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1 INTRODUCTION

This report is an Environmental Assessment (EA) for the Prince Edward Island Convention Centre/Queens Wharf Development ("the Project") proposed by the Charlottetown Area Development Corporation (CADC; the "Proponent") in Charlottetown, Queens County, Prince Edward Island (PEI).

This document is intended to fulfill the requirements for the project under the Canadian Environmental Assessment Act (CEAA) and the PEI Environmental Protection Act (PEI EPA), thereby initiating the environmental impact assessment review and approval process. The information provided herein will assist the provincial and federal Regulatory Authorities (RAs) in reviewing the environmental effects of the Project, in determining required mitigation, and ultimately deciding whether an approval will be issued for the Project to proceed.

1.1 Project Title, Project Proponent, and Author of the EA

The Project title and details of the Project Proponent and the environmental consultant hired by the Proponent to author this document are as follows.

Project Title: Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI

Project Proponent: Charlottetown Area Development Corporation
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Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI

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1.2  Project Overview

A brief overview of the Project, including a summary description of the Project, as well as its location, purpose, and schedule, is provided below.

1.2.1  Project Summary

The Project involves the Construction and Operation of the Prince Edward Island Convention Centre/Queens Wharf Development, in Charlottetown, Queens County, PEI. The new convention centre will provide meeting, convention, and trade show space in Charlottetown. Currently, the Government of Prince Edward Island and CADC are in the process of acquiring the existing Fisheries and Oceans Canada (DFO) Area Office and Canadian Coast Guard (CCG) Base property from Public Works and Government Services Canada (PWGSC). Once the property is acquired, CADC proposes to construct the Prince Edward Island Convention Centre, which has been designed to attach to the southeast end of the Delta Prince Edward Hotel (the Delta). The proposed addition will consist of approximately 3,350 square metres (m²) of meeting, convention, and trade show space on the main level and the expansion of the existing parking facility by approximately 3,200 m², creating an additional 80 parking spaces. The Project will also involve the renovation of the existing convention space in the Delta.

To facilitate the construction of the proposed convention centre, the existing property will be redeveloped, which will include demolition of the existing buildings, earthworks, piling driving, installation of a steel sheet pile wall, and infilling behind the wall. The total area of the marine habitat to be affected by the marine infill has been reduced from 2,011 m² to 1,552 m² due to a redesign/relocation of the steel sheet pile wall.

1.2.2  Project Location

The proposed convention centre will be located on the Charlottetown Harbour at 1 Queen Street, Charlottetown, Queens County, PEI. The general location of the Project is shown in Figures 1.1 and 1.2 (Appendix A).

1.2.3  Project Purpose

Prince Edward Island currently does not have a building with the capacity to host large scale conventions and trade shows under the same roof. The Project will create convention space in
Charlottetown, allowing the province to meet the current need for convention and trade show space in one building. Presently, conventions are held at the Delta while trade show space is located across town at the Charlottetown Civic Centre. The proposed convention centre is also expected to contribute to the tourism industry on PEI and surrounding region.

1.2.4 Project Schedule

Construction of the Project is expected to begin in March 2011, following the receipt of all necessary permits, authorizations, and funding. A two-year Construction period is anticipated, with Construction scheduled to begin March 1, 2011 and be completed by March 1, 2013. Key timelines (subject to change) are outlined below:

- Site Preparation - March-April 2011;
- Seawall Extension - April-July 2011;
- Marine Infilling - April-August 2011;
- Pile Driving - June-July 2011;
- Additional Parking Area Construction - July-November 2011;
- Construction of Convention Centre - March 2011-December 2012;
- Renovations to the Existing Delta Convention Space - August-December 2012;
- Boardwalk Construction - Spring 2013; and

Operation of the Project will begin immediately following Construction and will continue for several decades or longer. Though not currently envisioned, Decommissioning and Abandonment of the Project would be at the end of its useful service life.

1.3 Regulatory Context

1.3.1 Federal Environmental Assessment

The Project has triggered an EA under Section 5 of CEAA. The identified triggers include the following: an authorization by DFO pursuant to section 35(2) of the Fisheries Act, for the harmful alteration, disruption, or destruction of fish habitat (HADD); the transfer of federal land from PWGSC to the Province of Prince Edward Island and CADC; and the potential commitment of funding by Infrastructure Canada (INFC) through the Building Canada Funds – Major Infrastructure Component. Transport Canada will be issuing an approval under the Navigable Waters Protection Act for the new convention facility; however, this approval does not trigger a review under CEAA.

