel's depth into the South Arm to -16.5 m and now provides access to the proposed container terminal in Point Edward. The PEV Wharf Approach Deepening will provide the same access to the PEV bulk handling terminal.

The CDF construction and dredging operation is expected to span approximately four months. The construction of a CDF at Blast Furnace Cove in advance of the dredging will create opportunities for local construction companies and suppliers. A number of local and Canadian-based dredging contractors have responded to a public Expression of Interest indicating an intention to bid on the dredging work. In support of the dredging operation there will be further short-term employment opportunities for heavy equipment contractors managing the transfer of the dredge material from the dock to the CDF.

Longer-term benefits are likely to accrue to the local service and supply industry following the PEV berth access dredging. PEV's ability to accommodate larger vessels translates into a more economically viable transhipment model. Combined with a planned capital expansion program to upgrade existing wharf facilities, the dredging will enable PEV to gradually increase throughput at the terminal creating new demand for local goods and services including permanent tug support (tugs are not currently stationed in Sydney) and pilots.

2.4 Regulatory Framework

Potential federal EA "triggers" under CEAA for the proposed Project consist of several potential requirements under the CEAA Law List Regulations. These include approval under the *Navigable Waters Protection Act* (NWPA) and two triggers under the *Fisheries Act*: authorization for the Harmful Alteration, Disruption or Destruction (HADD) of fish habitat; and Section 32, the destruction of fish by means other than fishing. A licence required for dredging in the federal harbour from Transport Canada (Federal Real Property Regulations under *Federal Real Property and Federal Immovables Act*), is also a CEAA trigger. The proponent is not a federal entity, and there is no federal funding involved with the proposal. The submerged lands to be infilled in Blast Furnace Cove are owned by the province and leased to PEV. The proposed Project is not included in the CEAA Comprehensive Study List Regulations and is therefore subject to a screening-level assessment.

The Access Channel Deepening EA assessed the environmental effects of the relevant issues associated with the proposed Project, and included the use of Blast Furnace Cove as a CDF for dredged sediments. The Project is similar to what has already been previously assessed for the harbour and this EA therefore relies substantially on the previously approved Access Channel Deepening EA with respect to the characterization of environmental effects, mitigation, and monitoring requirements for the dredging and disposal components. In addition, PEV has gathered new information on sediment quality and benthic habitat in the marine areas upon which the EA for the Project focuses and has conducted new sediment dispersion studies.

After review of the results of new sediment chemistry study, the NSE EA Branch determined that a provincial EA Registration under the Nova Scotia *Environment Act* as a Class I Undertaking is required according to Schedule A of the EA Regulations:

E. Waste Management

1. A facility for storing, processing, treating or disposing of waste dangerous goods that were not produced at that facility, other than facilities operated by, or on behalf of, a municipality or Provincial agency for waste dangerous goods collected only from residential premises.

2. A facility for treating, processing or disposing of contaminated materials that is located at a site other than where the contaminated materials originated.

Provincial approval will also be required under Part V of the *Environment Act* to construct and operate the CDF. An authorization pursuant to the provincial *Crown Lands Act* and/or the *Beaches Act* may be required to infill Blast Furnace Cove.

2.5 Consultation

The Access Channel Deepening EA process included public consultation. Further public consultation for this Project is considered unnecessary. The EA will be made available for public review as a mandatory part of the provincial EA Registration process.

The federal and provincial governments have agreed to informally coordinate their respective EA processes (i.e. without a written harmonization agreement) for efficiency whereby one EA document satisfies requirements for both levels of government. It is anticipated that Transport Canada will have an overall coordination role with specific details of coordination to be developed in consultation with the Proponent.

While the harbour area included in the Project is closed to most commercial fisheries in Sydney Harbour, PEV will discuss the potential impacts with representatives of the Sydney Harbour Fishers Association (SHFA) and note any issues and concerns.

The PEV team will also work with the responsible federal and provincial departments to engage the Mi’kmaq during the EA process. A Mi’kmaq Ecological Knowledge Study (MKES) was previously conducted for the Access Channel Deepening EA (including the Blast Furnace Cove area). Transport Canada and DFO have issued a request for consultation on the Project to Kwilmu'kw Maw-klusuaqn (KMKNO) also known as Mi'kmaq Rights Initiative. The provincial government has also issued a request to KMKNO for a Mi'kmaq-Nova Scotia-Canada Consultation Process. Proponent representatives have met to discuss the project with local members of the Mi'kmaq community and also offered to meet with KMKNO.

In written response to the draft EA document, the KMKNO expressed concern regarding the potential for the Project to affect submerged archeological resources in areas that have not been previously dredged. They also recommended development of a communication plan with respect to Mi'kmaq fishers and wished to receive copies of assessment reports and permit applications.

CHAPTER 3 PROJECT DESCRIPTION

3.1 Project Components and Activities

The PEV Wharf Approach Deepening Project is proposed for the near shore area of the former Sysco No. 3 and No. 4 docks in Sydney Harbour.

The specific activity for which this CEAA screening report has been prepared is the dredging of the bottom sediments above -16.5 m elevation within the identified approach to the PEV wharf and the disposal of the sediments in a new CDF. The vessel approach route was determined in consultation with the Atlantic Pilotage Authority and included a ship simulation exercise at Holland College in Prince Edward Island. The dredge area and volume was based on the analysis of recent bathymetry (McGregor Geoscience Ltd, 2008). The dredging area and estimated volume is shown in Figure 4 (see also Drawing C-01 in Appendix A).

3.1.1 Project Alternatives

As requested by Environment Canada, several key Project alternatives are described below and summarized in Tables 1 and 2.

3.1.1.1 Dredging Equipment

Based on consideration of several factors (refer to Table 1), the Proponent has concluded that a hydraulic TSHD or a mechanical clamshell dredge with environmental bucket are both acceptable and technically feasible dredging technologies for the Project. In general, the TSHD would result in higher levels of sediment resuspension due to larger volumes of water to be discharged from the CDF. The environmental bucket has been selected, in part, because it will reduce the potential for marine discharges from the CDF due to lower water volumes. The Project will employ this technology in accordance with best management practices provided by Environment Canada. The Proponents selection of this technology is designed to both minimize the environmental impact of the dredging operation and simplify the environmental management and controls associated with the CDF operation. The environmental effects assessment section of this EA (Section 6.0) has assumed use of the environmental bucket dredging technology.

Table 1. Comparison of Alternative Dredging Technologies

Factors for Consideration	Hydraulic TSHD	Mechanical Clamshell Dredge with Environmental Bucket
Vertical Operating Accuracy [1]	± 10 cm	± 15 cm
Horizontal Operating Accuracy [1]	± 10 cm	± 10 cm
Maximum Dredging Depth [1]	15 m	Not applicable
Minimum Dredging Depth [1]	1 m	Not applicable
Positioning Control in Currents/Winds/ Tides [1]	Relatively more control	Relatively less control
Estimated Dredging Rate [2]	15,000 m^3/day	3,000 m^3/day
Estimated Loss Rate [2]	1.5% of dredging rate	3% of dredging rate
Estimated Sediment Resuspension Rate [2]	2.8 kg/s	1.1 kg/s
Estimated Project Duration [2]	12 days	60 days
Estimated Outflow at CDF [2]	0.2 m^3/s	n/a [*]
Estimated TSS at CDF Outflow [2]	500 mg/l	n/a [*]
Material Handling and Transportation	Reduced material handling requirements due to capability for direct transfer via pipeline	Requires hauling by barge and/or truck
Water Intake	Hopper accumulates large amounts of excess water that requires decanting and management	Bucket removes sediments at nearly in situ density, thereby minimizing excess water and associated management
Other Operational Considerations	• Cannot work in tight areas or in close proximity to • Difficulty dredging consolidated sediments and debris • Capable of interchanging dredgehead types to suit different task requirements	• Can work in tight areas and in close proximity to infrastructure (*e.g.*, immediately adjacent to PEV wharf) • Can remove hard-packed materials, debris, and debris-laden sediments • Capable of interchanging bucket

Table 1. Comparison of Alternative Dredging Technologies

Factors for Consideration	Hydraulic TSHD	Mechanical Clamshell Dredge with Environmental Bucket
	• Cannot operate from land • Capable of dredging on a practically continuous basis with higher production rates than similarly sized mechanical dredges	types to suit different task requirements • Can operate from a barge or from land
Recent Experience in the Region	A TSHD was successfully used in Sydney Harbour to dredge soft, silty sediments as part of the Access Channel Deepening Project. This included dredging contaminated sediments from the South Arm of Sydney Harbour.	Environmental bucket dredges have been successfully used in Atlantic Canada (*e.g.*, in Halifax Harbour and Saint John Harbour) for dredging soft, silty sediments, including contaminated sediments
* The CDF will not have a direct discharge to the marine environment; any water release will be pumped through a geotube or treated. Sources: [1] CBCL 2012 (Report is attached in Appendix A of this document). [2] Palermo *et al*. 2008		

3.1.1.2 Disposal Options

Table 2 summarizes the review of the alternative options for the management of dredged material. The creation of a CDF in Blast Furnace Cove is considered the preferred option and this is carried forward for further consideration and assessment in Section 6.0 of this report.

Blast Furnace Cove is in an existing heavily utilized industrial setting immediately adjacent to the dredge activity. Nearby lands are known to be impacted by previous industrial activity and the Nova Scotia Lands risk-based remedial criteria[1] for these sites are designed for commercial/industrial land use. The availability of this site and its proximity to the dredge location, combined with the owner's desire to eventually infill the site to create additional useable lay-down area (as set out in the Sydney Harbour Master Port Development Plan, TEC 2007) led the Proponent to conclude that pursuit of alternative land-based disposal options was not necessary. There are no nearby waste facilities for the disposal of dredged sediment and transport to distant facilities would be expensive and impractical.

[1] Environmental Management Plan – Harbourside Commercial Park (SLR, 2011)

Dredged sediment disposal in the Blast Furnace Cove CDF would be by a direct pipeline from a barge or short truck haul on the site (no hauling on public roads). Disposal of the dredged material this close to the source generally reduces the transportation distance and emissions and the potential for accidents and malfunctions.

The eventual infilling of Blast Furnace Cove was identified in the Port Master Plan (TEC Inc. 2007) for expansion of industrial land for the wharf facility. Its use as a CDF will initiate the infilling and land development; this is discussed further in Section 3.1.2.

Table 2 Comparison of Alternative Options for Managing Dredged Material

Factors for Consideration	CDF	Disposal at Sea
Opportunity for Beneficial Use	CDF will create usable land area for material lay down and stockpiling and will be consistent with current industrial land use in the area	Ocean disposal will not promote any beneficial land/water use and, depending on location of disposal site, may not be consistent with current land/water use in the area
Disposal Site and Environmental Context	The proposed CDF site is in a highly industrialized area, located in the vicinity of the dredge footprint on property currently leased by PEV, and has been subject to previous disturbance, including historical infilling.	Given that no ocean disposal sites are known to have been permitted in the general Sydney Harbour area since the early 1990s, identification of a new site would likely be required. This would necessitate extensive investigations and consultation with Environment Canada that would have major Project scheduling and cost implications. In addition, establishment of a new disposal site could result in adverse environmental effects in a previously undisturbed area.
Material Handling and Transportation	Close proximity of dredge footprint to Blast Furnace Cove will likely substantially reduce requirements for transportation of dredged material prior to disposal, although some additional handling will be necessary for trucking, if used	Would likely involve substantially more transportation of dredged material (depending on location of disposal site), but potentially less handling

Other Operational Considerations	• Dredged material (including contaminated material and fines) will be securely contained and managed prior to release • Management of water in the CDF by pumping to filtering/treatment processes eliminates direct discharge to the marine environment and facilitating regulatory compliance • Sediment chemistry results (Appendix C) exceed lower level ocean disposal sediment screening criteria under the Disposal at Sea Regulations pursuant to the *Canadian Environmental Protection Act, 1999* (CEPA)	• Dredged material (including contaminated material and fines) would be exposed to open water and associated tides and currents, with potential for resuspension • Monitoring potential environmental effects and compliance would have a higher level of difficulty and complexity
Recent Experience in the Region	A CDF was successfully developed to contain dredged material associated with the Sydney Harbour Access Channel Deepening and Sydport Container Terminal Development Project in the South Arm of Sydney Harbour.	Material dredged during the Pier C Extension Project in Halifax Harbour was successfully disposed of at an existing permitted ocean disposal site in close proximity to the project site.

3.1.2 CDF Construction

Project construction will begin with the creation of a CDF in Blast Furnace Cove for the disposal of the dredged material (see design drawings in Appendix A). The CDF construction includes the installation of a slag berm with geotextile filter across the mouth of Blast Furnace Cove; the geotextile filter will extend around the perimeter of Blast Furnace Cove to further prevent migration of potential contaminants into the harbour and isolate the CDF from the local groundwater regime. The area behind the berm will contain the dredged sediments, allowing them to settle. The proposed mechanical clamshell dredge with environmental bucket will likely not generate sufficient water to produce an overflow discharge. In the event of any excess water within the CDF, it will be pumped to a geotube for the filtration of particulates or possibly be transferred to the nearby water treatment plant on the NS Lands site. The CDF will not discharge directly to the marine environment.

The CDF will be constructed with specified aggregate materials and geotextile for structural stability and low permeability. A rock mattress will be placed on the bottom (footprint) of the berm to consolidate the existing soft sediments. An intermediate slag layer will be placed over the rock mattress to transition to the slag core which will form the bulk of the berm. The geotextile will be placed over the slag core and will be covered with additional slag on the inside face of the berm and filter stone and armour rock on the outside (harbour) face. A typical berm section is shown in Figure 5, including an emergency overflow that will require a silt boom to be placed outside the CDF. The geotextile will be placed on the banks around Blast Furnace Cove to create a continuous containment system. Slag fines will be used as a cushion under the geotextile and as ballast over the geotextile.

The CDF area will eventually be reclaimed as an expanded laydown area for the PEV facility following material placement and geotechnical assessment. This will likely require a period of material consolidation followed by surcharging and backfilling to provide environmental protection and structural stability. The post-dredging assessment of the CDF is required to fully design the infilling for land reclamation and environmental protection. A preliminary assessment was done based on the known properties of the dredge material and the expected CDF disposal conditions and is included in Appendix B. The assessment suggests a geotextile or sand layer will be required over the sediments and then lifts of slag placed to the full height of the infilled area. The assessment is for geotechnical purposes only (stability and constructability); environmental considerations related to the possible installation of a liner over the sediments are subject to detailed assessment following placement of the dredged material. In any case, the CDF will be infilled for both geotechnical stability and environmental protection as appropriate for the proposed material laydown application.

The existing storm sewer currently discharging to Blast Furnace Cove will be rerouted which will include trenching, pipe work, manholes, and an outfall structure. The rerouting is shown in Figure 6.

3.1.3 Wharf Approach Dredging

Dredging will be carried out using marine-based mechanical dredging equipment with an enclosed "environmental" bucket. This technology was selected over alternative options to minimize the re-suspension and migration of sediment beyond the dredge area and to substantially reduce or eliminate discharge from the CDF to the marine environment. TSS monitoring stations will be established in proximity to the dredging operation to confirm dispersion estimate results (see section 3.1.6). Details of this program will be included in the Environmental Management Plan to be developed for the Project.

The dredge unit typically consists of a barge-mounted crane with the environmental clam installed as shown in Figure 7. The barge is manoeuvred by a tugboat and held in location by its spud system. On-board instrumentation is used for positioning and various other instrumentation and software control the dredging itself to achieve the required accuracy. The excavated sediments are deposited directly into a barge/scow alongside the crane barge. The barge/scow is towed by tugboat to an off-loading area.

All dredged material will be transferred to the CDF located at Blast Furnace Cove. Further information on materials handling is included in section 3.1.4.

Figure 5 Typical Berm Section for the CDF Construction

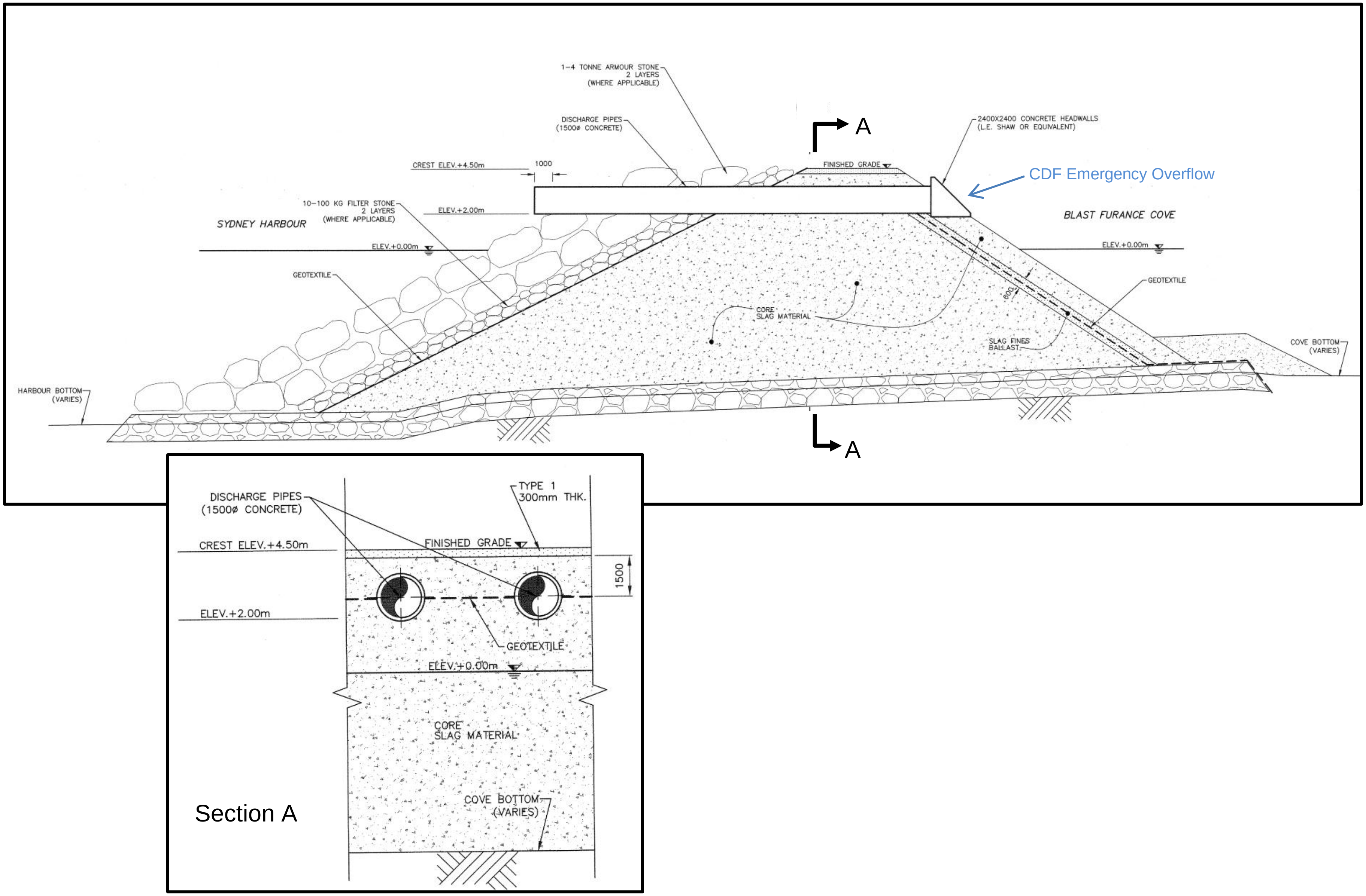


Figure 6 Storm Sewer Rerouting around Blast Furnace Cove for the CDF Construction.