The Canadian Environmental Assessment Agency (the Agency) shall be the Federal Environmental Assessment Co-ordinator for this Project as per Section 12.4(1)(a) of CEAA. DFO, PWGSC, and INFC are RAs. Environment Canada and Health Canada will be federal authorities, providing specialist or expert information and knowledge in support of the EA process.
1.3.2 Provincial Environmental Assessment

The Project is considered to be an “undertaking” under Section 9(1) of the PEI EPA:

“No person shall initiate any undertaking unless that person first files a written proposal with the Department and obtains from the Minister written approval to proceed with the proposed undertaking.”

Further, Section 9(3) of the Act states:

“An environmental assessment and environmental impact statement shall have such content as the Minister may direct.”

An environmental impact assessment must be completed and the corresponding environmental impact statement prepared and submitted so as to enable a review of the Project by the Technical Review Committee (TRC), comprised of provincial regulatory agencies. The outcome of the environmental impact assessment review process will determine if the Project should be approved, including any approval conditions.

A Watercourse, Wetland, and Buffer Zone Activity permit, administered by the Prince Edward Island Department of Environment, Energy, and Forestry (PEIDEEF), may be required for the Project as is to be conducted within 10 m of a water body.

Prince Edward Island has Ozone Layer Protection Regulations under the Environmental Protection Act (Government of PEI 2005) that describe the permitted operation, maintenance, and disposal activities of refrigerant equipment and halocarbon compounds. The Project will be carried out in accordance with the existing provincial and federal regulations (Federal Halocarbon Regulations, amended in 2003 under the Canadian Environmental Protection Act) during all phases of the Project – Construction, Operation, and Decommissioning and Abandonment.

1.4 Terms of Reference

On October 28, 2010, the Terms of Reference Land Transfer and Convention Center Construction, Charlottetown, Prince Edward Island (the TOR) was provided to the Proponent by the Agency. The TOR was prepared by INFC, DFO, PWGSC, and PEIDEEF.

The TOR, and additional clarification received by the Proponent via mail (November 19, 2010) and email (December 1, 2010), provides guidance on the scope of the Project and the scope of the assessment. The TOR states that the federal and provincial EA processes will be completed in a coordinated fashion.
1.5 Organization of this EA

This EA is organized to reflect the process by which the assessment has been conducted. It is organized into eight sections, including a references section.

- **Section 1** provides background information on the Project including the purpose for the Project and the regulatory context.

- **Section 2** provides a description of the Project. Construction and Operation activities are described, as is the location and schedule for the Project.

- **Section 3** provides a description of the methodology employed to carry out this EA, the scope of the assessment (scope of Project, factors to be considered, and scope of factors to be considered), and a summary of consultation and engagement activities and initiatives undertaken for the Project.

- **Section 4** provides an overview of the existing environment in which the Project is located.

- **Section 5** provides the environmental effects assessment for the Project, including Project-related environmental effects during Construction, Operation, Decommissioning and Abandonment of the Project, including Accidents, Malfunctions, and Unplanned Events; a discussion of the effects of the environment on the Project is also provided.

- **Section 6** presents the conclusions of the environmental assessment.

- **Section 7** presents closing remarks.

- **Section 8** details literature, websites, and personal communication cited in the report.
2 PROJECT DESCRIPTION

This section provides a preliminary description of the facilities and equipment that comprise the Project, based on the progress of the design at the time of the writing.

It is important to recognize that the Project description, equipment, and layout described below may change slightly with detailed engineering design. The description outlines the most up to date details of the Project. This section describes the key aspects of the Project, as currently conceived, including:

• a description of the Project component and proposed mitigation for potential environmental effects;

• a discussion of the activities that will be carried out during Construction, Operation, and eventual Decommissioning and Abandonment of the Project; and

• a discussion of the Project-related emissions and wastes.

2.1 Overview of Project

The Project involves the Construction and Operation of the Prince Edward Island Convention Centre/Queens Wharf Development, in Charlottetown, Queens County, PEI. The proposed convention centre has been designed to attach to the Delta and will provide meeting, convention, and trade show space under one roof for the province of PEI. Refer to Figures 2.1 and 2.2 (Appendix A) for the proposed site plan and cross section of steel sheet pile wall.

2.2 Description of Project Components

Construction of the proposed convention centre will involve the following components: marine infilling, convention centre, and additional parking area.

2.2.1 Marine Infilling

The existing steel sheet pile wall will be extended and the area behind the wall will be infilled. The total waterlot area to be infilled is 1,552 m². The total length of the seawall will be approximately 139 metres (m) and the height of the wall will be at +4.3 m above the lowest normal tide (LNT).

2.2.2 Convention Centre

The proposed convention centre has been designed to attach to the southeast end of the Delta Hotel. The addition will consist of 3,250 m² of meeting and convention space on the main level. The additional space will include three (3) additional ballrooms, seven (7) breakout rooms,
janitors facilities, women’s and men’s washroom facilities, office space, a foyer, two (2)
elevators, storage areas, and service space. There will be three (3) to six (6) roof top HVAC
systems installed on the roof of the new convention centre for heating/cooling of the new
ballrooms only. These will operate with air to air exchange. In addition, a boiler may be
required to supplement heating of the ballrooms. The existing boiler for the Delta is currently
being assessed to determine if it has the capacity to meet the new requirements, or if a new
boiler will be required. The convention centre will operate using municipal sewer and water
systems and power will be supplied by Maritime Electric Company, Limited.

2.2.3 Additional Parking Area

The parking facility will be situated on piles beneath the convention centre. The new facility will
expand the existing parking area by approximately 3,200 m², creating an additional 80 parking
spaces. The elevation of the underground parking facility will be approximately + 2.0 m above
chart datum.

2.3 Construction Phases

Once the building design is finalized and upon approval from the regulatory agencies,
construction of the Project will involve the following phases:

- site preparation;
- seawall extension;
- marine infilling;
- pile driving;
- additional parking area construction;
- construction of convention centre;
- renovations to the existing Delta convention space;
- boardwalk construction; and
- landscaping.

Equipment used during construction may include, but is not limited to, the following: excavators,
tandem trucks, a crane, vibratory pile hammer, barges, and bulldozers. Prior to construction an
Environmental Protection Plan (EPP) will be prepared and mitigation will be implemented during
the construction phases. A brief description of the Construction activities is provided below.

2.3.1 Site Preparation

In order to construct the proposed convention centre, the existing on-site buildings will need to
be removed. Currently, the site is occupied by the DFO Area Office (the administration building)
and the CCG Base (shops building, stores building, and buoy shed). The DFO area office will
be removed first and demolition is expected to take two to three weeks to complete. The CCG
buildings will be removed after the seawall extension and marine infilling have been conducted.
Because of their small size, it is expected that the buildings will be removed using excavators.
Prior to demolition, fencing will be installed around the perimeter of the project site with controlled access points. The controlled access and perimeter fencing will be maintained (where necessary) for the duration of the construction. Activities during Site Preparation are expected to cause an increase in traffic in the area. Traffic control will be implemented as necessary.

Due to the presence of hazardous substances in the CCG buildings, demolition is expected to take six to eight weeks. The CCG buildings are known to contain asbestos and lead. Removal of asbestos containing materials will be conducted by a contractor holding a valid asbestos contractor’s certificate as per Part 49 – Asbestos Regulations, of the *Occupational Health and Safety Act General Regulations*. The contractor will be required to dispose of the asbestos containing materials in a provincially approved manner and to acquire the necessary permits for disposal. To remove the lead based paint, the painted structural steel will be removed from the buildings and cut, under controlled conditions, into lengths suitable for transport and transported to an off-island steel recycling facility located in Quebec. All cuttings will be contained and collected for approved disposal. It will be the responsibility of the contractor to obtain all permits and/or authorizations prior to transporting hazardous materials outside of PEI.

Approximately 3,300 m³ of existing on-site material will be excavated. The soil/sediment at the site is contaminated with levels of polycyclic hydrocarbons (PAHs) and metals that exceed the applicable guidelines. Due to this contamination no soil/sediment will be removed from the site, but will be reused on the site as fill. After excavation, the soil will be stored on site and covered with a plastic tarp until it is to be used as backfill inside the steel sheet pile wall and the building foundation. The contaminated material will be contained and encapsulated by the new construction. Other fill material will include select borrow. Prior to infilling, a silt curtain will be installed around the area to prevent the siltation of the surrounding water. The silt curtain will remain in place until the infill area has been stabilized.

### 2.3.2 Seawall Extension

The steel sheet pile wall will be extended and work will be conducted from land. A vibratory hammer will be used to drive steel sheet piles for most of the length of the wall. A hydraulic impact hammer will be used to set the piles approximately 1 to 1.5 m into the bedrock. In addition, diagonal support anchors (*i.e.*, tie rods) will be installed at a 45 degree inclination using a specially equipped drill rig mounted on a platform, suspended from a crane which will be positioned adjacent to the steel sheet pile wall. The support anchors will be drilled/grouted into bedrock to develop the required resistance. All drill cuttings and wash water will be contained on site behind the steel sheet pile wall. The construction of the new wall is expected to take approximately five weeks. Prior to construction a silt curtain will be installed around the infill area. An Environment Effects Monitoring (EEM) Program will be conducted prior to work in the marine environment (if possible) and during pile driving and infilling activities to ensure that sedimentation controls are functioning properly and that the level of total suspended solids (TSS) in the vicinity of the Project site is below applicable guidelines. During construction, visual monitoring will be conducted in the vicinity of the seawall. If any excessive changes in turbidity occur outside of the silt curtain as a result of construction, work will stop and DFO will
be contacted. The materials for the seawall will be delivered to the site by trucks following already established roadways.