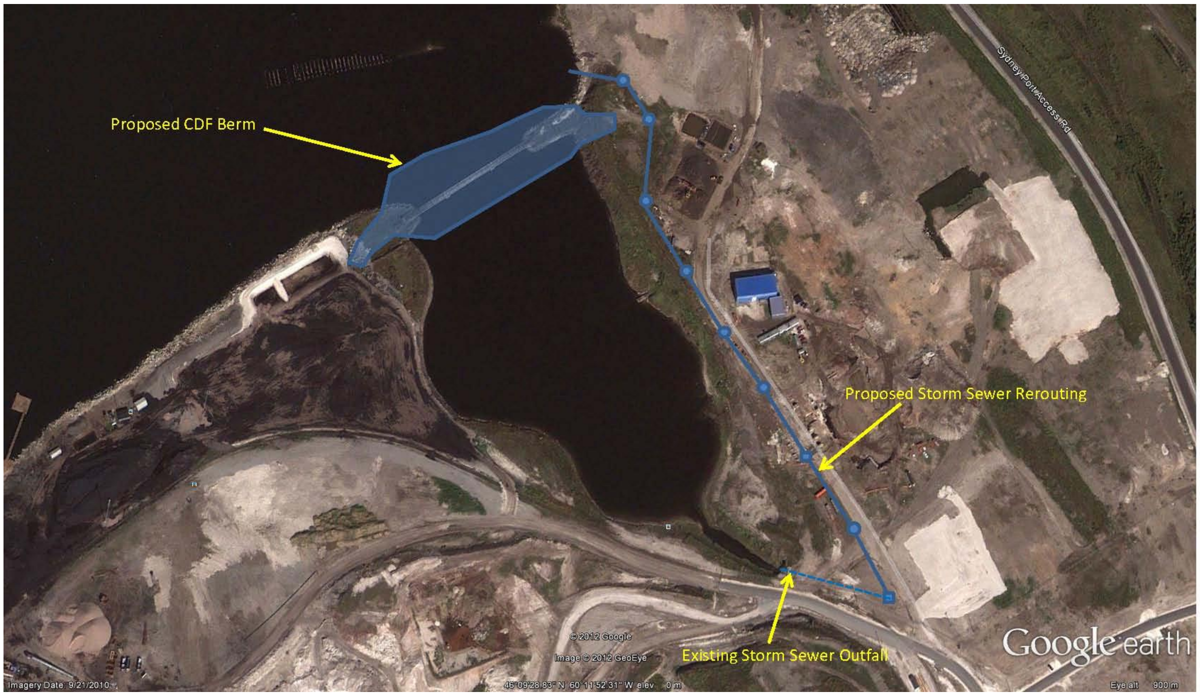
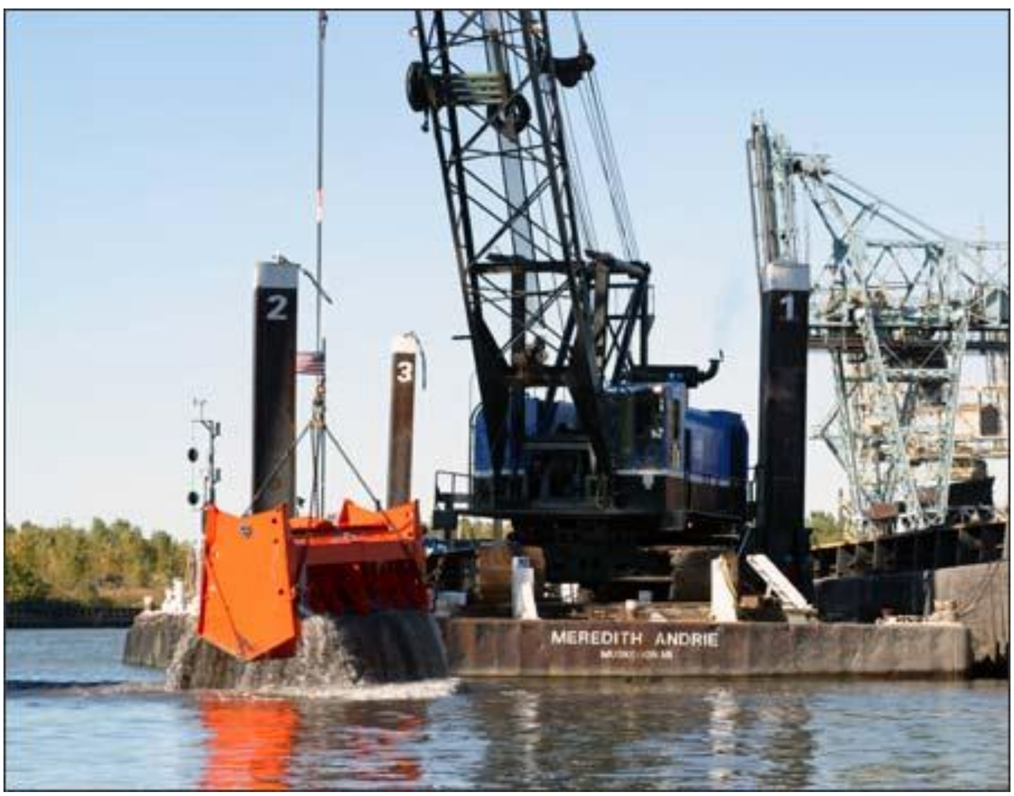


Figure 7. Typical environmental clam dredge operation[2]



[2] http://www.cablearm.com/env/envpics.html# (May 1, 1012)

3.1.4 Dredged Materials Handling / CDF Operation

The proposed dredge bucket method will entrain much less water than the alternative of hydraulic dredging with a suction dredge. The more concentrated dredge product from the environmental bucket will require intermediate handling and transfer(s), including barge hauling to a transfer location at the shore and subsequent transfer to a dumping point in the CDF. This transfer to the CDF can be achieved by truck haul or pumping from the barge.

The PEV site is relatively flat and unimpeded; both pipeline or truck haul can be easily managed here. Truck hauling would require water-tight boxes and covering with tarps or other enclosure method. If trucks are used, a temporary loading area and haul route would be prepared consisting of slag over a geotextile to contain any spillage and spread of contaminated sediments. The temporary loading area and road material would be removed and properly disposed upon completion of the dredge material disposal. Pumping systems using recirculated water from the CDF may be used for the transfer of the dredged material from the barge to the CDF depending on the material properties and this would significantly improve the transfer from the barge to the CDF itself, replacing the truck haul with a pipeline and allowing better sediment distribution in the CDF.

As the deposited sediments build up in the CDF, the solids will settle. The concentrated solids produced by the bucket clam will limit the total volume deposited into the CDF. The CDF operation will be controlled so that there is no direct discharge to the marine environment. If the as-placed material from the dredging exceeds the CDF capacity, excess water will be pumped to an on-land geofilter and infiltration site or for treatment in the NS Lands water treatment plant.

There is potential for fine-grained material placed in the CDF to migrate through the slag infill that makes up Blast Furnace Cove's perimeter. It is generally recognized that such fine-grained materials "self-seal" upon consolidation within a CDF (Palmero and Averett, 2000). For this reason, lining of CDFs is not a common practice. Where liners are considered necessary it is usually to manage highly contaminated material. In these cases a clay layer, conditioned dredged material or synthetic material may be used to reduce flow from a CDF; cutoff walls constructed outside the CDF may also be used for this purpose.

The slag infill that makes up much of the perimeter of Blast Furnace Cove may not "self-seal" sufficiently to prevent fine-grained material migration from within the CDF. For the proposed CDF operation, a geotextile liner will be placed along the sides of Blast Furnace Cove as a filter/barrier to fine-grained sediment migration. The geotextile will be installed from the top of the bank to the cove bottom and ballasted in place with slag, as shown in Figure 7 and Figure 8. Monitoring wells will be installed outside the perimeter area of the CDF to verify the effectiveness of this barrier.

The management of the CDF with respect to monitoring and mitigation is discussed in the following section.

3.1.5 Site Management

The placement of the dredged material into the CDF, and the monitoring of the site post-placement, will be managed to assess the conditions and minimize impacts. The sediments within the proposed dredge footprint have been shown to exceed the CCME Soil Quality Guidelines for Commercial/Industrial Use (see section 5.3.4 for discussion of the sediment chemistry). The upper sediment layer in particular exceeded the guideline value for Arsenic in all samples and several other metals in some samples. At least one PAH parameter was exceeded in 19 of the 20 upper sediment samples. For TPH, at least one parameter exceeded the guidelines in 14 of the 20 samples. PCBs were detected in 19 of the 20 samples, but were below the CCME guideline value. The lower sediment layer had fewer samples analyzed, but there was only one TPH exceedance in the four samples. In most cases TPH and PAH parameters were very low or non-detect; PCBs were non-detect in all four lower sediment layer samples.

The dredged material that will be placed in the CDF will be a blend of the upper and lower sediments. There is insufficient data related to the sampling elevations and thickness to do a concise determination of the volumes of the two sediment layers which make up all the dredge quantity (see section 5.3.4 for discussion of the sediment stratigraphy). However, if the top sediment layer average thickness of 0.43 m is applied to the dredge area, which is 178,620 m^2, a volume of 76,800 m^3 is estimated for the quantity of this material. This constitutes 43% of the total volume. Therefore, about 57% of the dredged material will be from the uncontaminated sediment layer.

Site management assumes some degree of control is required to ensure the potential for impacts due to the placed material is contained. To this end, the CDF will be constructed with geotextile along the perimeter and ballasting it in place with slag fines. The slag and geotextile will provide a substrate for build-up of a self-sealing barrier to particle migration, thus containing the dredged material. The dredged material will be placed in a wet (sub-aqueous) environment, maintaining the existing anoxic conditions. This will limit the odours from the sediments in the CDF.

As a further site management measure, the CDF containment will be monitored by wells installed in the slag fill outside the CDF. The monitoring well program will be developed for the EMP and will include at least 3 wells in the expected pathway of migration from the CDF to the harbour and 1 well in an up-gradient location as a background reference. The monitoring results will be compared to the baseline conditions (i.e. conditions before the CDF construction and sediment disposal). In the event of a deterioration of water quality compared to the baseline condition the use of flocculants in the CDF to enhance settling and reduce the potential migration of fine sediments outside the CDF will be implemented. Other mitigative measures for impacts could include the installation of barriers, such as clay cutoff walls, sheet piling or grouting, or groundwater pumping, which could include filtering with geotubes as a remedial measure.

Infilling of the CDF for the end-use bulk storage will require about 3 metres of fill over the placed sediments. This will provide a separation barrier and prevent contact. The preliminary geotechnical assessment noted in section 3.1.2 provides an indication of the expected infilling for stability and constructability. A liner may be required as part of the site management (containment), depending on the chemistry of the blended as-placed sediments, to act as a protective barrier for potential vapour migration. This will be assessed before the infilling so the final design can be prepared.

The infilled site will be designated as commercial/industrial land use. This will provide another level of control by limiting the exposure to the site. Institutional controls such as restricting excavation of the infilled area will be applied.

3.1.6 Dispersion Modeling

Two dredging options were modeled to simulate turbidity (represented by TSS above background). These options were for a Trailing Suction Hopper Dredge (TSHD) and the clamshell dredge with environmental bucket. The model included the dredging operations and the CDF overflow (for the TSHD option). Since completion of the modelling it was determined that the environmental clam bucket was the preferred dredging method and this is the only option carried forward for further assessment.

The same hydrodynamic model that was developed for the Sydney Harbour Dredging project was used for the current case. The observed TSS values from the Sydney Harbour Dredging project support the model assumptions so it was considered acceptable for the current case without re-calibration. The modeling results are provided in Appendix C.

Two sets of model runs were conducted, with (1) sediment settling, considered most likely, and (2) no-settling assumptions, in order, to cover uncertainties in sediment size (i.e. if it is finer than expected) and weather conditions (i.e. stormier than usual). The simulated currents, which cover a range of representative tidal and estuarine flow conditions, were used to drive plume dispersion simulations using a moving source of suspended sediments (the dredge) over the dredging area, and another fixed source at the CDF for scenarios where an overflow is considered. Using the conditions shown in Table 1 of Appendix C for the TSHD and the environmental clam, the model generally shows both technologies are acceptable with TSS above background as follows:

- average predicted TSS is no more than 40-50 mg/l above background for the TSHD scenario with no settling (dispersion only), confined to the near shore location of the dredging and CDF and decreasing to no more than 10-20 mg/l above background within the inner harbour. With settling, the maximum predicted TSS drops to ≤100 mg/l.
- average predicted TSS is no more than 10-20 mg/l above background for the environmental clam scenario with no settling (dispersion only), confined to the inner harbour. With settling, the maximum predicted TSS drops to ≤10 mg/l. With settling, the maximum predicted TSS drops to 20-30 mg/l and the range shrinks considerably to the immediate dredge area only.
- maximum predicted TSS is no more than 200-250 mg/l above background for the TSHD scenario with no settling (dispersion only), confined to the near shore location of the dredging and CDF and decreasing to no more than 10-20 mg/l above background at the mouth of the South Arm and towards Sydney River. With settling, the range shrinks considerably to the CDF and immediate dredge areas only.
- maximum predicted TSS is no more than 100-125 mg/l above background for the environmental clam scenario with no settling (dispersion only). TSS is confined to the near shore location of the dredging and decreases to no more than 10-20 mg/l above background before the mouth of the South Arm and towards Sydney River. With settling, the maximum

predicted TSS drops to 90-100 mg/l and the range shrinks considerably to the immediate dredge area only.

In summary, the two main differences between dredging options are as follows:

- the re-suspension rate and associated TSS impacts are estimated to be twice as great with the TSHD, and
- the time to complete the work is 5 times longer with the clamshell dredge.

3.2 Schedule

The Project will begin with construction of a CDF in Blast Furnace Cove in the summer of 2012. The dredging is planned to occur immediately after the CDF construction is complete (late summer – early fall) and take 1 -2 months to complete depending on the number of dredge units deployed. A single mechanical bucket could take about 2 months to complete the job but adding a second unit would cut the time to complete the work in half. Once the dredged sediments are placed in the CDF, settling and dewatering will occur which is expected to take several weeks. The schedule for infilling of the CDF is not yet determined. It will depend on the final geotechnical and environmental evaluations for the stability/constructability and environmental protection. The infilled land use, when complete, will be Industrial/Commercial.

Figure 8 Geotextile Liner in Blast Furnace Cover

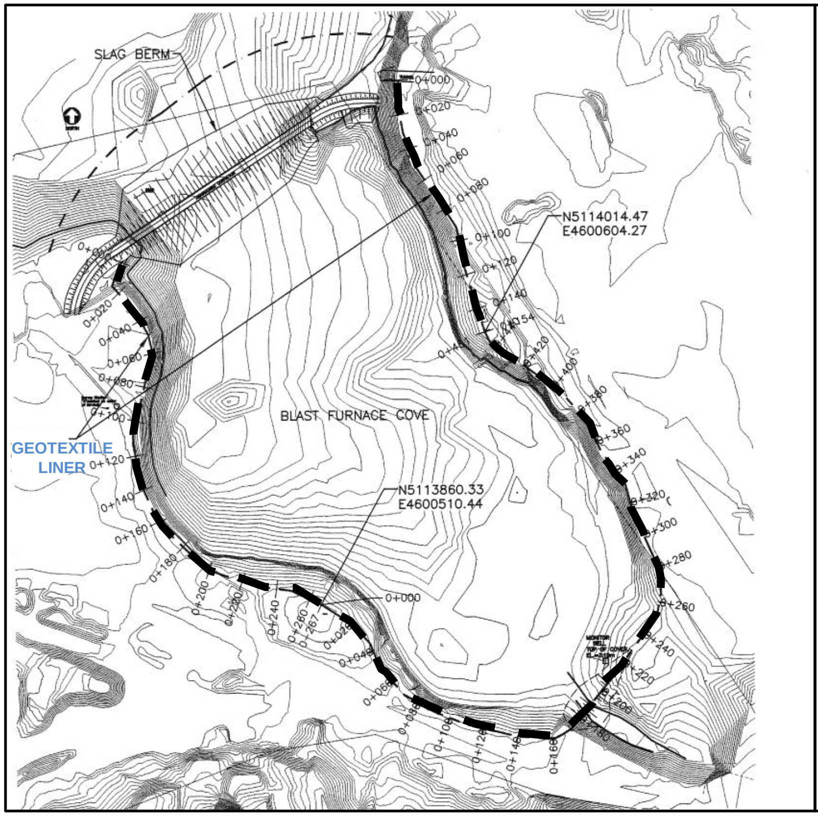
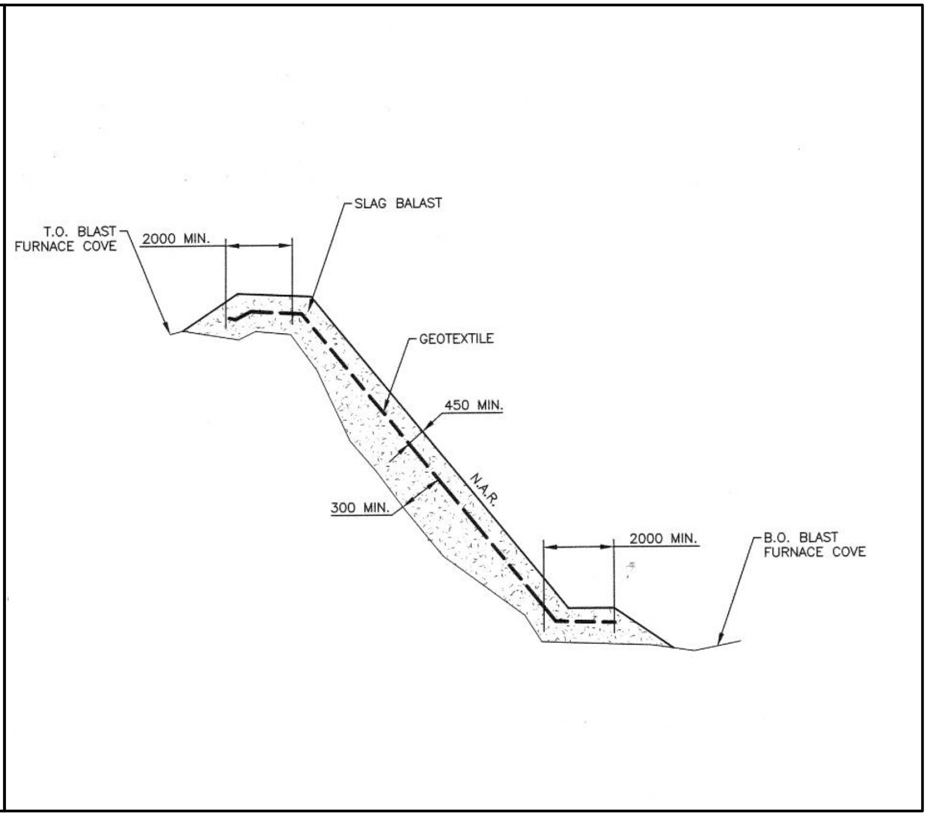


Figure 7 Geotextile Liner Installation



CHAPTER 4 SCOPE OF ASSESSMENT

4.1 Scope of Project to be Assessed

The Project includes near berth dredging in front of the existing PEV wharf for the purpose of meeting the new port standard of -16.5 m and enabling larger vessels to access the facility.

The scope of the proposed Project includes all of the components and activities described in Section 3.1, as well as any potential accidents, malfunctions, and unplanned events that may occur in relation to the Project (refer to Section 6.2.1). This EA focuses primarily on potential Project-environment interactions that may occur during the construction phase (*i.e.*, CDF construction, dredging, and infilling). The operations phase will mainly address the operations (i.e., land use) associated with the reclaimed CDF infill at Blast Furnace Cove. Dock operation activities will remain consistent with current practices at No. 3 and No. 4 docks, albeit with larger vessels and increased loading and unloading activities. As indicated in Section 2.2.5 of the Access Channel Deepening EA report, sedimentation rates in Sydney Harbour are low; therefore, maintenance dredging during the operational phase of the Project is considered unlikely. The CDF, once infilled, will serve as an expanded laydown area with the same function as the existing PEV site and will not be decommissioned; therefore decommissioning is not applicable to this assessment.

The spatial boundaries for the assessment will focus on the CDF area in Blast Furnace Cove and the proposed dredge footprint as illustrated on Figure 4 in Section 2.3.2 of this document. The spatial boundary will also include an area potentially affected by resuspension and dispersion of sediments during the dredging and CDF dewatering process. Consideration will also be given to those species and activities occurring on a harbour-wide basis where applicable.

The Access Channel Deepening EA assessed the environmental effects of the use of Blast Furnace Cove as a CDF for dredged sediments. Pursuant to Section 24 of CEAA, this EA relies substantially on the Access Channel Deepening EA with respect to the characterization of environmental effects, mitigation and monitoring requirements for the CDF construction and infilling of Blast Furnace Cove. Given the other similarities between the Access Channel Deepening Project and the PEV Wharf Approach Deepening Project, both of which involve dredging and CDF construction/infilling in the South Arm of Sydney Harbour, the Access Channel Deepening EA is also relied upon wherever applicable for assessment of the dredging component (albeit with clam bucket rather than TSHD technology). NSE has indicated that the primary interest with respect to the provincial assessment process will be the land based structures and activities.

Table 3 below lists the various Project components that are included in the Project to be assessed in this report.

Table 3 Scope of Project to be Assessed

PROJECT PHASES/ COMPONENTS	DESCRIPTION
Construction:	
- Dredging	Dredging of the approach to the PEV wharf using marine-based mechanical dredging (an "environmental" clamshell dredge bucket and barge).
- Construction of slag cofferdam to isolate Blast Furnace Cove as CDF	Rock mattress, slag core, geotextile filter, filter stone and armour stone protection, discharge weir, silt curtains
- Infilling Blast Furnace Cove CDF	Discharging dredge material into CDF via pipeline or truck haul, controlled dewatering using goetubes or water treatment facility, environmental sampling, surcharging and infilling to final grade.
Operation:	
- Operation	Dock operation activities will remain consistent with current practices at No. 3 and No. 4 docks, albeit with enhanced berthing capability due to the increased depth at the wharf.
- Maintenance	It is not anticipated that maintenance dredging will be required given very low rates of sedimentation at this location. Inspection and maintenance will be required for the CDF and will include repair of rock armour walls and surface runoff controls as required.
Modification:	N/A
Decommissioning	N/A
Abandonment:	N/A

4.2 Scope of Assessment

As required under Section 16(1) of CEAA, this screening includes consideration of the following factors:

a) The environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out;

b) The significance of the effects referred to in paragraph (a);

c) Comments from the public that are received in accordance with CEAA and associated regulations;

d) Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project; and

e) Any other matter relevant to the screening, such as the need for the Project and alternatives to the Project that the RA may require to be considered.

This document also complies with the basic requirements for a Class I Registration under the provincial Environmental Assessment Regulations.

The scope of the project to be assessed is defined in Section 4.1 above, primarily to include potential interactions between the environment and construction, operation, and maintenance activities associated with the proposed dredging and CDF construction/infilling work.

This screening report considers Project-environment interactions (refer to Table 4) and their importance to environmental and social integrity. The primary focus of the report is concentrated on specific Valued Environmental Components (VECs) that may require special mitigation or consideration. Based on methods originally proposed by Beanlands and Duinker (1983), this is a generally accepted approach that can improve the efficiency and effectiveness of the EA process by targeting issues of greatest relevance and importance to stakeholders, including regulators, scientists, resource managers, and the public.

The following VECs were identified in the Access Channel Deepening EA:

- Benthic Habitat Communities and Sediment Quality
- Marine Fish and Water Quality
- Marine Mammals and Marine-related Birds
- Terrestrial Habitats and Wildlife
- Atmospheric Environment
- Land Use
- Commercial Fisheries
- Archaeological and Heritage Resources

There are strong similarities between the Access Channel Deepening and proposed PEV Wharf Approach projects, including the similar nature of construction activities (*i.e.*, dredging and infilling) and spatial overlap in the South Arm of Sydney Harbour. Therefore, the environmental effects assessment and prescribed mitigation measures for each VEC in the CEAA screening report for the Access Channel Deepening EA are also generally applicable and valid for the PEV Wharf Approach Deepening Project.

The scope of this assessment focuses on the key differences between the coverage of the Access Channel Deepening EA and EA requirements for the currently proposed PEV Wharf Approach Deepening Project. Table 4 summarizes potential Project-environment interactions. Table 5 provides a rationale for VEC selection for this environmental assessment and reliance on Access Channel Deepening Project.

Table 4 Potential Project–Environment Interaction Matrix

PROJECT PHASES / COMPONENTS	ENVIRONMENTAL COMPONENTS																												
	DIRECT ENVIRONMENTAL EFFECTS																				INDIRECT ENV. EFFECTS[1]							OTHER	
	Land					Water					Air			Natural Systems							Socio-Economic				Cultural				
List each project phase and project components described in the proponent's project description. (The following project components are provided as an example only.)	Terrain and Topography	Soil Quality	Aquatic Sediments	Erosion / Slope Stability	Other	Surface Water Quality	Surface Water Quantity	Groundwater Quality	Groundwater Quantity	Other	Air Quality	Climate Change	Other	Vegetation	Wetlands	Species at Risk	Migratory Birds	Wildlife / Wildlife Habitat	Fish and Fish Habitat	Other	Human Health / Safety	Navigation Related	Land and Water Use	Other	Physical and Cultural heritage	Aboriginal Use [2]	Historical / Archaeological site [3]	Acoustic environment (noise)	Vibration
Construction:																													
- Dredging			X	X		X					X	X				X	X	X	X			X	X		X	X		X	
- Rerouting of storm sewer	X	X		X		X		X			X	X		X					X									X	
- Construction of slag cofferdam to isolate Blast Furnace Cove as CDF			X	X		X					X	X				X	X		X			X	X			X		X	
- Infilling Blast Furnace Cove CDF	X	X	X			X		X			X	X		X		X	X		X			X	X			X		X	
Operation:																													
- Operation and maintenance of CDF infill site.			X	X		X		X			X								X			X	X					X	
- Change in Shipping			X								X	X										X	X					X	
Modification: N/A																													
Decommissioning: N/A																													
Abandonment: N/A																													
Accident / Malfunctions			X			X		X											X										

[1] Only indirect environmental effects resulting from a project impact on the environment must be considered in the EA.
[2] The current use of lands and resources for traditional purposes by aboriginal persons.
[3] Include any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Table 5 Screening and Selection of Valued Environmental Components (VECs)

VEC Identified for the Access Channel Deepening EA	Scoping Considerations	Selected VEC for PEV EA	Related Sections in this EA
Benthic Habitat, Communities and Sediment Quality	• Section 6.1 of the Access Channel Deepening EA report assesses potential Project interactions with benthic habitat. Section 6.1.1 of this EA relies upon the results of that assessment where applicable for the Marine Environment VEC. • In addition to the use of existing relevant information from the Access Channel Deepening EA, the following Project-specific information is incorporated into Section 5.3.4 of this EA report: ○ A benthic fish habitat video survey was conducted in the PEV dredge footprint to supplement existing information characterizing the fish habitat in the area. ○ A sediment sampling and analysis program was undertaken in the PEV dredge footprint. This EA report considers the results of physical and chemical analysis of marine sediments to be dredged and used as Project infill material (refer to Section 5.3.4). ○ A sediment transport modeling study was completed, based on the hydrodynamic model used for the Sydney Harbour Dredging Project, and the results incorporated into this EA report (refer to Section 3.1.6).	Marine Environment	5.3.4 6.1.1 Appendix F
Marine Fish and Water Quality	• Section 6.2 of the Access Channel Deepening EA report assesses potential Project interactions with marine fish and water quality. Section 6.1.1 of this EA relies upon the results of that assessment where applicable for the Marine Environment VEC. • In addition to the use of existing relevant information from the Access Channel Deepening EA, the following Project-specific information is incorporated into Section 5.3.4 of this EA report: ○ The potential water quality effects associated with Project dredging will depend on the physical and chemical characteristics of the sediment to be dredged. As noted in the scoping consideration for Benthic Habitat Communities and Sediment Quality above, Section 5.3.4 of this EA report includes consideration of results of a Project-specific sediment sampling and analysis program in the PEV dredge footprint. ○ Pertinent observations made with respect to marine fish and water quality during the 2011 benthic fish habitat survey are described in Section 5.3.4 of this EA report. ○ A sediment transport modeling study was completed, based on the hydrodynamic model used for the Sydney Harbour Dredging Project, and the results incorporated	Marine Environment	5.3.4 6.1.1 Appendix E

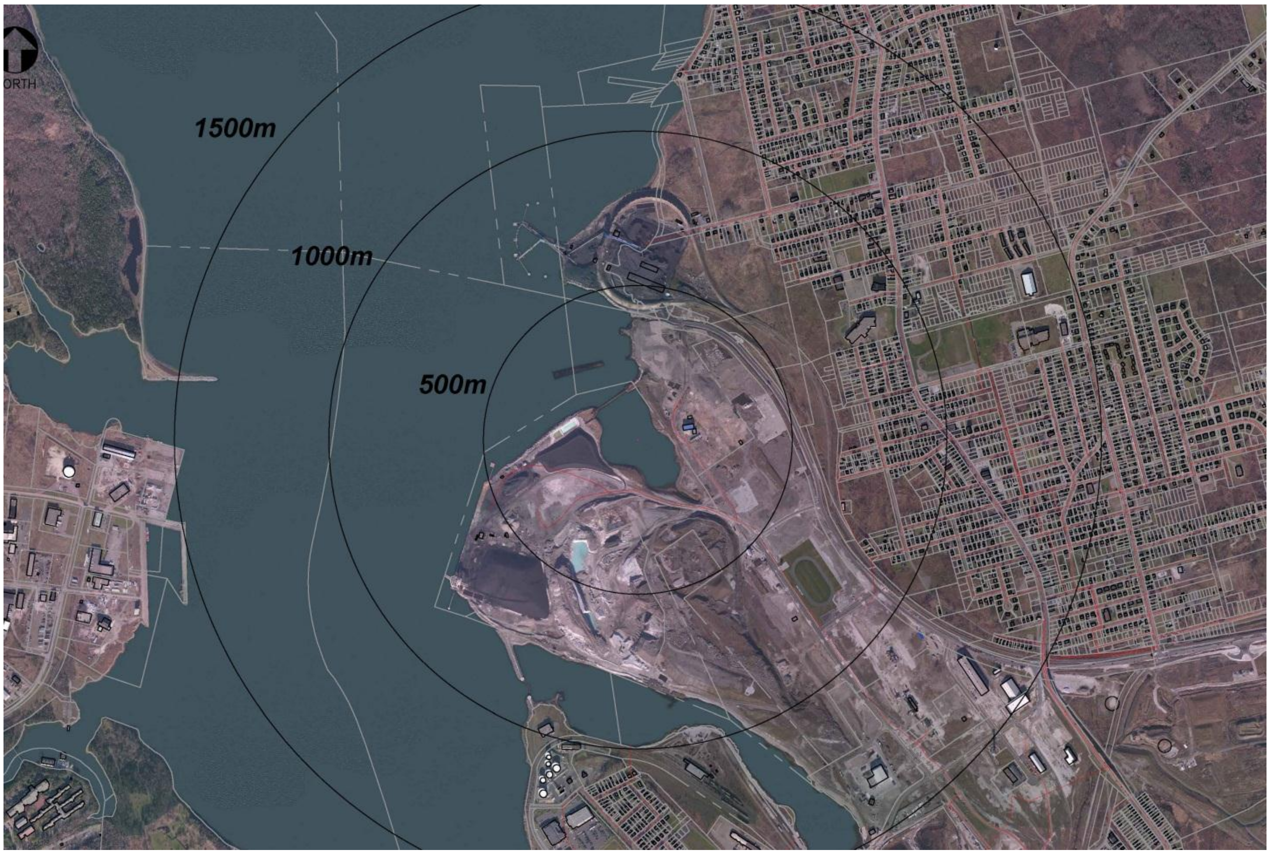
VEC Identified for the Access Channel Deepening EA	Scoping Considerations	Selected VEC for PEV EA	Related Sections in this EA
	into this EA report.		
Marine Mammals and Marine-related Birds	• Section 6.3 of the Access Channel Deepening EA report assesses potential Project interactions with marine mammals and marine-related birds. Section 6.1.1 of this EA relies upon the results of that assessment where applicable for the Marine Environment VEC.	Marine Environment	5..3.3 6.1.1
Terrestrial Habitats and Wildlife	• Project activities will be primarily located in the marine environment. The adjacent shoreline is located in a highly disturbed and industrialized area devoid of natural terrestrial habitat. Existing environmental conditions related to terrestrial habitats and wildlife are described in more detail in Section 5.4. • There is no local groundwater use and the nearby area is known to be impacted from previous industrial activity. Infilling of Blast Furnace Cove will likely divert some groundwater flow through adjacent land but no net change in groundwater flow/discharge is expected. • In consideration of the environmental context described above, a detailed assessment of potential Project effects on terrestrial habitats and wildlife is not considered necessary and is not included in this EA report.	No VEC selected	
Atmospheric Environment	• The Project will result in air and noise emissions due to operation of the dredge vessel and other construction equipment. • Air emissions from construction vessels and equipment, including sulphur oxides (SOx), nitrogen oxides (NOx), particulate matter (PM), volatile organic compounds (VOCs), and carbon monoxide (CO), will be comparable to emissions from existing operations at ACBT and will represent only a small increase in total potential air emissions. • The dredged sediments are expected to produce odours when exposed to the atmosphere. Much of the CDF disposal will be sub-aqueous and this will provide some odour mitigation. The dredged material can be transferred from the barge to the CDF via pipeline or truck. If truck-hauling is done, the trucks will be covered (tarped). In cases where the sediments are exposed to the atmosphere, they are known to dry to a hard, stable crust which inhibits dust generation. As soon as the CDF material is stable it will be surcharged and infilled. This will also prevent dust generation post-dredging. For persistent odours, sealers can be applied. • Existing environmental conditions related to the atmospheric environment are described in more detail in Section 5.3.2. • There is potential for accidental events (e.g., fires) to result in air quality effects. This EA report includes consideration of	No VEC selected	Section 6.2.1