The new seawall will be built to 4.3 m above chart datum, the same as the existing seawall; the design will be similar to the existing seawall.

The steel sheet structure is designed for a minimum 50-year life span, with possible extension of its service life through repair/upkeep. Upkeep to the seawall will most likely involve patchwork, where required. Any projects carried out in the future to replace or renovate the seawall would likely require the completion of a separate environmental assessment at that time and would comply with all existing regulations.

2.3.3 Marine Infilling

Approximately 6,000 tonnes (t) of select borrow will be used during the infilling and associated grading of the site. Approximately 3,500 m$^3$ of on-site excavated material will also be used for infilling and site grading. The infill material will be added in 1 m lifts, allowing the fill to settle after each addition. Transporting fill material to the site is expected to cause an increase in traffic in the area. Traffic control will be implemented as necessary.

2.3.4 Pile Driving

The foundation of the convention centre, including the parking facility, will be situated on steel H-piles which will be independent of the steel sheet structure. The piles will be driven approximately 2 to 3 m into the bedrock. Pile driving will be conducted using a high frequency vibro-hammer (HFV) with controlled variable eccentricity. Vibratory hammers use both heavy, stationary weight and vibration to drive piles into substrate. They produce sounds with lower intensity and with a higher repetition rate than an impact hammer. An impact hammer will be used to drive the piles into the bedrock; however this will be for a short duration of time. During construction of the convention centre the use of a vibratory hammer during pile driving is required to minimize noise levels given the proximity of existing buildings and also to avoid lethal impacts to fish in the vicinity of the site.

Concrete pile caps will be installed on top of the steel piles. Minor excavation may be required for installation of the pile caps. During pile driving, excavation for pile caps and infilling, silt fences and/or silt curtains will be used to enclose the area being filled to avoid or minimize siltation of the marine environment. Excavated material will remain on site.

2.3.5 Additional Parking Area Construction

While the convention centre is being constructed to meet the existing need for convention and trade show space, the additional parking area is required under the City of Charlottetown Zoning and Development Bylaw which indicates that the convention centre will need to provide one
parking space for every five fixed seats or every three m of bench space and where there are no fixed seats, one parking space is required for every 19 m².

As previously noted the parking facility will be situated on piles. The new facility will expand the existing parking area by approximately 3,200 m², creating an additional 80 parking spaces. The elevation of the underground parking facility will be approximately 3.0 m, which is near existing grade. The parking facility will be constructed of structural slab poured in place. All concreted will be produced off-site.

The current parking facility at the Delta experiences flooding during heavy rainfall events and storm surges. This is primarily a result of a restriction in the size of the storm sewer in front of the Delta, the proximity of the parking entrance to the street, and the steep slope of the parking entrance. Currently, with forecast of bad weather sandbags are placed at the top of the entrance ramp to the Delta parking facility to control any excess water from entering the underground parking area. As the Project does not include any work on this section of the hotel it is expected that the practice of placing sandbags at the entrance for flood protection will continue.

2.3.6 Construction of Convention Centre

The building will be constructed on pile foundations with suspended concrete slabs for the parking level and main level floors. The main level will be built with a structural steel frame with steel roof trusses and a steel deck. The exterior walls will be steel studs with brick veneer or an aluminum framed curtain wall. The roof will consist of two-ply modified bitumen. The interior of the building will primarily be finished with gypsum wall boards with paint or vinyl wall coverings, carpeting on the floors in the foyer, meeting rooms and ballroom, and a combination of gypsum board and suspended acoustic ceilings.

During construction silt fencing will be installed around the site (as necessary) to stop the entry of sediment laden water into the marine environment. The silt fencing will remain in place until the area surrounding the parking lot is stabilized (i.e., seeded or covered with sod).

As the proposed convention centre will be constructed as an extension to the Delta Hotel, floor levels must match the existing 5.9 m (chart datum) elevation. To protect against storm surges, there will be an elevated outdoor patio surrounding the building at an elevation of approximately 5.8 m with a stacked block retaining wall sloping down to the boardwalk level (4.3 m). In the event of a storm surge breaking over the seawall, the retaining wall will protect the building and keep the surge water away from the building perimeter.

2.3.7 Renovations to the Existing Convention Space in the Delta Prince Edward

The existing convention space in the Delta will be renovated as part of the construction of the convention centre. The existing ballrooms and foyers will receive new carpeting, wall coverings,
paint, and most likely new light fixtures and sound systems. To avoid disturbance to guests, the work will take place during business hours Monday through Friday.

2.3.8 Boardwalk Construction

During construction of the proposed convention centre, the section of boardwalk that currently runs between the Delta and the DFO Area Office will be decommissioned and the existing material will be disposed of in a provincially approved manner. Once construction of the convention centre is complete the boardwalk will be rebuilt along the waterfront at the southeast end of the new convention centre. The existing boardwalk was constructed using pressure treated lumber and the new boardwalk will be re-constructed using pressure treated lumber. Construction waste and materials will not be allowed to enter the marine environment; however, in the event materials enter the water, they will be retrieved immediately and disposed of according to provincial regulations.

While there are no known incidents of flooding at the site, it is anticipated that over time tides will exceed the seawall elevation (4.3 m). Therefore, the walkway will be constructed to withstand overtopping conditions and to avoid risk to the seawall.

2.3.9 Landscaping

Once construction is complete landscaping of the property will include spreading grass seed, placing sod, and planting gardens. Landscaping at the site will involve the use of non-invasive plant species.

2.3.10 Emissions and Wastes

Few emissions and wastes are expected as a result of Construction. Emissions will be limited to air contaminants and noise from the operation of heavy equipment, and fugitive dust as a result of excavation activities. The emissions and noise will remain largely confined to the work site and immediately adjacent areas, but as these activities will be conducted between 7 am and 7 pm Monday through Friday, the emissions are not expected to cause a significant nuisance to nearby residents. Generally, the noise emitted from the on-site equipment will fall between 80 to 100 dBA, which is within normal allowances for commercial zones.

Construction and demolition wastes will be generated during site preparation and construction activities. Potential sources of nonhazardous or solid wastes generated by Project activities include packing/crating materials, scrap metals, and domestic wastes. All Project waste will be disposed of in a provincially approved manner. Waste will be reused or recycled, if possible. All trucks hauling demolition waste or debris will be covered. Fugitive dust from the movement of equipment on unpaved surfaces during construction and demolition has the potential to cause adverse environmental effects to ambient air quality if dust mitigation measures are not used. Professional judgement and experience of the contractor together with frequent and open communication with nearby residents will be used to identify and address issues with dust. If
complaints are received, consideration would be given to each grievance on a case by case basis, and the mitigation will be implemented, such as the application of water during periods of heavy activity and/or during dry or windy periods, to minimize the generation and transport of airborne dust. Waste oil will not be used for dust control under any circumstances.

Remnants of the existing timber structures, concrete blocks, and gabion baskets will be removed from the site and disposed of in accordance with provincial regulations.

Potentially hazardous materials could be present during the proposed Project activities, including fuels and lubricants for Project vehicles and equipment. All potentially hazardous materials will be handled in a manner consistent with current accepted practices. Hazardous materials will be locked in a secure area when not in use to prevent accidents and vandalism. Spill kits will be present on-site in case of accidental release of hazardous materials. The Proponent will comply with all conditions of required permits. Waste oils will be disposed of in accordance with provincial regulations.

2.4 Operation

2.4.1 Use of Facility

During the Operation of the convention centre (several decades or longer) activities expected include use of the facility for meetings, conventions, and trade shows. The operation of the building will include heating/cooling of the facility and maintenance activities. During Operation maintenance activities may be performed to upkeep the facility, including vegetation management, building repairs, and maintenance of the seawall. There will also be recreational use of the boardwalk on the property as it will connect the boardwalk sections at Peakes Quay and the Charlottetown Yacht Club.

The three new ballroom areas and the new foyer will be heated/cooled using individual air handling units with hot water heating coils and chilled water cooling coils. This system is similar to the system for the three existing ballroom areas. The meeting rooms and public spaces will be conditioned with individual fan coil units with hot water heating coils and chilled water cooling coils. The boiler(s), chiller(s), air handling units, and pumps will be stored in the mechanical room on the second level of the convention centre while the double walled oil storage tank will be located at the south end of the new parking facility.

2.4.2 Emissions and Wastes

All solid wastes generated from the convention centre will be disposed of according to provincial requirements. Waste items will be recycled or composted where applicable.

The facility will be operating on municipal water and sewage systems.

March 2, 2011
As previously stated, the convention centre has been commissioned to meet the current need for convention and trade show space in Charlottetown. There is not expected to be an increase in vehicle traffic associated with the operation of the convention centre, and therefore, there is no expected increase in vehicle emissions.