VEC Identified for the Access Channel Deepening EA	Scoping Considerations	Selected VEC for PEV EA	Related Sections in this EA
	accidental events as well as mitigation (i.e., preventative and contingency) measures to minimize potential associated environmental effects (refer to Section 6.2.1). • Project-related air emissions will be mitigated through the use of properly maintained engines, the reduction of idling time, dust minimization practices, and the inclusion of pollution control devices as appropriate. • Although some noise effects caused by Project equipment will be unavoidable, they will not be unprecedented, as Project activities will take place in an area routinely subject to industrial activity and high levels of noise. Existing industrial noise sources includes: Logistec (trains, trucks), Portside Aggregates (screening, crushing, trucks, loaders), Harbourside Commercial Park (construction, commercial activity), Tar Ponds Cleanup (construction), PEV (coal loading/unloading, trucks) and the local area (Whitney Pier and north-end Sydney commercial activity). • Project activities will be conducted in accordance with the provincial *Guideline for Environmental Noise Measurement and Assessment* (NSE 1989). This guideline contains noise criteria for different periods of the day (day, evening and night) and includes a measurement duration of a minimum of two continuous hours of data in one time period to be representative. The Nova Scotia noise guidelines are as follows: o 65 dBA between 0700 h and 1900 h; o 60 dBA between 1900 h and 2300 h; and o 55 dBA between 2300 h and 0700 h. • The EMP will contain provisions for receiving and responding to complaints regarding air quality and noise. • In consideration of the environmental context and mitigation described above, a detailed assessment of potential Project effects on atmospheric environment is not considered necessary and is not included in this EA report.		
Land Use	• The Project is consistent with local land use and will provide additional bulk solids handling opportunities for the PEV facility, with increased land use and economic benefits to the local area. • In consideration of the environmental context described above, a detailed assessment of potential Project effects on land use is not considered necessary and is not included in this EA report.	No VEC selected	

Commercial Fisheries	• Section 6.7 of the Access Channel Deepening EA report assessed potential Project interactions with commercial fisheries. Section 6.1.2 of this screening will rely upon the results of that assessment where applicable for the Commercial Fisheries VEC. • In addition to the use of existing relevant information from the Access Channel Deepening EA, the following Project-specific information will be incorporated into Section 5.6.4 of this EA report: o The Project is located in a fishery closure area for shellfish.	Commercial Fisheries	5.6.4 6.1.2
Archaeological and Heritage Resources	• Based on previous field work within the proposed dredge area, no shipwrecks or other archaeological/heritage resources are known or suspected to be present within the Project footprint. Detailed surveys have been conducted to confirm this. • The potential for submerged ancient First Nations artifacts of archaeological significance to be present in the Project footprint is considered low given that the shoreline where the PEV wharf and Blast Furnace Cove are situated is the product of extensive infilling. The wharf and cove are located on the northwestern edge of 70 hectares of new land that were created between 1901 and 1990 through the infilling of Muggah Creek and a portion of the South Arm of Sydney Harbour (SEACOR 2003). The glacial recession from Nova Scotia c. 12,000 B.P., and ensuing isostatic rebound, resulted in significant emergence of land to the north of the Project Area. This new coastline provided resources such as breeding grounds for large marine mammals, which would have attracted settlement by First Nations peoples. The apex of emergence north of the Project Area occurred approximately 9,000 B.P. when there was a large peninsula to the east that jutted north toward the Laurentian Channel. This landform would have provided marine mammals an ideal breeding ground and would have had high potential for First Nations settlement. By 6,000 B.P., however, isostatic subsidence and rising sea levels had resulted in the shoreline reaching near present levels. The Project Area appears to have been well inland during this time and there does not appear to have been any major waterways nearby. As a result, it is very unlikely that there was any First Nations settlement near the Project Area that would have become submerged with the rise of sea levels. Therefore the potential for submerged early Holocene First Nations sites of archaeological significance to be present in the Project footprint is considered low. • In consideration of the environmental context described above, detailed assessment of potential Project effects on archaeological and heritage resources is not considered necessary.	No VEC selected	

The Project Area is defined as the spatial footprint to be dredged as well as the area to be occupied by the proposed CDF in Blast Furnace Cove, as indicated on Figure 4 in Section 2.3.2. Further location reference is provided in Figure 9 in the context of proximity to potential receptors. This figure shows distances from the CDF where the dredged sediments will be deposited, which will be the main source of potential odour, dust and noise issues. The nearest residential receptors are over 500 m from the CDF.

Figure 9. Distance from CDF to Potential Receptors.



Spatial boundaries for the assessment of Project effects include a Study Area within which potential effects may be realized. The Study Area encompasses the Project Area and a buffer zone to capture potential environmental effects associated with resuspension of dredged sediment. Some species and activities will be considered on a harbour-wide basis where applicable.

The temporal boundary for the assessment is continuous during Project construction (*i.e.*, mid-2012) and operational activities.

Given the scoping analysis presented in Table 5 above, the following VECs have been selected for further assessment in this CEAA screening report:

- Marine Environment; and
- Commercial Fisheries.

CHAPTER 5 DESCRIPTION OF EXISTING ENVIRONMENT

5.1 General Description

The area in which the Project will occur has been the subject of previous studies for various undertakings. The most relevant are those documents associated with the Access Channel Deepening EA, including the associated Environmental Management Plan (Stantec 2011a) and Fish Habitat Compensation Plan (Stantec 2011b).

The Sydney Tar Ponds Agency (STPA) have an on-going Environmental Effects Monitoring (EEM) program in place which includes a marine component for water quality, sediment properties, crab tissue monitoring and benthic community sampling. Results reported by Dillon (2010) for sediment grab samples in four areas of Sydney Harbour indicated Area 1 near Muggah Creek had the highest concentrations of measured parameters, particularly As, Cd, Cu, Pb, Hg, Zn, PAHs and PCBs. Dillon also noted that the overall sediment deposition rates in bottom traps were low for all four areas.

The PEV Wharf Approach Deepening is proposed for the near wharf area at the former Sysco No.3 and No.4 docks. This was the site of a heavy industrial (steelmaking) operation for about 100 years. During the years of the steelmaking the site expanded significantly due to infilling of the adjacent harbour with slag, a steelmaking by-product. The No.1 and No.2 docks were located at the north end of the steel plant property. Raw materials were unloaded and transferred to storage areas on the site and finished product was loaded for shipment at these docks. Later, the No.3 and No.4 docks were built on the edge of the slag infill, just to the south of the other two docks, and replaced them for material receiving and shipping.

The site location is on the east side of Sydney Harbour. The dredge area is within several hundred metres of the wharf. The CDF is located several hundred metres northeast of the wharf within the PEV leased property.

5.2 Previous Studies and Assessments

The historic use of both the site and the local area for heavy industrial operations has led to a number of studies and assessments of the environmental conditions. It is generally known that the steelmaking and coking operations contributed to soil, sediment and groundwater contamination within the Muggah Creek watershed. Relevant information from assessments directly related to the

PEV site are discussed in order to help understand the impacts expected here, including Blast Furnace Cove.

5.2.1 Sysco Pier Environmental Baseline Study

PEV commissioned a Baseline Environmental Assessment (CBCL Limited, 2002) as part of its due diligence study for a proposed bulk transshipment facility at the former Sysco No.3 and No.4 docks. The assessment focused on the existing environmental conditions at that time. The key findings of the Baseline Environmental Assessment relevant to the current EA relate to the soils/groundwater and marine sediment and are summarized here.

- A drilling and test pit program identified Slag Fill, Sandy Fill, Marine Sediments and Glacial Till as the stratigraphic units at the site.
- The water table occurred within the Slag. Groundwater was noted to generally flow outward from the site towards Muggah Creek to the south, the South Arm of Sydney Harbour to the west and the site lagoon [Blast Furnace Cove] to the north. The high permeability of the slag suggests that there is some reversal of groundwater flow (from shoreward to inland) along the shoreline of the site at high tide, and relatively rapid drainage of groundwater towards the shoreline during falling tide.
- The slag was noted to contain some metals in excess of CCME industrial criteria while metals in groundwater were relatively low (chromium and arsenic marginally exceeded the criteria). Groundwater pH levels were typically above the Marine Life criteria due to the alkaline nature of the slag.
- A sample of black slag from MW7 showed the occurrence of PAHs, but at concentrations that were well below CCME Industrial criteria. The groundwater here also contained elevated levels of PAHs, possibly associated with the black slag.
- Low level BTEX and TPH concentrations were detected in the Slag at several locations, but at concentrations that were well below Tier I criteria. Low level dissolved phase BTEX and TPH concentrations (i.e. well below Tier I criteria) were detected in several groundwater samples.
- Marine sediments that were described as “tarry” were encountered under the Slag unit at MW4B and MW9B at the south of the study area. These sediments were noted to contain excessive PAH concentrations. Any groundwater migration from this area is expected to migrate to Muggah Creek by a relatively direct route.
- A sandy layer containing creosoted wood debris was encountered under the Slag Fill unit at MW10 and was noted to contain elevated PAHs, consistent with creosote composition. Groundwater at this location was also noted to contain elevated PAHs, including naphthalene concentrations in excess of CCME Marine Aquatic criteria. It is expected that groundwater at this location would migrate to the lagoon [Blast Furnace Cove] by a relatively direct route.
- Marine sediment samples collected from the area of the docks (2 samples) and the lagoon [Blast Furnace Cove] (3 samples) indicated the following:
    - Concentrations of arsenic, cadmium, chromium, copper, lead, mercury, and zinc exceed CCME Sediment Quality Guidelines for sediments from both the pier and lagoon.

- Concentrations of PAH compounds for the two sediment samples from the docks area exceed CCME Sediment Quality Guidelines. Total petroleum hydrocarbons in all the marine samples were elevated.

5.2.2 Sysco and Nova Scotia Lands ESAs

With the shutdown of the Sysco steel production operations in 2000 an environmental assessment process was started to identify potential environmental liabilities at the site. As a result of these studies an understanding of site conditions was achieved that led to various demolition, cleanup, remediation and redevelopment work. The Sysco site is very large; ESA information that applies to the PEV site and nearby areas is reviewed here.

5.2.2.1 Phase I ESA

SEACOR (2002) completed the Phase I ESA of the former Sysco Lands. The site was assessed in 36 Site Classification Units (SCUs) based on historical land use and industrial processes. The three SCUs most relevant to the current EA are discussed here, as presented in the Phase I ESA.

SCU29 – Nos. 3 and 4 Piers Area.

This SCU includes much of the current PEV site and is described as infilled lands created in the 1960s and 70s to allow for construction of new marginal piers. Blast furnace slag was used as the primary fill material and it is possible that fill materials were placed on top of contaminated Muggah Creek sediments. Typical contaminant concerns related to the nature of the industrial activity and proximity to Muggah Creek were noted.

Subsequent to the Phase I ESA, SCU29 was subject to demolition and cleanup activity. The Transfer Building and North Crane were demolished in August 2002 and surface debris removal was carried out over much of the area at that time.

SCU21 – Blast Furnace Cove

Blast Furnace Cove is described as a remnant feature of historic infilling; As infilling of Muggah Creek progressed northward through the latter half of the 20th century, a gap was left between the infilled lands and the blast furnace area in order to accommodate sewer outfalls located in the area. Thus, Blast Furnace Cove was created from a portion of Muggah Creek. The Phase I ESA notes the construction of a materials transfer conveyor across the mouth of the cove in 1966 and the disposal of demolition waste (possible hazardous materials) near the shore of the cove in 1998. In addition to the potential for buried hazardous waste noted, potential environmental issues associated with Blast Furnace Cove are limited to contaminated sediment as a result of being, for nearly 100 years, the receiving water for heavy industrial effluent. Potential contaminants include heavy metals, PAHs, petroleum and PCBs.

SCU19 – Blast Furnace Area

SCU19 is adjacent to Blast Furnace Cove, on the north side. Site activity dates to the very early history of the steel plant. Because of the nature and level of activity there was much surface and buried infrastructure and a high potential for environmental issues due to leaks, spills and emissions. These include heavy metal and PAH impacts to soils and groundwater, as well as residual acid drainage effects. Process sewers may have resulted in petroleum hydrocarbon, heavy metal, solvent, PAH and PCB impacts to soil, groundwater and Blast Furnace Cove. Creosoted railway ties, hazardous building materials and stored chemicals also represent potential environmental issues.

Much of the site infrastructure was removed in 1988. Subsequent to the Phase I ESA further demolition and cleanup was completed including buildings, tanks and the remaining 2 blast furnaces.

5.2.2.2 Phase II ESA – Blast Furnace Area

This study (Amec, 2006a) included SCUs 17, 19 and 31, which are to the north and east of Blast Furnace Cove, and looked at a number of target areas related to the primary activites here from the early to late 1900s. It involved the assessment of subsurface soils and groundwater based on borehole drilling, test pitting and monitoring well installation. The key findings are as follows:

- The generalized stratigraphy across the site was observed to consist of fill soils, comprised mainly of a mix of sand and steel-making by-products (predominantly slag with some flue dust, mill scale and iron ore) overlying native sand and silty sand/till soils, all underlain by bedrock of the Canso Group.
- Visible hydrocarbons and/or free product accumulations in soil and groundwater were observed at 8 areas across the study site.
- Petroleum hydrocarbon and PAH contamination in soils and groundwater was found consistent with the 8 areas of visible hydrocarbons and free product as well as several areas where no visible hydrocarbons or free product was encountered.
- Metals exceedences of CCME commercial/industrial soil guidelines were encountered in the granular fill soils across SCU19. However, the metals of concern were characterized as immobilized in the fill soils.
- Dioxin and Furan contamination in surface soil and groundwater was identified at all sample locations investigated in SCU17 and SCU 19, above applicable guidelines.
- Only limited issues related to VOCs, SVOCs were identified and no issues related to PCBs, acid generation and asbestos were identified. Possible coal tar was found in one location but BTEX/TPH concentrations were below applicable guidelines.

5.2.2.3 Phase III ESA – Blast Furnace Area

This study (Amec, 2006b) was done to further investigate ten areas of contamination identified in the Phase II ESA for the site. A program of borehole drilling, test pitting and monitoring well installation was done; data collection included soil and groundwater sampling, groundwater elevations and free-product observations. The contamination at the ten target areas was generally grouped into four separate categories as follows:

- Shallow contamination with no free-product
- Shallow contamination with free-product
- Deep contamination with no free-product
- Deep contamination with free-product

The study used this information to evaluate feasible remedial technologies and preliminary cost information. The report notes that most target areas were able to be completely assessed. One exception, relevant to the current EA for the PEV dredging project, is that for target area 5 in SCU19 it is possible that contamination extends beyond the boundary, passed the Blast Furnace Cove shoreline. Target area 5 contamination was in the deep contamination with no free-product category, with the contamination suspected to be in the marine sediments prior to historic infilling, and possibly coal tar or Bunker 'C' fuel oil.

5.2.3 Previous Assessment Summary

The early environmental assessments at/near the PEV site indicate a persistent presence of hydrocarbon contamination, likely linked to marine sediments contaminated prior to infilling. Metal exceedances are mainly noted in the slag fill but the metals are not mobile. Blast Furnace Cove was not fully assessed but is most likely significantly impacted by the nearby historic industrial operations.

5.3 Description of the Biophysical Environment

The biophysical environment consists of the air and aquatic conditions. The aquatic environment is made up of the marine life and benthic habitat. The biophysical environment is described here.

5.3.1 Bathymetry

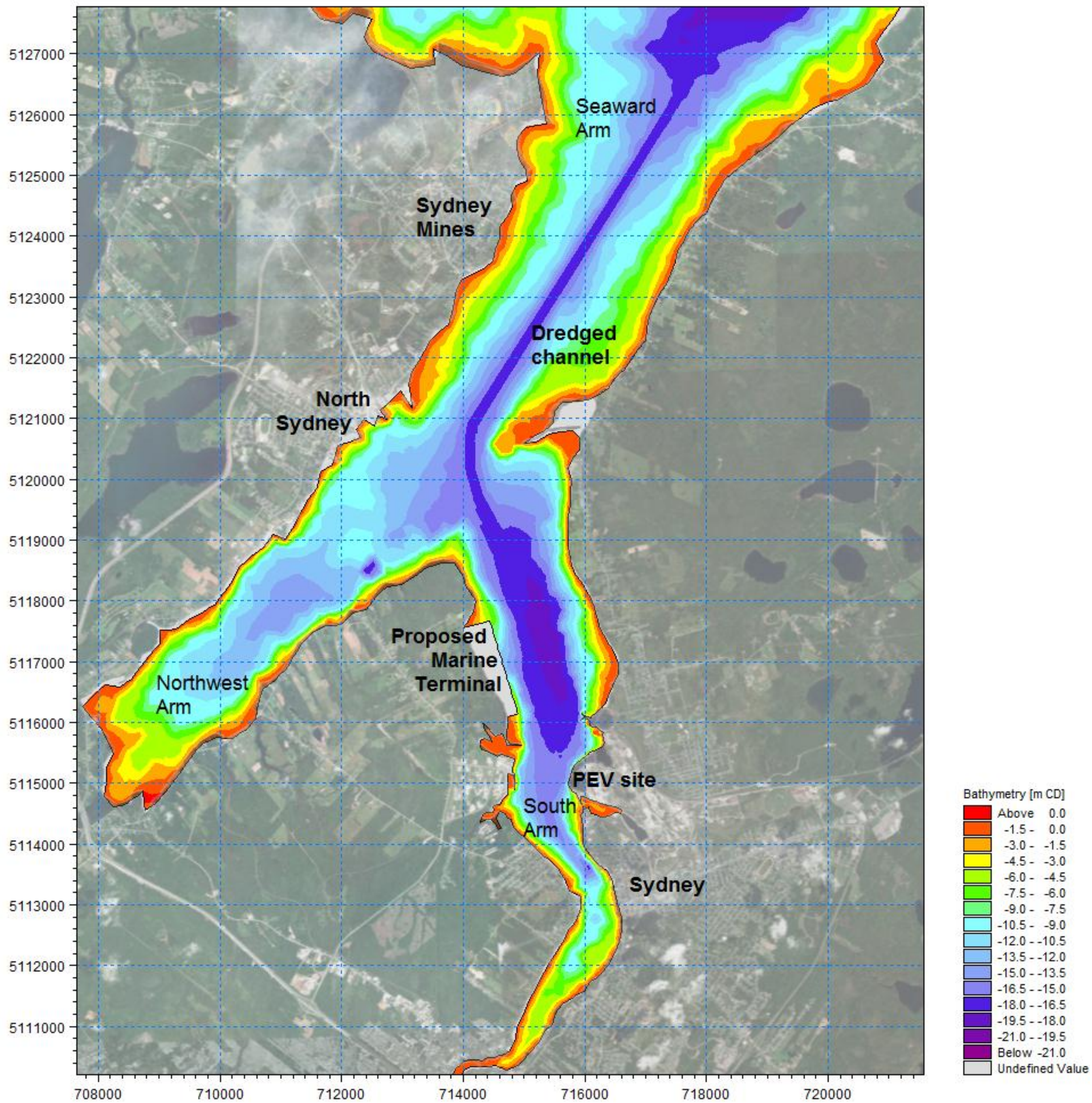
The bathymetry map shown on Figure 10 is based on navigation chart # 4266 from the Canadian Hydrographic Service (CHS), complemented by 2008 data from a high-resolution bathymetric survey of the proposed dredge channel area. It includes adjustment for the Sydney Harbour Dredging project, completed in January 2012. The sill across the Seaward Arm of the harbour has minimum depths in the order of -12 m Chart Datum (CD), which was dredged to -16.5 m CD. The channel deepens again into the South Arm, with depths up to -18 m CD off the proposed container terminal wharf. Although this depth continues beyond this area, it decreases in front of the PEV wharf to -14 m to -12 m CD.