There will be no new emergency generators associated with the new convention centre. The generators used to supply emergency power to the Delta will be used for the convention centre, as needed. A new high efficiency boiler(s) will be installed for the heating of the convention centre while cooling will be facilitated by a central chiller system. The boiler will use approximately 250 to 300 litres (L) of #2 Oil daily with an estimated annual fuel consumption of approximately 80,000 to 100,000 L.

During Operation and Maintenance, a small increase in the emissions of air contaminants, GHGs, and sound may occur locally, primarily as a result of the emissions of combustion gases (including greenhouse gases) in the immediate vicinity of the Project. These emissions are therefore expected to be nominal.

2.5 Decommissioning and Abandonment

The Project is designed, and will be built and maintained, to be in operation for several decades or longer. While decommissioning or abandonment of the Project is not currently envisioned, the Project will at some point be decommissioned at the end of its useful service life, in accordance with the applicable standards and regulations current at that time. A decommissioning and abandonment plan to be developed for the Project, at the end of its service life, will specify the procedures that will be followed with respect to the decommissioning and demolishing site infrastructure, and for site remediation based on the requirements current at that time. The decommissioning and abandonment plan will also contain measures to achieve targeted environmental goals.
ENVIRONMENTAL ASSESSMENT METHODS, SCOPE OF ASSESSMENT, AND CONSULTATION AND ENGAGEMENT

3.1 Environmental Assessment Methods

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

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

The EA focuses on specific environmental components (called Valued Environmental Components or VECs) that are of particular value or interest to regulatory agencies, the public, and other stakeholders. VECs are broad components of the biophysical and human environments that, if altered by the Project, may be of concern to regulatory agencies, Aboriginal persons, resource managers, scientists, and/or the general public. VECs are selected on the basis of:

- regulatory issues, guidelines, and requirements;
- knowledge of the project, its components, and activities;
- knowledge of existing conditions where the project will be located;
- issues raised by regulatory agencies, the public, and stakeholders;
- the scope of factors to be considered in the EA as determined by RAs; and
- the professional judgment of the Study Team.

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

3.1.1 Overview of Approach

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

The environmental effects assessment approach used in this EA is shown graphically in Figure 3.1. The environmental effects assessment methodology involves the following generalized steps.

- **Scope of Assessment** - This involves the scoping of the overall assessment, including the selection of VECs; description of measurable parameters; description of temporal, spatial, and administrative/technical boundaries; definition of the parameters that are used to characterize the Project-related environmental effects; and identification of the standards or thresholds that are used to determine the significance of environmental effects. This step relies upon the scoping undertaken by regulatory authorities; consideration of the input of the public, stakeholders, and First Nations (as applicable); and the professional judgment of the Study Team.

- **Existing Conditions** - Establishment of existing (baseline) environmental conditions for the VEC. In many cases existing conditions expressly and/or implicitly include those environmental effects that may be or may have been caused by other past or present projects or activities that have been or are being carried out.

- **Assessment of Project-Related Environmental Effects** - Project-related environmental effects are assessed. The assessment includes descriptions of how an environmental effect will occur, the mitigation and environmental protection measures proposed to reduce or eliminate the environmental effect, and the characterization of the residual environmental effects of the Project. The focus is on residual environmental effects, *i.e.*, the environmental effects that remain after planned mitigation has been applied. All phases of the Project are assessed (*i.e.*, Construction, Operation, and Decommissioning and Abandonment), as are Accidents, Malfunctions, and Unplanned Events. The evaluation also considers the effects of the environment on the Project. For each VEC, a determination of significance is then made, based on the identified significance criteria.
Selection of Valued Environmental Components
Rationale for Selection, Issues Identification, Regulatory Setting

Project Interactions with the Environment
• Identification of Environmental Effects
• Screening of Project-Environment Interactions
• Selection of Measurable Parameters

Identification of EA Boundaries
Spatial, Temporal, Administrative, and Technical

Establish Standards or Thresholds for Determining Significance of Environmental Effects
(also known as Significance Criteria)

Establish Existing Conditions

Assessment of Project-Related Environmental Effects
• Description of Project Environmental Effects
• Mitigation of Project Environmental Effects
• Characterization of Residual Project Environmental Effects
• Description of Effects of the Environment on the Project

Assessment of Cumulative Environmental Effects
• Screening of Cumulative Environmental Effects
• Identification of Other Projects and Activities
• Characterization of Residual Cumulative Environmental Effects

Determination of Significance
• Residual Project-Related Environmental Effects
• Residual Cumulative Environmental Effects