5.3.2 Ambient Air Quality

As indicated in the Access Channel Deepening EA, the air quality on mainland Nova Scotia is generally very good, and air quality in the Project area generally falls within the desirable objectives and well within provincial limits.

Both the provincial, Nova Scotia Environment (NSE), and the federal government, Environment Canada (EC), operate a network of ambient air monitoring stations within the province to measure ambient concentrations of various air contaminants. The closest air quality station to the Project location is in the city of Sydney at 71 Welton Street. This ambient monitoring site is located approximately 5 km from the Project site and is designed to measure ambient concentrations of sulphur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), ozone, (O3), and particulate matter less than 2.5 microns in diameter (PM2.5).

Figure 10　　Sydney Harbour Bathymetry.



5.3.3 Marine Environment

Seals are the most frequent occurring marine mammal in Sydney Harbour. The occasional cetacean (whale, dolphin, and porpoise) sighting is noted by Environment Canada, but the species were not identified. The Pleasant Bay Whale Interpretative Centre notes observations of the following species: blue whale, fin whale, humpback whale, minke whale, pilot whale, sei whale, Atlantic white-sided dolphin, white-beaked dolphin, and harbour porpoise. Pilot, minke and fin whales are the most commonly observed species off western Cape Breton and similarly, the most likely commonly occurring species off Sydney Harbour due to the presence of similar prey items and habitats. The occurrence of these species within a confined harbour is likely from chasing in schools of prey fish (*i.e.*, herring, mackerel, etc.).

The Sydney Harbour and South Arm are part of migration routes for Atlantic salmon, trout, mackerel and eel. Commercial and Mi'kmaq fisheries are described in Section 5.6.4.

5.3.4 Benthic/Sediment Quality

The proposed dredge area recently underwent sediment sampling and the dredge area and Blast Furnace Cove underwent benthic habitat characterization in support of the proposed PEV Project. The condition of the site within the context of this recent work and other known site information is discussed here.

Geochemistry

It is known that the proposed dredge area is overlaid by soft sediments of about 0.5 m thickness with an underlying marine silt/clay. The sediments are expected to show some residual impact from the Muggah Creek estuary discharge, a historical receiver of industrial and municipal effluents for many years.

Sediment samples were previously collected for the Access Channel Deepening EA. One sample, identified as Site 14, was in close proximity to the proposed PEV Wharf Approach Deepening Project. The samples were compared to the CCME Marine Sediment Guidelines and the CCME Soil Quality Guidelines for Industrial Use. Arsenic was the only parameter to exceed the CCME Soil Quality Guidelines for Industrial Use (13 mg/kg versus the guideline value of 12 mg/kg). Several other metals (Chromium, Copper and Lead) exceeded the CCME Marine Sediment Guidelines, as did 13 of 18 PAH compounds. PCBs were non-detect in the sample from Site 14.

A geotechnical and environmental sampling program was conducted in November 2011 to support the proposed dredging project. Eighteen (18) drill holes were placed in the dredge area as shown in Appendix D. Two sediment layers were identified corresponding to the soft sediments and underlying marine silt/clay indicated above. Native soils (gravel/sand, glacial till and bedrock) were encountered below the sediments in several drill holes. One drill hole adjacent to the wharf did not encounter the sediments; it showed a coal fill and glacial till only.

The top sediment layer consisted of a black SILT and CLAY. The black sediment layer thickness ranged from 0.10 m to 1.14 m, with an average thickness 0.43 m. This material contained some to trace fine sand and traces of gravel (often coal), and had a very soft (S1) consistency, a coal tar odour, and an oily sheen. The underlying sediment layer was a greenish grey SILT and CLAY. In 12 of the 17 holes where it was identified it extended to the maximum depth drilled and was typically more than 1.5 m thick; otherwise, thickness ranged from 0.06 m to 2.66 m where there was native material encountered beneath this layer. The greenish grey SILT and CLAY contained trace fine sand and was characterized by a very soft (S1) consistency. The colour ranged from brownish grey to greenish grey.

Where drill holes were advanced deep enough, the SILT and CLAY sediment was overlying a layer of SAND and GRAVEL and/or a layer of glacial till, overlying sandstone and siltstone bedrock. The SAND and GRAVEL layer, likely alluvial in origin, was encountered at an elevation of approximately -18.46 m and extended to the maximum drilled depth. This material was characterized by a grey colour, rounded to subangular particles, and a very loose to loose relative density. Glacial till was encountered at three boreholes located near the edge of Pier No.4 at elevations ranging from -14.70 m to -16.50 m and extended to the maximum drilled depth. The glacial till at these locations consisted primarily of gravel, but contained a wide range of particle sizes. It was characterized by some cobbles, some sand to sandy, some silt to silty and a greyish pink to greyish brown colour. The relative density of the glacial till encountered was very loose to compact.

New samples were collected from 17 locations during the November 2011 geotechnical and environmental program. The analytical results are included in Appendix E. Three (3) locations were previously sampled in October 2011 and are included in the current assessment. The assessment therefore includes twenty-four (24) samples from 20 locations within the proposed dredging footprint. The top sediment layer exceeded the CCME Soil Quality Guidelines for Industrial Use for Arsenic (all 20 samples), Copper (3 of 20 samples) and Lead (2 of 20 samples). The CCME Marine Sediment Guidelines had exceedances for Arsenic (all samples), Cadmium (8 samples), Copper (all samples), Lead (all samples), Mercury (19 samples) and Zinc (19 samples). Most PAHs exceeded one or both of the CCME Marine Sediment Guidelines and the CCME Soil Quality Guidelines for Industrial Use. Total PCBs were above the CCME Marine Sediment Guidelines but below the CCME Soil Quality Guidelines for Industrial Use. The four underlying sediment samples had far fewer exceedances of metals and PAHs for the CCME Marine Sediment Guidelines only. Only one parameter (benzene) in one of the four samples had an exceedance of the CCME Soil Quality Guidelines for Industrial Use.

Benthic Habitat

Other work conducted in support of the Access Channel Deepening EA included a benthic fish habitat video survey. The coverage of the survey did not include any transects in the PEV proposed dredging area. The closest survey area consisted of three transects in front of Blast Furnace Cove, east of the proposed dredge area. Two transects were entirely silty sand and the third was cobble with silt deposition transitioning to silty sand. Only limited flora was observed, primarily rockweed and the only fauna noted was northern ceranthids and rock crabs. These transects were described as exhibiting very little plant growth and few benthic fauna species.

The proposed dredge footprint and Blast Furnace Cove were included in a new benthic habitat characterization, completed in December 2011. Video benthic surveys were contracted by CBCL Limited (CBCL) to be completed in the main dredge area of the Wharf Approach and in Blast Furnace Cove to characterize the benthic environment in each area**.** Stantec completed the review of the video survey results. A total of 14 video transects were completed to assess the benthic habitat in the Project area.

The benthic environment within the main dredge area was found to be homogenous and can be characterized as a sandy-silt substrate supporting sparse macrofauna and macroflora (Appendix F

Photo 1, Figure 1). The occasional solitary hard surface offered by either debris or rock punctuated the barrenness with small clusters of improved diversity. The near shore area offered the greatest abundance of hard substrate material.

The benthic environment in the dredge area supported sparse cover from macroflora. Red and brown (including *Laminaria sp.* and *Fucus sp.*) algae were observed intermittently along most transects when a rock or hard debris were present on top of the silty-sand substrate. However, the cover provided by the algae was typically less than 1% within a five minute assessment window of a transect. Green algae were observed very rarely in the benthic surveys, and also supported less than 1% cover within an assessment window when present. All algae types were more commonly observed in the near shore area than in the deeper waters of the dredge area.

The macrofaunal community observed in the benthic environment included two anemone species, the Northern cerianthid (*Cerianthus borealis*) and the frilled anemone (*Metridium senile*). Northern cerianthid were observed more frequently, but their distribution was considered occasional throughout most of the transects. In a few areas they became common. The frilled anemones were typically uncommon, usually appearing as a single entity on a solitary rock or piece of debris. A colony of frilled anemones (*e.g.*, Appendix F Photo 2, Figure 1) was observed only a few times within the entire video survey area and was associated with hard debris when present.

The sandy-silt substrate of the main dredge area also supported infrequent observations of starfish, crab, slime worms (*Myxicola infundibulum*) and sand dollars (*Echinarachnius parma*). The starfish are anticipated to be Northern (common) sea star (*Asterias vulgaris*), while the crab are likely rock crab (*Cancer irroratus*). These invertebrates were considered uncommon throughout the survey area. A variety of fish species were also observed in the dredge area although their distribution was considered uncommon. A list of potential fish species was compiled based on the fish observed in the available video for the dredge area.

Pelagic species

- Atlantic silverside (*Menidia menidia*)
- Rock gunnel (*Pholis gunnelis*)
- Cunner (sea perch) (*Tautogolabrus adspersus*)
- Hake sp. (*Urophycis* sp.)

Bottom-dwelling species

- Flatfish sp. (*e.g.*, flounder)
- Non-flatfish species (*e.g.*, potentially sculpin)

There are two differing types of benthic environments within Blast Furnace Cove: the nearshore environment and the central Cove environment. The nearshore environment encompasses a rocky embankment that extends approximately 20 - 25 m into the Cove around its full perimeter. The remainder of Blast Furnace Cove is referred to as the central Cove area, which dominates the benthic environment.

The nearshore environment is characterized by a shoreline embankment comprised of gravel, cobble and rocky debris which is sometimes silt-covered and sometimes clear. It is anticipated that the rocky shoreline is the result of anthropogenic activities (i.e., slag infill) in Blast Furnace Cove. When the hard, rocky substrate is clear of silt-cover, it supports moderate macroflora diversity. Red, green and brown (including *Laminaria sp.* and *Fucus sp.*) algae were observed in the shallow waters of the shoreline, covering up to 100% of the substrate in some areas. However, the macrofauna community remained sparse with few or no organisms being observed within the nearshore area of each transect. Snails were observed occasionally (likely periwinkle, *Littorina sp.*). Frilled anemones were also present, but uncommon. Calcareous sponges were observed in some areas of the rocky near shore environment, but were uncommon.

Within the central Cove area, the substrate is predominantly sandy with a few areas of sufficient silt cover along each transect to bury the weighted transect line. Macrofauna and macroflora were sparse at the time of the survey. Red, green and brown (*Laminaria sp.* and *Fucus sp.*) algae were observed on the intermittent rock and debris pieces found on the sand. Combined, the three algae groups could provide up to 100% cover on an individual rock but within a two minute assessment window of the video, algae cover would represent less than 1% overall cover.

Empty shells (*i.e.*, shell hash) were observed intermittently throughout the central Cove area, as were shrimp and snails (likely periwinkle). Shrimp were not able to be identified to species level using the available video. The abundance of shrimp increased to common along T-12 and snails became abundant along T-14. At the southern end of the Cove, in the vicinity of the storm sewer discharge (*i.e.*, T-11-A, Figure 1), dense clusters of bivalves were observed. The bivalves were primarily clams, but included some mussels as well. Murky water conditions during the T-11 transect survey prevented species-level identification of the bivalves. A small number of jellyfish, or potentially sea gooseberries (*Pleurobrachia pileus*), were observed along the southern half of transect T-11. A single crab was observed in each of transects T-10, T-12, T-13 and T-14. Frilled anemone and Northern cerianthid were present but uncommon. Bottom-dwelling flat fish were observed occasionally along transect T-10, the outermost transect in the Blast Furnace Cove surveys. Barnacles (*Balanus balanoides*) were also observed on some hard surfaces in T-10 and T-11.

A detailed discussion of the survey methods and results is included in Appendix F.

5.4 Terrestrial Environment

The proposed work occurs almost entirely in the marine environment. The potentially affected terrestrial area is confined to the PEV industrial site. There is no significant vegetation or wildlife habitat surrounding the Blast Furnace Cove here, although fox have been observed near the entrance to the property at the west. Fox may wander onto the site from nearby green space between the industrial property and the nearby community of Whitney Pier. The local area is highly developed and no wetlands are identified near the site according to the Provincial wetland atlas mapping.

The Access Channel Deepening EA indicated that the South Bar peninsula (located within 5 km of the proposed site, to the south) supports habitat for migratory birds and species of concern. This area is also an important birding area in the province.

There is no local groundwater use. Groundwater generally flows through the slag fills into the nearest water body which includes Muggah Creek to the south of the PEV site, Sydney Harbour to the west and Blast Furnace Cove at the north (CBCL, 2002). Groundwater flow from the former Sysco land to the north of Blast Furnace Cove also flows into the nearest water body, including the cove itself (AMEC, 2006a). Infilling of Blast Furnace Cove will divert the flows into it towards and into Sydney Harbour with no net change in the discharge.

No fresh surface waters are located on or near the Project or infill site, and therefore there are no potential interactions between the Project and such resources.

5.5 Species at Risk or of Conservation Concern

An Atlantic Canada Conservation Data Centre (ACCDC) search and rare species modelling was completed for the Access Channel Deepening EA Project near the PEV site. As indicated in the Access Channel Dredge EA (Section 4.9.3), there were a total of 135 Red or Yellow NSDNR listed plant species recorded within 100 km of the project's area with 34 Red or Yellow listed species potentially present at the project site (including the Blast Furnace Cove area included in the Access Channel Dredge EA) based on rare species modelling. There were no plant species listed under the federal *Species at Risk Act* (SARA) or under the Nova Scotia *Endangered Species Act*.

In Section 4.9.4 of the Access Channel Deepening EA, results of the ACCDC search identified a total of 14 Red or Yellow-listed avian species which have been recorded within 100 km of the project. Based on the rare species modelling four rare bird species were identified as potentially being present in the project area including; Northern Goshawk (*Accipiter gentilis*), Short-eared Owl (*Asio flammeus*), Vesper Sparrow (*Pooecetes gramineus*), and Bobolink (*Dolichonyx ryzivorus*). Surveys conducted for the Access Channel Deepening Project in June 2007 revealed the presence of four Yellow listed bird species including Common Loon (*Gavia immer*), Common Tern (*Sterna hirundo*), Northern Goshawk and Boreal Chickadee (*Poecile hudsonica*).

The rare wildlife model and field surveys conducted for the Access Channel Deepening Project did not identify any rare or sensitive mammal or herpetile species that could potentially be on the Sydport site.

Benthic surveys undertaken for the PEV Wharf Approach Deepening Project did not identify any marine species at risk within the Project Area; however, there are several marine wildlife species of conservation concern that may be present in Sydney Harbour. Table 6 lists the species identified in the Access Channel Deepening EA that have potential to occur in Sydney Harbour.

Table 6 Marine Wildlife Species at Risk or of Conservation Concern

Species	Federal Status		Provincial Status
	COSEWIC	SARA	
Birds			
Harlequin Duck	-	Special Concern (Schedule 1)	-
Piping Plover	-	Special Concern (Schedule 1)	Red
Red Knot	Endangered	-	Yellow
Purple Sandpiper	-	-	Yellow
Common Tern	-	-	Yellow
Marine Mammals			
Harbour porpoise (Northwest Atlantic population)	-	Threatened (Schedule 2)	-
Fish			
American eel	Special Concern		-
Atlantic wolffish	Special Concern	Special Concern (Schedule 1)	-
Source: Jacques Whitford 2009.			

The Harlequin Duck may winter in Sydney Bight; however, Sydney Harbour does not provide critical habitat for the Harlequin Duck and there are no anticipated interactions between this species and Project activities.

According to historical data (Jacques Whitford 2009), the Piping Plover, Red Knot and Purple Sandpiper are only rare visitors to Sydney Harbour. Therefore, there are no anticipated interactions between these species and the Project.

Common Terns are known to breed in the South Bar area of Sydney Harbour (Schaefer 2004). South Bar is located well north of the proposed Project site in the South Arm and therefore dredging and construction activities are not expected to have any interactions with Tern colonies on South Bar. Common terns fly slowly over water, diving to catch fish or other aquatic prey in shallower waters. CDF construction and infilling in Blast Furnace Cove may permanently reduce a small area of the available feeding grounds for Common Terns; however, this loss of habitat will be minor relative to the remaining feedings grounds available in Sydney Harbour, and will not have a significant effect on tern populations.

Harbour porpoises are likely the most common cetacean in Sydney Harbour and its approaches, given their preference for shallow waters, and can be expected during the late spring, summer and early fall months. Harbour porpoise presence and density would likely be related to schooling fish prey species in the general region. This species is fast-swimming and agile, and can effectively modify their behaviour (*i.e.*, swim away, dive) to avoid approaching vessels. There are very few documented cases of vessel strikes to any species of seal or small toothed whale (Richardson et al. 1995). In addition, the noise produced by the dredge vessel will likely cause marine mammals and marine-related birds to avoid the dredging area altogether. Given the context of the Project (*i.e.*, a highly developed inner Harbour area) and the lack of critical or important habitat for any species of marine-related mammals or birds, the likelihood of mortality for marine mammals and marine-related birds due to vessel strikes is extremely low.

Given that harbour porpoises are most sensitive to mid-frequency sounds (> 1 kHz), much of the acoustic energy produced by dredging and vessel transportation will not be audible to these marine mammals. Based on the Southall *et al.* (2007) exposure criteria, neither dredging nor vessels will produce sounds intense enough to induce negative effects in any marine mammals.

There is little potential for SARA listed fish species to be present in the dredge area. There is some potential for Atlantic wolffish to be present in Sydney Harbour, although anecdotal evidence from local fishers suggests that the Atlantic wolffish has not been spotted in Sydney Harbour in recent years (Jacques Whitford 2009). Atlantic wolffish is typically found in coastal areas of Nova Scotia, although their distribution is patchy and not abundant. Moreover, adult wolffish prefer hard bottom substrates with boulders/ledges to hide under; this habitat is sparse in the dredge area. If wolffish were present, adult wolffish are strong swimmers and individuals would likely be able to avoid the dredge. Wolffish spawning takes place in deeper water and the entire pelagic larval stage is spent near the spawning area (Bigelow and Schroeder 1953, in DFO 2000). As young wolffish are rarely found in shallow waters, it is thought that they remain in deeper waters (>30 m) until sexual maturity (>50 cm), as such, wolffish eggs, larvae and juvenile are not likely to be found within the proposed dredge or infill area.

American eels are a catadromous species (live in freshwater, spawn in saltwater) and as such can be found in lakes, streams, rivers, and estuaries). Currently there is one individual commercially fishing eels in the upper reaches of Sydney Harbour (Barachois Creek area), but Project activities will not interact with that area.

5.6 Description of Socio-Economic and Cultural Environment

The project site is located in Sydney Harbour in the CBRM. The local area is highly influenced by the former steel-making and coal mining activities that dominated the regional economy throughout the 20^{th} century. Although these industries no longer exist, they created an industrial setting that is still apparent today.

5.6.1 Land Use

The regional setting is highly developed. Land use immediately adjacent to the marine setting is heavy industrial and is the site of the former steel plant shipping and receiving facility. It is currently used by PEV for bulk materials transhipment. Other nearby land use is industrial/commercial while further east (Whitney Pier) is institutional, commercial, recreational and residential land use. South of the site (the north end Sydney) is a mix of commercial and residential land use, while the area to the north (South Bar) is rural residential. To the west, across the harbour, are industrial (Sydport) and residential (Point Edward/Westmount) lands. Much of these local features are shown in Figure 9, with distances to potential receptors shown using the CDF as the reference point.

5.6.2 Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq

A Mi'kmaq Ecological Knowledge Study (MEKS) was conducted by Membertou Geomatics Consultants (MGC) in 2008 to identify Mi'kmaq lands and resources potentially affected by the Access Channel Deepening Project. The MEKS Study Area encompassed a 10 kilometer radius around the Access Channel Deepening Project footprint (i.e., extending to Malcolms Brook to the south, to Cabot Strait to the north, to the western point of Long Island, and to the eastern point of First Dodd Lake area). The dredging and infilling areas associated with the currently proposed PEV Wharf Approach Deepening Project are located within the boundaries of the previous Access Channel Deepening MEKS Study Area.

Based on the MEKS data documentation and analysis, MGC concluded that "the Mi'kmaq have historically undertaken traditional use activities in the study area, and that this practice continues to occur today. These activities involve the harvesting of fish species, plants and animals; all of which occurs in varying locations throughout the study area and at varying times of the year. The most prevalent traditional use activity that the study identified to be occurring is that of fishing, although hunting and plant gathering also occur in a prevalent manner as well. The fishing activity occurs primarily in the Sydney Harbour area of the Northwest Arm and South Bar, North Sydney, and Blackett's Lake streams and waterways. Hunting and plant gathering occur primarily in the areas adjacent to the Membertou [First Nation] community, and in the Caribou Marsh area and the Mira Road area as well" (MGC 2008). Additional information regarding the Mi'kmaq fishery is provided in Section 5.6.4.

5.6.3 Socio-economic Setting

In the early to mid-1900's steelmaking drove the local economy. This industry led to moderate prosperity and helped build and sustain the city of Sydney. The decline of this industry began in the mid 1960's and ended with the cessation of steelmaking in 2000. The decline of steelmaking encouraged a broadening of the economic base with an emphasis on tourism, service industries and technology.

Today the local area (Sydney and surrounding area) is known as the Cape Breton Regional Municipality (CBRM). The CBRM was created in 1995 through the amalgamation of incorporated and unincorporated areas of Cape Breton County including the largest population centers in Sydney. It covers an area of 2,473 km^2 and has approximately 835 km of coastline on the Atlantic Ocean. It is the second largest municipality, in terms of land area, in Atlantic Canada.

There is a total work force of approximately 44,000 in the CBRM (Statistics Canada 2006). Of these, approximately 1,700 are experienced in sciences and 7,400 in trades, transport and equipment operations. The area is still affected by the loss of the two largest industries on the Island: the coal industry and the steel industry. Employment rates are lower in CBRM and Cape Breton County when compared to provincial rates (Statistics Canada 2006). However, the available experienced labour is substantial in the CBRM and Cape Breton in general.

The CBRM has a much lower percentage of individuals involved in resource based industries than the other more rural Cape Breton Island counties. In comparison to Nova Scotia as a whole, the CBRM has a greater percentage of individuals involved in health; social science; education and government; sales and service; and trades, transport and equipment operators (Statistics Canada 2006). There is an ongoing effort to diversify the local economy through tourism, telecommunications, coal production, wind power and service-based industries. In addition, all three levels of government supported the financing of the Access Channel Deepening Project with a view to encouraging further commercialization of harbour assets and attracting private investment, both of which are represented by the PEV Wharf Approach Deepening Project.

5.6.4 Fisheries

Although there is no commercial fishing in the proposed dredge area, fishing activities that occur in other areas of Sydney Harbour are described in the Access Channel Deepening EA. The EA report indicates both recreational and commercial fisheries occur in the spring and summer months. Smelt fishing occurs from the end of October through the end of February. A spring commercial fishery exists for herring, gaspereau and mackerel in the area of Point Edward to South Bar, heading out toward the sea. Flat fish and flounder are also present but are fished recreationally only. There is also a busy herring fishery in the Northwest Arm toward North Sydney. Lobster season generally runs from early May through July. Due to PAH concentrations, the lobster fishery and rock crab are closed in both the South Arm and the North West Arm of the harbour. However, the fisheries exist beyond South Bar. There are no active aquaculture operations in the area.

Results of the MEKS revealed that fishing is the most prevalent ongoing Mi'kmaq traditional use activity in the area; both in Sydney Harbour and in other surrounding water bodies. The species currently fished include lobster, mackerel, clam, eel, mussels, oysters, scallops, bass, smelt, cod, gaspereau, flounder, catfish, perch, herring, and trout. Lobster and mackerel were identified as the most important species fished in Sydney Harbour, with 16 and 9 fishing areas identified, respectively. The majority of the lobster fishing sites are located in the Cabot Strait region, near Spanish Bay at the mouth of Sydney Harbour, while mackerel sites are located primarily at Muggah Creek, South Bar, and out in the Seaward Arm of the harbour. Trout, cod, and smelt were determined to be the most widely fished species, with 70, 21, and 21 fishing sites identified in the MEKS Study Area, respectively. The majority of fishing sites for these species were found to be near the North West Arm, North Sydney, Bras d'Or, and Blackett's Lake. The fish species identified in the MEKS are fished primarily for food, with trout and salmon being a common food source for the Mi'kmaq.

CHAPTER 6 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

This EA report considers environmental effects potentially associated with Project-environment interactions, with a focus on those potentially affecting the VECs identified in Section 4.2 (*i.e.*, Marine Environment and Commercial Fisheries).

Some of the potential interactions between the Project and the environment may be beneficial or neutral, while others will require application of certain mitigation measures or best management practices (BMPs) to reduce or eliminate potential adverse environmental effects.

The severity of potential environmental effects is evaluated based on the significance of the residual effects (*i.e.*, any adverse environmental effects that may remain after the application of BMPs and mitigation measures as specified in this EA report). Table 7 summarizes general criteria that have been applied for evaluating the significance of residual environmental effects in this EA; these criteria were developed by Transport Canada and included as part of the Environmental Screening Report template appended to the Proponents' Guide for Environmental Assessment (2010). These criteria are also considered suitable for the provincial EA requirements.

A range of potential significance criteria/ratings may be applicable in some cases (*i.e.*, Tables 8 and 9 in Sections 6.1.1.4 and 6.1.2.4, respectively) where the severity of potential adverse effects can vary considerably (*e.g.*, small spills/fires that would not cause significant effects but are relatively more likely to occur versus very large spills/fires that could cause significant effects but are highly unlikely to occur).

6.1 Environmental Effects on Biophysical Components

6.1.1 Marine Environment

Marine Environment has been selected as a VEC due to the potential for Project activities (i.e., dredging and disposal) to adversely affect aquatic resources at and in the vicinity of the Project site. For the purposes of this assessment marine environment includes: benthic habitat; marine wildlife and sediment quality.

Table 7 Transport Canada Significance Criteria Definitions

Criterion	Low	Moderate	High
Magnitude (of the effect)	• Effect is evident only at or nominally above baseline conditions.	• Effect exceeds baseline conditions however it is less than regulatory criteria or published guideline values.	• Effect exceeds regulatory criteria or published guideline values.
Geographic Extent (of the effect)	• Effect is limited to the project site/footprint.	• Effect extends into areas beyond the project site/footprint boundary.	• Effect is trans-boundary in nature.
Duration (of the effect)	• Effect is evident only during the construction phase of the project.	• Effect is evident during construction and/or the operational phase of the project.	• Effects will be evident beyond the operational life of the project.
Frequency (of conditions causing the effect)	• Conditions or phenomena causing the effect occur infrequently (e.g. < once per year).	• Conditions or phenomena causing the effect occur at regular intervals although infrequent intervals (e.g. < once per month).	• Conditions or phenomena causing the effect occur at regular and frequent intervals (e.g. > once per month).
Permanence (of effect)	• Effect is readily reversible over a short period of time (e.g. one growing season).	• Effect is not readily reversible during the life of the project.	• Effect is permanent.
Ecological Context (of effect)	• Evidence of environmental effects by human activities. Effect results in minimal disruption of ecological functions and relationships in the impacted area.	• Relatively pristine area. Effect results in some disruption of non-critical ecological functions and relationship in the impacted area.	• Pristine area / not affected by human activity. Effect results in disruption of critical ecological functions and relationship in the impacted area.

Sediment quality is a concern due to the existing industrial contaminants found in Sydney Harbour marine sediments and potential to mobilize and transport these contaminants, thereby affecting the quality of habitat. Sediment quality, referring to the chemical and physical properties of the sea bed substrate, is directly related to benthic habitat quality. The seafloor provides habitat for demersal fish species, benthic and sedentary invertebrates. Benthic invertebrates provide a food source for demersal and pelagic fish, marine mammals and birds. Changes in sediment quality can therefore result in changes to benthic communities, which in turn can affect higher trophic levels in the marine food web. As a result of these ecosystem connections, the assessment of the marine environment VEC will focus on benthic habitat and sediment quality which will be most directly affected by Project activities.

6.1.1.1 Residual Environmental Effects Evaluation Criteria:

A significant adverse environmental effect to Marine Environment is defined as an unmitigated, unauthorized, or uncompensated alteration to marine habitat, either physically, chemically or biologically, in quality or extent, to such a degree that there is a permanent decline in the species diversity of the habitat.

6.1.1.2 Description of Potential Effects:

During Project construction activities, dredging will result in temporary disturbance of the marine environment and direct mortality of benthic organisms in the footprint of the dredging and infilling areas. Dredging of the approach to the wharf will result in a temporary loss (alteration) of habitat while the infilling of Blast Furnace Cove will result in a permanent loss (destruction) of fish habitat.

Dredging can also result in re-suspension of contaminated sediment, potentially harming aquatic organisms or adjacent habitat. Results of the sediment sampling collected in November 2011 indicate that sediments within the Project area contain elevated levels of metals, PAHs and PCBs compared to the CCME Marine Sediment Guidelines (2002). Re-suspension of the contaminants back to the seafloor surface and re-distribution spatially could result in a change to surficial sediment quality in some instances and could increase the risk of contaminant-related effects on benthic animals, if the concentrations are high enough. As a result of these environmental effects to benthic habitat, the dredging process and infilling of the marine environment in the CDF will constitute a harmful alteration, disruption or destruction (HADD) under the *Fisheries Act* and therefore will require authorization by DFO.

The dispersion modeling completed by CBCL (see section 3.1.5 and Appendix C) showed increased TSS compared to background, particularly near the dredge area and CDF discharge. This was more pronounced for the TSHD and no settling (worst case) scenarios. The environmental clam with settling scenario did not exceed 10 mg/l above background for the average concentrations. The level of TSS decreased quickly with distance from the active area. The average TSS above background was mostly in the 10-20 mg/l range and did not impact the fishing area of Sydney Harbour. The maximum TSS concentrations were as high as 200-250 mg/l, but those levels were confined to the dredging and CDF discharge area; the model showed minimal dispersion into the fishing area, at 10-20 mg/l above background.

It was identified in the Access Channel Deepening EA (Section 6.2.3) that there are no anticipated adverse environmental effects on adult, juvenile or eggs and larvae of commercial or non-commercial species from Project-related noise from construction related vessel traffic. The process of dredging the navigational channel and infilling the CDF could result in direct mortality to marine fish, mainly sessile benthic species or any fish trapped in the CDF once the berm is constructed. Mobile pelagic and demersal fin-fishes will avoid dredging activities due to the associated noise and direct mortality will generally be avoided.

Similar to the Access Channel Deepening EA, environmental effects related to the interaction between Project activities with marine mammals and marine-related bird populations could result in direct mortality or injury from collisions, changes in habitat use resulting from increased underwater noise levels, and changes to habitat quality resulting from environmental effects to key food sources (i.e., marine fish and shellfish). Increased noise levels from construction activities could lead to a change in habitat use by marine mammals and marine-related birds in the area. Noise from construction activities may cause some marine mammals and birds to avoid the Project area. The Access Channel Deepening EA identified that underwater noise levels from dredging and from construction-related vessels will not affect the health or well-being of marine mammals in Sydney Harbour; however, they may result in a temporary change to habitat use by marine mammals, as most species would move away from the dredge to avoid the noise and potential for collision. This disruption will subside once construction is complete.

Dredging of the wharf approach in Sydney Harbour and infilling associated with the Blast Cove CDF could potentially have indirect adverse environmental effects on marine mammals and marine-related birds by reducing the availability or quality of their primary food sources through removal of benthic habitat and communities. Suspended sediments resulting from the disturbance of the seafloor may also have environmental effects on marine fish and shellfish. Most marine mammals and marine-related birds rely on marine fish and shellfish as an important component of their food sources. The Access Channel Deepening EA identified that the results of the environmental effects of dredging on benthic habitat communities and marine fish are not significant and therefore there were no anticipated long-term effects to the food sources of marine and marine-related birds in Sydney Harbour.

6.1.1.3 Description of Recommended Mitigation Measures:

DFO developed the Policy for the Management of Fish Habitat (DFO 1986), which applies to all projects and activities, in or near water that could harmfully alter, disrupt, or destroy (HADD) fish habitats by chemical, physical, or biological means. The guiding principle of this policy is to achieve no net loss of the productive capacity of fish habitats. Sections 34 to 37 of the federal *Fisheries Act* specifically administer those aspects dealing with fish habitat. The type and area of habitat to be created 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 to be employed and the assessed ecological value of existing habitat at the dredge and infill sites.

Although infilling of Blast Furnace Cove will result in a permanent loss of fish habitat, the effects of dredging on the benthic environment will be temporary. Benthic communities have been shown to recover from dredging disturbance (Dernie et al. 2003). The duration of this recovery period depends on site-specific conditions encountered at the dredge site with a conservative estimate in the order of five to ten years recovery (Newell 1998); however it could be as little as two to three years recovery. Geotechnical and oceanographic studies undertaken for the Access Channel Deepening EA indicated that the post-dredge seafloor will be very similar to the existing seafloor in terms of surficial grain size and type. This is also expected to be the case for the PEV Wharf Approach Deepening Project; that is, it is likely to recover to a state similar to its current characteristics and that benthic habitat will be re-established in a relatively short period of time.