Follow-Up

Summary

Figure 3.1 Summary of Stantec Environmental Assessment Methodology
• **Assessment of Cumulative Environmental Effects** - Cumulative environmental effects of the Project are identified in consideration of other past, present or future projects or activities, for all phases of the Project (i.e., Construction, Operation, and Decommissioning and Abandonment), as well as for Accidents, Malfunctions, and Unplanned Events. An assessment of potential interactions is completed to determine if an assessment of cumulative environmental effects is required (i.e., there is potential for substantive interaction) for that specific Project-related environmental effect that overlaps with those of other projects or activities that have been or will be carried out. The residual cumulative environmental effects of the Project in combination with other past, present, or future projects or activities that have been or will be carried out are then evaluated, including the contribution of the Project to those cumulative environmental effects.

• **Determination of Significance** - The significance of residual Project-related and cumulative environmental effects is then determined, in consideration of the significance criteria.

• **Recommendations for Follow-up** - Follow-up and monitoring to verify the environmental effects predictions or to assess the effectiveness of the planned mitigation are recommended, where applicable.

Further details on the environmental assessment methodologies that were used in this EA can be provided upon request to Stantec.

### 3.2 Scope of Assessment

**Scope of Project**

The RAs, namely PWGSC, DFO, and INFC, as authorized under subsection 15(1) of *CEAA*, have determined that the scope of the Project to be assessed under *CEAA* includes the following components: building demolition; seawall and site work; pile driving; concrete work and parkade; mechanical and electrical work; steel frame and demolition; building enclosure; and outside landscaping.

The TOR requires a description of each Project component, as follows:

- physical description of the proposed project, including function, dimensions, capacities, and footprints, and heights of structures;

- construction details, including land clearing, demolition, excavation, drilling, transportation of construction material, management of construction/demolition wastes, and management of contaminated soil;

- details regarding typical operating/maintenance cycle, raw material used, and wastes generated, where applicable; and
Factors to be Considered

All EAs conducted under CEAA require specific factors to be considered. Section 16(1) of CEAA establishes the mandatory factors to be considered for all EAs.

The RAs have determined that the EA will consider the mandatory factors outlined in Sections 16(1)(a) through 16(1)(e) of CEAA, as follows:

(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 this Act and the regulations;

(d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project;

(e) Any other matter relevant to the screening…that the responsible authority…may require to be considered.”

Scope of Factors to be Considered

The EA shall consider the factors outlined in Section 16(1)(a) to (e), of CEAA. Specifically, the EA will consider the potential environmental effects of planned activities and mitigation to be carried out during Construction and Operation of the Project, as required under Sections 16(1)(a) and (b) of CEAA, including the potential cumulative environmental effects of other projects or activities that have been or will be carried out. The potential environmental effects of credible Accidents, Malfunctions, and Unplanned Events that could occur during these phases and/or as part of these activities shall also be assessed.

The environmental components identified in the TOR to be included in the EA are listed in Table 3.1, along with the name of the VEC that each of those components will be assessed under in this EA.
Table 3.1 VECs to be Assessed

<table>
<thead>
<tr>
<th>Environmental Components Identified in TOR</th>
<th>Assessed as in this EA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality and Climate</td>
<td>Atmospheric Environment</td>
</tr>
<tr>
<td>Surface Water and Aquatic Habitat</td>
<td>Freshwater Environment, Wetland Environment, Marine Environment</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Groundwater Resources</td>
</tr>
<tr>
<td>Subsurface Geology and Soils</td>
<td>Terrestrial Environment</td>
</tr>
<tr>
<td>Fish and Fish Habitat</td>
<td>Marine Environment</td>
</tr>
<tr>
<td>Fisheries</td>
<td></td>
</tr>
<tr>
<td>Wildlife and Wildlife Habitat</td>
<td>Terrestrial Environment</td>
</tr>
<tr>
<td>Migratory Birds</td>
<td>Terrestrial Environment</td>
</tr>
<tr>
<td>Species of Special Concern</td>
<td>Terrestrial Environment, Marine Environment</td>
</tr>
<tr>
<td>Noise and Vibration</td>
<td>Atmospheric Environment</td>
</tr>
<tr>
<td>Contaminated Sites</td>
<td>Public Health and Safety</td>
</tr>
<tr>
<td>Socio-economic Conditions</td>
<td>Labour and Economy, Land Use</td>
</tr>
<tr>
<td>Anything of Historical, Paleontological, or Architectural Significance</td>
<td>Archaeological and Heritage Resources</td>
</tr>
<tr>
<td>Physical and Cultural Heritage</td>
<td></td>
</tr>
<tr>
<td>Current Use of Lands and Resources for Traditional Purposes by Aboriginal Persons</td>
<td>Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons</td>
</tr>
<tr>
<td>Not in original scope.</td>
<td>Transportation</td>
</tr>
</tbody>
</table>

3.3 Consultation and Engagement

The consultation and engagement plan in support of the EA of the Project has been developed following the guidance of CEAA and provincial EIA guidelines (PEI 2010). A summary of the planned activities and initiatives is provided in the following sections.