DFO has indicated that habitat loss/alteration associated with dredging activities will require authorization under Section 35(2) of the *Fisheries Act*. Habitat compensation will be required to meet the approval of DFO and mitigate potential effects on fish habitat. The proponent team and DFO have had several discussions concerning compensation requirements and potentially suitable compensation projects for Sydney Harbour. Approved compensation planning for the PEV project will build on knowledge gained through planning and implementation of habitat compensation in Sydney Harbour for the Access Channel Deepening Project. This consisted of the placement of low profile rock reefs to improve habitat diversity and productivity in selected areas in the harbor. Habitat compensation will be set by DFO to promote “no net loss” in consideration of the relative productivity of the areas affected by the proposed dredge/infill (generally low productivity) and the anticipated productivity enhancement to be provided by the compensation methods (generally high for rock reefs with additional “credit” for rock associated with the CDF face). The compensation proposal may also include some research based enhancements to the newly established rock reefs such as juvenile lobster seeding. The compensation program will also include monitoring for several years to evaluate program success. Fish habitat compensation will be the primary method for mitigating adverse environmental effects from the PEV Project.

Dredging can result in suspended sediments and re-suspension of contaminated sediment. As noted above, the dispersion modeling showed a low-level of TSS increase above background in a small area of the inner harbor for the average conditions and higher, but localized, increase for the maximum concentrations which quickly decrease with distance from the dredging and CDF discharge area.

Mitigation measures, including application of best practices, will also be applied during dredging with either the suction dredge vessel or a clam bucket dredge in such a way that reduces the suspension and migration of sediment beyond the Project area.

The proposed dredging will be completed using an “environmental bucket” type dredger (i.e., a dredger equipped with a clamshell bucket that is designed to close securely with potential to form a watertight seal) wherever geotechnical conditions permit (generally soft sediments of the type found in the PEV wharf approach). Watertight clamshell buckets have been found to generate 30-70% less resuspension in the water column in comparison with open buckets (US Army Corps of Engineers 1987); resuspension rates from environmental bucket dredges typically run at one percent of the dredged volume or less when properly operated (NY/NJ Harbour Partnership 2003).

The Proponent acknowledges that use of an environmental bucket must be applied in an appropriate fashion in order to improve performance on environmental criteria as described above. In particular, it is important to slow down movement of the excavating device through water column (hoisting/lowering rate, swinging rate, water/bed impact) as well as to provide operator training and oversight on proper use of the bucket. Accordingly, the following BMPs (as provided by Environment Canada) will be implemented during bucket dredging:

- Retaining a properly trained dredge operator who will ensure that dredging activities are conducted in a manner that minimizes the re-suspension of sediments;
- Control of the dredge bucket on descent so that a large plume is not created by plunging the bucket into the sediments;
- Controlling ascent rates and pausing at the surface of the water to allow water to slowly drain from the bucket;
- Visual monitoring of the turbidity in the vicinity of the work and if turbidity outside the zone of influence (i.e., 500 m) changes excessively from the existing conditions of the surrounding water bodies (i.e., distinct change in water clarity), additional mitigation measures may be required (e.g., changes in timing according to tidal cycle);
- Aiming to achieve full bucket capacity to minimize potential for washing of sediment from the bucket;
- Ensuring the bucket is capable of sealing properly when closed;
- Locating the bucket directly above the watertight barge or scow, and as far down as possible before releasing the material;
- Ensuring the bucket is empty before continuing with the next dredge load;
- Not allowing leveling of the bottom to be carried out by dragging the bucket across the bottom;
- Modifying existing equipment, if necessary, to make it (more) fit for purpose, e.g., appropriate sealing of split hull barges to minimize loss of contaminated fines;
- If odours are an issue, reducing impacts on community by preventing uncontrolled release of gasses from hoppers or barges;
- Eliminating or reducing overflow from hoppers or barges reduces quantity of suspended sediment lost out of the hopper or barge;
- Not overfilling barges when loading by mechanical dredgers;
- Using spill plate/apron when mechanically offloading barges for transfer of sediment for near shore placement; and
- Using baffle plates or energy dissipators at discharge end of the hydraulic pipeline in order to reduce the discharge energy of the hydraulic flow into placement site.
- Increasing the flow length and/or ponding depth of the confined disposal facility increases retention time and can result in greater sedimentation efficiency

- Use additives/flocculants to improve settling characteristics of suspended fine grained material, if necessary based on groundwater monitoring results.
- Use floating oil booms (oil-absorbing fabrics) to help prevent the spread of sheens or floating debris if detected during dredging. Oily residues have been observed in Sydney Harbour sediments.
- Spray foam or other odour absorptive or preventive material onto the dredged material placed above the water line if odours become a problem.
- Any debris in a dredging area can disturb the dredging processes. Prepare flexible procedures to remove debris at site and arrange for appropriate disposal.
- Unexploded ordnance may be present in dredging area. Pickup of these materials by dredging might cause detonation. Safety regulations require procedures to handle these situations.

One of the most important environmental benefits to occur from use of the clam dredge technology compared with the TSHD is the greatly reduced amount of turbid water to be managed (and discharged) at the CDF. Use of the clam bucket will allow for no CDF discharge directly into the marine environment.

Monitoring

A Marine Monitoring Plan will be developed in consultation with DFO and Environment Canada. Basic elements to be addressed in the Plan include:

- Monitoring of water quality from the dredging activity – TSS will be tested during dredging to confirm sediment dispersion. General procedures will be similar to those described for the Access Channel Deepening EMP Appendix F.
- Monitoring of HADD compensation – A multi-year monitoring program of the HADD compensation sites/research undertakings will be developed in consultation with DFO.

It is not considered necessary to monitor any water discharges from the CDF as they will not be directed into the marine environment.

6.1.1.4 Residual Effects and Significance:

Provided that relevant regulatory requirements and proposed mitigative measures to control/reduce the re-suspension and/or displacement of sediments, prevent the release of deleterious substances into the marine environment, and offset habitat loss are followed, Project activities are not likely to result in significant residual adverse environmental effects on the marine environment within the Project area or vicinity. In particular there will be no marine discharges from the CDF, and a HADD compensation program will be developed in consultation with DFO and monitored to promote no net loss of the productive capacity of fish habitat. Table 8 presents a summary of the assessment of residual environmental effects for the Marine Environment VEC.

Table 8 Significance of Residual Environmental Effects – Marine Environment

Environmental Component(s)	Potential Adverse Environmental Effect(s)	Significance Criteria (of Residual Effect)						Overall Significance (of Residual Effect)
		Magnitude	Geographic Extent	Duration	Frequency	Permanence/ Reversibility	Ecological Context	
Marine Environment	Change in benthic habitat communities and sediment quality.	H	M	M	H	L-H	L	ME / NS
	Change in habitat use	M	M	M	H	L-H	L	ME / NS
	Mortality of benthic species, marine fish, marine mammals and marine-related birds	L	L	L	L	L	L	ME / NS

Potential significance ratings for each criterion (refer to Table 4 for definitions)

H: High

M: Moderate

L: Low

Potential overall significance ratings:

S: Significant Adverse Environmental Effect

ME: Minor Adverse Effect/Mitigation Effect

NS: Not Significant Adverse Environmental Effect

UN: Uncertain/Unknown Effect

6.1.2 Commercial Fisheries

Commercial Fisheries was selected as a VEC in consideration of the potential environmental effects of Project-related activities on nearby commercial fish species and the commercial fishing operations in Sydney Harbour. Although the Project area is a fishery closure area, the remainder of Sydney Harbour supports an active commercial fishery. Key fisheries identified in the Access Channel Harbour Deepening EA included all finfish and shellfish harvested commercially within Sydney Harbour, with a particular focus on lobster and rock crab, the two dominant fisheries in terms of landings and landed value. The Commercial Fisheries VEC is closely linked to the assessment of Project-related environmental effects of the Marine Environment VEC (Section 6.1.1).

6.1.2.1 Residual Environmental Effects Evaluation Criteria

A significant adverse environmental effect to the commercial fisheries is defined as an unmitigated or non-compensated net financial loss, outside the range of normal inter-annual variation in landings, to Commercial Fisheries as a result of Project activities.

6.1.2.2 Description of Potential Effects:

Concern was expressed by Sydney Harbour fishers during the Access Channel Deepening EA regarding adverse effects on the commercial fishery mainly due to changes in lobster and crab populations, loss of gear from increased vessel collisions, and loss of access to traditional fishing areas due to increased vessel traffic. A change in commercial fishery income could result from changes in the abundance of target species due to direct mortality, destruction of habitat, a long-term change in habitat use, or from the loss of gear or access to fishing grounds. The potential interactions between the PEV Wharf Deepening Project and environmental effects to Commercial Fisheries primarily includes, effects to fish habitat discussed in Section 6.1.1. These effects include alteration and destruction of fish habitat as well as changes to water quality from dredging and dewatering the CDF. Some minor direct mortality of benthic species can also be expected from dredging and infilling activities. It is possible that some of these effects could extend beyond the Project footprint to commercially fished populations and waters outside the fishery closure area thus potentially affecting catch rates.

As noted in Section 6.1.1 the risk associated with sediment dispersion in terms of TSS above background during dredging is largely confined to the dredging area. There will be no marine discharge from the CDF. For the maximum concentrations case the increase in TSS will be limited to the immediate area of dredging and confined to the fishery closure area.

Potential for loss of fishing gear or restricted access to fishing grounds will not be an issue given the Project activities occurring in the closure area.

6.1.2.3 Description of Recommended Mitigation Measures:

Residual environmental effects associated with fish habitat, including commercially fished species, resulting from the dredging of the wharf approach have been addressed in Section 6.1.1, Marine Environment, and were rated not significant after application of mitigation. Mitigative measures are proposed to control/reduce the re-suspension and/or displacement of sediments (e.g., prevent the release of deleterious substances into the marine environment, and offset habitat loss). In particular, a HADD compensation program will be developed in consultation with DFO and in conjunction with the rock reefs recently established through the Access Channel Deepening Project to promote no net loss of the productive capacity of fish habitat. These actions, confirmed through a monitoring program, will also reduce effects on commercial species in the harbour that may spend part of their life-cycle near the PEV project area.

6.1.2.4 Significance of Residual Effects:

Provided that the proposed mitigative measures to control/reduce the re-suspension and/or displacement of sediments, prevent the release of deleterious substances into the marine environment identified in the Section 6.1.1, and offset habitat loss are followed, Project activities are not likely to result in significant residual adverse environmental effects on the Commercial Fisheries within the Project area or vicinity. Table 9 presents a summary of the assessment of residual environmental effects for the Commercial Fisheries VEC.

Table 9 Significance of Residual Environmental Effects – Commercial Fisheries

Environmental Component(s)	Potential Adverse Environmental Effect(s)	Significance Criteria (of Residual Effect)						Overall Significance (of Residual Effect)
		Magnitude	Geographic Extent	Duration	Frequency	Permanence/ Reversibility	Ecological Context	
Commercial Fisheries	Dredging/Infilling	L	M	L	M	L	L	ME

Potential significance ratings for each criterion (refer to Table 4 for definitions)

H: High

M: Medium

L: Low

Potential overall significance ratings:

S: Significant Adverse Environmental Effect

ME: Minor Adverse Effect/Mitigation Effect

NS: Not Significant Adverse Environmental Effect

UN: Uncertain/Unknown Effect

6.2 Other Environmental Effects

6.2.1 Accidents and Malfunctions

Potential accidental events associated with the Project include small spills of hazardous materials during Project construction. As with any construction site, there is potential for small fires associated with workers and equipment. Construction and dredging have the potential to interact with existing shipping traffic, possibly resulting in marine vessel accidents/collisions.

Hazardous Material Spills

If hazardous materials were to enter the marine environment, there is potential for adverse effects on marine biota, mammals, avifauna and habitat. Potentially hazardous materials could be present during the proposed Project activities, including fuels and lubricants for Project vessels and equipment.

Adherence to best management practices and proper equipment selection, inspection and maintenance will act to prevent potential accidental spills. 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 according to applicable legislation, and any requiring disposal will be disposed of at an approved facility.

Effects of localized, minor spills on the marine environment would be minimal, as any such spills would be rapidly cleaned up in accordance with emergency response and contingency plans. A major spill is unlikely given the limited amounts of hazardous materials that would be available on site for the dredging/infilling Project; however should a spill occur, it would be contained and cleaned up rapidly and effectively. Significant effects on the environment from spills of hazardous materials are unlikely.

Fire

During construction and operation, activities such as equipment re-fuelling and careless smoking could result in a fire. Fire-fighting chemicals could enter the marine environment and adversely affect fish, fish habitat and marine water quality if allowed to disperse and persist. Fires also have the potential for adverse effects on atmospheric resources and could pose risks to human health and safety.

Vessel Incident

Although unlikely to occur, marine vessel accidents have the potential to impact the marine environment, including fish and fish habitat, water quality, marine mammals, and marine-related birds, as well as cause damage to fishing equipment. Of particular concern are Project-related vessel incidents resulting in the release of oil or other deleterious substances.

Failure of CDF

Failure of the CDF could include breaching by storms or erosion as well as loss of containment of the dredge material through the adjacent slag walls. PEV will employ a CDF berm inspection and maintenance program similar to that described for the Access Channel Deepening Project EMP Section 6.1.4 and Appendix E. The CDF will be constructed with a geotextile on the containment berm and around the perimeter of Blast Furnace Cove. The disposal of fine dredged sediments into a CDF generally results in a "self-sealing" barrier upon settlement and consolidation of the fine-grained material. The geotextile will provide a better substrate for this self-sealing than the slag material and will create a filter/barrier to sediment migration.

Summary

Provided emergency response and contingency planning by PEV and the Harbour authorities, significant adverse residual environmental effects related to an accidental event are not considered likely. Of particular concern would be a potentially large spill associated with a vessel incident. It is presumed that such an incident and spill would be rapidly responded to according to PEV and Coast Guard contingency and spill management plans to limit adverse environmental effects. Table 10 presents a summary of the assessment of residual environmental effects for the Accidents and Malfunctions.

Table 10 Significance of Residual Environmental Effects – Accidents and Malfunctions

Environmental Component(s)	Potential Adverse Environmental Effect(s)	Significance Criteria (of Residual Effect)						Overall Significance (of Residual Effect)
		Magnitude	Geographic Extent	Duration	Frequency	Permanence / reversibility	Ecological Context	
Benthic Habitat; Sediment Quality; Marine Fish and Water Quality; Marine Mammals and Marine-related Birds	Effects caused by small spills of hazardous material(s)	L-M	L-M	L-M	L	L	L	ME-NS
Benthic Habitat; Sediment Quality; Marine Fish and Water Quality; Marine Mammals and Marine-related Birds	Vessel Incident (with spill)	L-H	L-M	M	L	L	L-M	ME-NS
Benthic Habitat; Sediment Quality; Marine Fish and Water Quality; Marine Mammals and Marine-related Birds	Failure of CDF	L-H	L	M	L	L	L	ME-NS

Potential significance ratings for each criterion (Refer to Table 4 for definitions)

H: High
M: Medium
L: Low

Potential overall significance ratings

S: Significant adverse environmental effect
NS: Not significant adverse environmental effect
ME: Minor Adverse Effect/ Mitigable Effect (Not Significant
UN: Uncertain/ Unknown Effect

6.2.2 Effects of the Environment on the Project

The definition of environmental effects under Section 2(1) of CEAA includes "any change to the project that may be caused by the environment". Potential effects of the environment on the Project are discussed below.

Sea-Level Rise

As identified for the Access Channel Deepening EA, increasing concentrations of greenhouse gases in the atmosphere are believed to be causing global warming (IPCC 2007). Increased temperatures are predicted to contribute to a rise in sea level. Although estimates vary, global sea-level rise is expected to be approximately 0.5 m by 2100 (Wigley and Raper 1992; IPCC 1995; Forbes *et al.* 1997); emerging evidence suggests that a global mean sea-level rise of up to 1.3 m may be plausible during this time (Forbes *et al.* 2009). These estimates exclude local crustal subsidence effects and possible rapid dynamical changes in ice flow, (*e.g.*, accelerated melting of polar ice caps). In their assessment of sea level rise impacts on PEI, MacCulloch *et al.* (2002) adopted a total projection of 0.7 m relative sea level rise to 2100 in the Charlottetown region (0.5 m for global sea level rise plus 0.2 m for crustal subsidence), with an uncertainty of ±0.4 m. It is reasonable to adopt the same value for Sydney, as trends in crustal subsidence and relative sea level rise are relatively similar between the two sites (Peltier 2002).

The design of the CDF will incorporate an adequate factor of safety to deal with anticipated changes in weather severity during the lifetime of the Project, including storms and sea level rise associated with climate change. It is unlikely that climate change due to global warming will have a significant effect on the Project.

Extreme Weather Events

During construction activities, extreme weather events, such as heavy precipitation and storm surges have the potential to affect or cause temporary delays in Project activities. There are a number of planning, design and construction strategies directed at minimizing the potential effects of the environment on the Project so that the risk of damage to the Project (and resulting risk to the environment) or interruption of activities can be reduced to acceptable levels.

As discussed in the Access Channel Deepening EA, extreme weather events also have the potential to damage construction vessels. Extreme wind can produce high waves, dense blowing sea foam, heavy tumbling of the sea and poor visibility. The ice season typically starts into the month of February and ends early April. In the summer, waves off Sydney Harbour are generally small because the winds blow predominantly from the land. The strongest wave climate occurs in December and January, when the direction is strongly biased towards the North.

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. Reduced visibility due to fog is likely to occur in late spring and early summer, with a peak fog potential in July. During winter poor visibility occurs less than 10% of the time and is often caused by snow. The Project dredging is currently predicted to occur during the relatively warmer months of mid-2012.

Summary

Similar to the Access Channel Deepening EA, with the use of appropriate design criteria to ensure safety and integrity of the CDF during severe environmental conditions as well as monitoring and/or contingency planning to reduce to likelihood of any adverse effects, it is therefore predicted that effects of the environment on the Project not to be significant.

6.3 Environmental Effects Summary and Conclusions

It is concluded that no significant adverse residual environmental effects are likely to occur from the PEV Wharf Deepening Project, provided that all proposed mitigation measures and BMPs are adhered to throughout Project activities.

The Project is expected to provide additional bulk solids handling opportunities for the PEV facility, with increased economic benefits to the local area; this is considered a positive socio-economic effect.

Table 11 summarizes the potential environmental effects, prescribed mitigation measures / BMPs, residual environmental effects and significance determinations for each of the selected VECs and other (non-VEC) environmental components that have potential to be affected by the Project.

Table 11 Potential Environmental Effects Summary

Environmental Components	Project Phase/ or Component	Description of Potential Environmental Effects	Recommended Mitigation Measures / or Best Management Practices (BMPs)	Residual Effect (Is there a residual effect that is likely to occur? If yes, provide a description)	Significance of Residual Effect	Monitoring	Follow-up
Marine Environment	Construction and Operation	Refer to Section 6.1.1	Refer to Section 6.1.1	Temporary alteration of fish habitat in dredge area; permanent loss of fish habitat in infill area; habitat compensation provides no-net-loss of productive capacity of fish habitat; dispersion of resuspended sediments and associated water quality effects; fish mortality and exposure to contaminated sediments that are presently capped by relatively cleaner sediments.	ME-NS	M	N
Commercial Fisheries	Construction	Refer to Section 6.1.2.	Refer to Section 6.1.2.		ME	NA	N
Effects of the env. on the project	Construction and Operation	Refer to Section 6.2.2.	Refer to Section 6.2.2.	Refer to Section 6.2.2	ME	M	NA
Accidents / Malfunctions	Construction and Operation	Refer to Section 6.2.1.	Refer to Section 6.2.1.	Temporary effects from spills; Possible effects if CDF failure	ME-NS	M	NA

S: Significant adverse environmental effect
ME: Minor Adverse Effect/ Mitigable Effect (Not Significant)
NS: Not significant adverse environmental effect
UN: Uncertain/ Unknown Effect

M: Monitoring required
F: Follow-up required
NA: Not required or not applicable

CHAPTER 7 CUMULATIVE EFFECTS

An assessment pursuant to CEAA must address potential cumulative effects. As per the Cumulative Effects Assessment Practitioners Guide (Hegmann *et al*. 1999), the concept of cumulative environmental effects recognizes that the potential environmental effects associated with individual activities can combine and interact with each other to cause aggregate effects that may be different in nature or extent from the effects of the individual activities. Cumulative environmental effects assessment requires a consideration of the temporal and geographic boundaries of the assessment and interactions among environmental effects of the Project and past, present and reasonably foreseeable future projects and activities.

7.1 Residual Effects Assessment

The cumulative effects assessment focuses only on adverse effects of the project remaining after the application of mitigation measures (i.e., only residual effects on an environmental component identified within the scope of your assessment for the two VECs selected – Marine Environment and Commercial Fisheries). As per Table 11, there are several relevant residual environmental effects with potential to overlap spatially and temporally with similar environmental effects from other projects and activities in Sydney Harbour.

7.2 Cumulative Effects Assessment

Consistent with the Environmental Screening Report template appended to Transport Canada's Proponents' Guide for Environmental Assessment (2010), the cumulative effects assessment presented in Table 12 is focused on the residual effects of the Project that may interact cumulatively with the residual effects of other reasonably foreseeable actions (past, present or future) that may overlap in time or space with the PEV Wharf Approach Deepening Project. This cumulative effects assessment focuses on the Project Area and immediate surroundings.

Table 12 Cumulative Effects Summary

Project or Activities	Category	Potential Cumulative Interactions	VECs Potentially Affected by Cumulative Effects
The Sydney Harbour Access Channel Deepening and Sydport Container Terminal Development Project	Dredging/infilling completed January 2012	Effects on marine environment from re-suspension of sediment; temporary disruption of benthic and marine habitat from dredging; permanent loss of benthic and marine habitat due to infilling; habitat compensation provides no-net-loss of productive capacity of fish habitat; mortality of fish.	• Marine Environment • Commercial Fisheries
Steel making at the Sysco site and Sydney Tar Ponds remediation Project	Past and Ongoing	Introduction of industrial contaminants to Sydney Harbour. Recent and ongoing remediation of Sydney Tar Ponds.	• Marine Environment • Commercial Fisheries
Untreated sewage outfalls in the South Arm of Sydney Harbour	Ongoing	Untreated sewage discharges including nutrient, contaminant and TSS loading; nuisance odours.	• Marine Environment • Commercial Fisheries • Atmospheric Environment
Change in shipping activity at the PEV terminal	Future	Increase in vessel traffic; prop wash; water quality effects; air emissions.	• Marine Transportation and Navigation • Commercial Fisheries • Marine Environment • Atmospheric Environment

Dredging and infilling associated with the Access Channel Deepening Project will contribute to cumulative HADD effects in the South Arm of Sydney Harbour, both temporarily (*i.e.*, associated with dredging) and permanently (*i.e.*, associated with the CDF and future terminal development). Shoreline infilling projects within Sydney Harbour have potential to result in the cumulative loss of habitat within the intertidal zone. However, the proposed Project site has no natural intertidal zone, as the existing shoreline has been subject to extensive infilling since the 1900s.

The Access Channel and PEV Wharf Approach Deepening Projects both include the introduction of hard multi-dimensional substrate with unembedded interstitial spaces (*i.e.*, rock or slag on the face of the CDF) that partially offsets Project-related habitat loss. Fish habitat compensation in accordance with Section 35(2) of the *Fisheries Act* will mitigate the cumulative HADD of fish habitat in Sydney Harbour. In general, fish habitat compensation, required as a condition of *Fisheries Act* authorizations, mitigates cumulative effects associated with the loss of productive capacity of fish habitat.

The South Arm of Sydney Harbour is currently closed to fishing due to historically high levels of industrial contamination. Fish habitat compensation associated with the PEV Wharf Approach Deepening Project and the Access Channel Deepening Project will enhance fish habitat in other, fishable areas of Sydney Harbour.

All infilling and dredging projects in Sydney Harbour have potential to adversely affect the marine environment, including fish and fish habitat, water quality, and marine benthos, as well as to collectively alter the physical environment in the Harbour. Potential cumulative effects have been and will be controlled through environmental permitting and planning (including assessment and prescription of associated mitigation commitments through the federal and provincial EA processes), implementation of best management practices, habitat compensation, monitoring, and regular reporting to DFO and Environment Canada. Furthermore, the Access Channel and PEV Wharf Approach Deepening Projects are expected to cumulatively enhance harbour-related infrastructure, support economic development, and result in land use benefits. Potential adverse cumulative environmental effects associated with these projects are predicted to be not significant.

Historical steel-making activities at the Sysco site and untreated sewer discharges have potential to interact with the Project to result in cumulative effects on water quality and sediment quality in the South Arm of Sydney Harbour. However, mitigation measures associated with the PEV Wharf Approach Deepening Project – including application of BMPs and use of appropriate technology during dredging, secure containment of fines within the CDF, and associated monitoring – will minimize potential cumulative effects.

The Sydney Tar Ponds and Coke Ovens sites are the result of nearly a century of steelmaking. As part of the Sydney Tar Ponds and Coke Ovens Remediation Project (STPCORP) currently being carried out by the Sydney Tar Ponds Agency (STPA), the Tar Ponds are being capped using a combination of geotextiles and clean fill. The primary objective of the remediation project is to stabilize or otherwise remediate contaminated sediments and groundwater onsite (including PAHs and PCBs) to prevent further erosion or leaching into Sydney Harbour where environmental impacts have long been noted. Remediation activities started in 2007 and are expected to be completed by 2014.

In the long-term, the STPCORP is expected to have a net positive effect on benthic habitats, sediment quality, marine fish, and water quality since the heavily contaminated sediments associated with former steel-making activities at the Sysco site will be capped, effectively preventing further leaching of heavy metals, PAHs, and PCBs into Sydney Harbour.

In the short term, discharges from the STPCORP have been and will continue to be strictly managed through engineered siltation controls, regulatory limits, and monitoring. The remediation project, which has been approved under the federal and provincial EA processes (including mitigation and regulatory conditions to ensure that environmental effects are not significant) may result in short term (regulated) increases in turbidity as the contaminated tar ponds are infilled with clean materials and capped, thereby resulting in a cumulative contribution of suspended solids to Sydney Harbour. The extent of the cumulative effects will be controlled by both the STPCORP and the PEV Wharf Approach Deepening Project as per mitigative and regulatory requirements and it is expected that the effects of the projects, individually and cumulatively, will be not significant.

Due to spatial and temporal overlap, water quality effects associated with the PEV Wharf Approach Deepening Project have potential to interact with the marine environmental effects monitoring (EEM) program that has been underway in the South Arm since 2009 as part of the STPCORP. Potential cumulative effects will be reduced through consultation with PWGSC, which is managing the adjacent EEM program. PEV will notify PWGSC regarding their dredging activities, in the same way that PWGSC was notified of Access Channel Deepening Project activities, to account for potential Project-related effects on the STPCORP EEM program.

DFO noted in a recent technical report that activities associated with the Access Channel Deepening Project were "expected to have a substantial impact on the [STPCORP] monitoring program during the actual period of dredging" due primarily to "mechanical interference with bottom communities and the generation of turbidity plumes resulting in particle transport into the South Arm" (DFO 2012). DFO also stated that, "since the sediments due to be excavated are mainly sands, distinguished by low contaminant levels, the transport of contaminants into the inner harbour is expected to be minimal. It is anticipated that the principle effect of the dredging will be to further cap or bury the more highly-contaminated sediments of the inner harbour with coarser-grained, less contaminated material. Therefore, the effect of the dredging will be to further remediate sediments of the inner harbour" (DFO 2012). DFO concluded that "it is considered unlikely that dredging operations or container terminal construction will produce environmental signals that will significantly interfere with the interpretation of the longer term monitoring results for the Tar Ponds remediation project" (DFO 2012).

The PEV Project has potential to result in the release of organics along with associated odours, which could interact cumulatively with odour issues related to the Sydney Tar Ponds Remediation Project. The effects of both of these projects on the atmospheric environment have potential to overlap spatially and/or temporally in such a way that disturbs the same receptors (e.g., local residents). Nuisance odours have the potential to adversely affect residential quality life in a number of ways, ranging from impacts on simple enjoyment of their properties to pronounced anxiety associated with perceived health effects. Residents now expect to be informed regarding causative factors.

Odour mitigation measures noted in Table 5 for the PEV Project include maintaining the dredged sediments in a sub-aqueous state for the majority of the CDF disposal operation, surcharging and infilled the CDF as soon as the material is stable, and applying sealers to address persistent odours. In addition, the Project-specific EMP will contain provisions for receiving and responding to complaints regarding air quality. Potential nuisance odours from the STPCORP site are currently monitored on an ongoing basis. Where odours are at a nuisance level, the STPA samples using gas chromatography and nasal rangers, and reports directly back to complainants. In consideration of the short duration of Project activities, the heavily industrialized setting, and the lack of residential receptors within 500 m of the Project site (refer to Figure 9), it is anticipated that these measures will be sufficient to mitigate potential issues related to cumulative nuisance odours to acceptable levels.

The PEV Wharf Approach Deepening Project is likewise not anticipated to have a substantive effect on the Tar Ponds EEM program over the long term. Although the sediments to be dredged during the current Project are relatively finer and more contaminated than those associated with the recent Access Channel Deepening Project, and are therefore not expected have the same clean capping effect, the removal of the most contaminated upper layers of sediments via dredging and the subsequent isolation of this material in a CDF is similarly expected to ultimately result in a net improvement in the quality of marine sediments in the South Arm. Consultation with PWGSC regarding monitoring programs, implementation of BMPs and mitigation to minimize turbidity during dredging, and management and monitoring of water outflow from the CDF during dewatering are considered sufficient measures to lower potential Project interactions with the EEM monitoring program to acceptable levels.

For the purposes of this environmental assessment, the Project to be assessed is the PEV Wharf Approach Deepening and associated CDF infilling, including use of the infill area (to the extent it can be known currently) as described in Chapter 3.0. For the purposes of understanding potential cumulative environmental effects associated with certain or reasonably foreseeable future projects and activities (as required by CEAA), consideration has also been given to potential increases in future vessel traffic calling at the PEV terminal.

It is expected that shipping activity at the PEV wharf will increase after the completion of the PEV dredging project from a historical yearly average of 400,000 tonnes of product and 12 vessel calls per year, to something in the order of 1.5 million to 2 million tonnes of product and 75 to 100 vessel calls. Although this is a substantial increase in the total number of vessels currently calling at Sydney, it is well recognized that the port is underutilized when compared to even its recent history. It is anticipated that the incremental (i.e., cumulative) traffic will be easily accommodated with existing port infrastructure, although it will create a requirement for permanently stationed tugs and place additional demands on pilotage services. Preliminary discussions are underway with prospective tug operators, and the Atlantic Pilotage Authority is being kept informed of the Project's status and timelines. This will reduce any issues related to the cumulative addition of vessel traffic in the harbor including potential conflict with existing vessel traffic.

Cumulative effects on water quality will be managed through compliance with applicable legislation, codes and standards of practice for shipping, including the *Ballast Water Control and Management Regulations* under the *Canada Shipping Act* to reduce risk of introduction of marine invasive species. Routine effluents produced by ships (*e.g*., grey and black water, bilge water, deck drainage, discharges from machinery, and non-hazardous waste material) will also be managed in accordance with the *International Convention for the Prevention of Pollution from Ships* (MARPOL) and International Maritime Organization (IMO) guidelines. It is recognized that there will be some additional disturbance of fine benthic material through prop wash.

There will be an incremental addition of air emissions from the operation of the additional vessels. Federal Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals, made pursuant to the *Canada Shipping Act*, 2001, stipulate requirements for control of emissions from ships, including emissions of NOx, SOx, volatile organic compounds (VOCs), and ozone-depleting substances. Air emissions from vessels calling on the PEV terminal will be mitigated through adherence to these regulations. In addition to these existing regulatory controls on vessel air emissions, the governments of Canada and the United States, with the support of France, issued a joint proposal to the IMO to establish an Emission Control Area (ECA) in North American coastal waters. The proposed ECA was formally adopted by the IMO on March 26, 2010 (Transport Canada 2010; US EPA 2010). The ECA will subject large ships operating in designated areas, including within 200 nautical miles of the Canadian coast, to stringent environmental standards for the control and reduction of air pollution. ECA requirements are expected to decrease large vessels' emissions of NOx and SOx by 80% and 96%, respectively, and also reduce their emissions of fine particulate matter (Transport Canada 2009). Allowing for the lead time associated with the IMO process, the North American ECA will become enforceable in August 2012 (US EPA 2010).

Additional coal storage and dust mitigation will be undertaken in compliance with all NSE permit conditions.

Potential future growth beyond this 2 million tonnes threshold is dependent on a number of variables related to total supply chain costs and a long term supply source and details cannot be predicted at this time. Should these conditions prove favourable, any further terminal development, including wharf upgrades, would be subject to further design and engineering analysis and regulatory approval at that time.

In consideration of the mitigation described above, and assuming compliance with Sections 32, 36, and 35(2) of the *Fisheries Act*, cumulative environmental effects associated with the projects listed in Table 12 are anticipated to be not significant.

CHAPTER 8 PUBLIC PARTICIPATION

8.1 Public Participation under Subsection 18(3)

- Is the RA of the opinion that public participation in the screening of the project is appropriate? Yes ☐ No ☒
- Scope of the project and factors to be assessed posted on the CEAR? Yes ☐ N/A ☒
- Public Notice to request public input posted on the CEAR? Yes ☐ N/A ☒

The Access Channel Deepening EA process (including harbour dredging and infilling of Blast Furnace Cove) included public consultation. Further public consultation for the proposed PEV Wharf Approach Deepening Project is considered unnecessary.

8.2 Other Public Participation

The PEV EA team will meet with members of the Sydney Harbour Fishers Association (SHFA). While the PEV Project Area is closed to most commercial fisheries in Sydney Harbour, PEV will discuss the Project with representatives of the SHFA and note any issues and concerns.

The PEV team will also work with the responsible federal and provincial departments to engage the Mi'kmaq during the EA process. Transport Canada has issued a request for consultation to Kwilmu'kw Maw-klusuaqn (KMKNO) also known as Mi'kmaq Rights Initiative. Proponent representatives have met with local members of the Mi'kmaq community and have also offered to meet with KMKNO.

The EA will be made available for public review as a mandatory part of the provincial EA Registration process. No other public participation has been deemed necessary given the consistency of the Project with current land use as well as its anticipated economic benefits to the region.

8.3 Community and Aboriginal Knowledge

The Access Channel Deepening EA process (including harbour dredging and infilling of Blast Furnace Cove) included a Mi'kmaq Ecological Knowledge Study (MEKS) as Appendix G of the EA document. Additional MEK work is not proposed for the PEV Project at this time.

CHAPTER 9 MONITORING PLAN

As per section 20 (2) of the CEAA, Transport Canada is responsible for ensuring that mitigation measures will be implemented.

- Monitoring Plan to be developed for this project? Yes ☒ No ☐
- Other RAs/FAs will assist in monitoring? Yes ☒ No ☐
- The Proponent will be reporting on implementation of mitigation measures? Yes ☒ No ☐

PEV will provide written confirmation to Transport Canada and DFO on the effectiveness of implementing the mitigation measures detailed in the report, notably Table 11, no later than one month after the completion of the construction stage on the Project. This written confirmation will include a summary of the mitigation measures applied during the construction stage of the Project.

The Proponent will discuss details of the monitoring plan with RAs prior to implementation.

CHAPTER 10 FOLLOW-UP PROGRAM

• Is a CEAA Section 38 follow-up program considered appropriate for this project?	Yes ☐	No ☒
• Follow-up program posted on the CEAR?	Yes ☐	N/A ☒
• Other RAs/FAs will participate in the follow-up program?	Yes ☐	N/A ☒

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APPENDIX A

CDF Design Drawings

APPENDIX B

Preliminary CDF Geotechnical Assessment

APPENDIX C

Dispersion Modeling

APPENDIX D

Geotechnical Program

APPENDIX E

Environmental Sampling Results

APPENDIX F

Benthic Habitat Assessment