3.3.1 Regulatory Consultation

Regulatory consultation has been conducted with several regulatory agencies throughout the course of the EA. A meeting was held with CADC, PEIDEEF, PWGSC, CEA Agency, Transport Canada, Environment Canada, and INFC on September 18, 2010, to discuss project details and the scope of the EA.

3.3.2 Public and Stakeholder Engagement

As part of the design process for the proposed convention centre, consultation was carried out in 2007 and 2008 with the following stakeholders: Mi’kmaq Confederacy of PEI (MCPEI),
ENVIRONMENTAL ASSESSMENT (EA):
Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI

Downtown Residents Association, Greater Charlottetown Chamber of Commerce, Tourism Industry Association of PEI, Tourism Advisory Council, City of Charlottetown, Tourism Charlottetown Chamber of Commerce, Charlottetown Area Development Corporation (Board of Directors), and Westmount Hospitality Group/Inn Vest REIT.

The project description was sent out to the PEI Fisherman’s Association, PEI Aquaculture Alliance, and the PEI Shellfish Association in a letter dated December 22, 2010. These groups were encouraged to review the project details and provide feedback regarding the potential concerns with respect to local fisheries. The PEI Shellfish Association had concerns regarding habitat loss in the area, as well as potential siltation of oyster beds during pile driving and infilling in the marine environment. They have indicated that these concerns have been addressed in the project description (i.e., use of silt curtain during marine work) and the assessment of the marine environment (i.e., preparation of a habitat compensation plan). The PEI Fisherman’s Association wanted to ensure that an EA was being conducted for the project. The PEI Aquaculture Alliance indicated that they had no concerns associated with the project.

Additional stakeholders and the general public will be invited to participate in the EA process of the Project in several ways. The Proponent is planning to hold a public open house to present information on the Project, answer questions, and collect comments and feedback. The open house will be held no less than 15 days after the EA is registered with PEIDEEF. A report summarizing the open house, including all comments and questions received, will be prepared and submitted to CEAA and PEIDEEF.

The EA will be posted on the website of the Government of PEI (www.gov.pe.ca) along with any other Project-related information. A copy of the EA will also be available for public review at the Charlottetown office of PEIDEEF, which is located on the fourth floor of the Jones building at 11 Kent Street. A Notice of Commencement has been posted on the Canadian Environmental Assessment Registry (CEAR) website (http://www.ceaa.gc.ca/050/details-eng.cfm?evaluation=59114) with a project description and contact information for additional information.

A notice will be placed in the local newspaper, the Guardian, advising the public of the Project and providing contact information of both the Proponent and PEIDEEF so that comments can be submitted or so that further information can be requested.

3.3.3 First Nations Consultation

On September 11, 2009, the Province of PEI and CADC signed a Memorandum of Understanding with MCPEI to partner with the First Nations as they pursue the acquisition of federal government land on the Charlottetown waterfront for tourism development opportunities. The agreement states that MCPEI, on behalf of the Mi'kmaq governments of Lennox Island and Abegweit, will be part of the redevelopment process. At the request of the First Nations, PWGSC consulted with the Mi'kmaq governments of Lennox Island and Abegweit with regard to
the Project, specifically on the land transfer to the Province. In conjunction with the Memorandum of Understanding, PWGSC reached an accommodation with the First Nations.

In December, 2010, as part of this environmental assessment process, letters were sent to the province’s Aboriginal groups to determine if there were any potential impacts related to the project on traditional and cultural activities. The letters were written on behalf of Public Works and Government Services, Infrastructure Canada, Department of Fisheries and Oceans and the Province of Prince Edward Island as part of their duty to consult and good governance with Aboriginal groups. Responses were received and no potential infringements were identified (Appendix B).

3.3.4 Other Project or Activities That Have Been or Will Be Carried Out

The consideration of other projects or activities that have been or will be carried out in the vicinity of the Project is a necessary component of the assessment of cumulative environmental effects to meet the requirements of CEAA. For convenience, the specific projects and activities that are planned or under construction are grouped with other similar projects, to facilitate the assessment of cumulative environmental effects in logical groupings. The other projects and activities considered in the cumulative environmental effects assessment in this EA (i.e., “other projects or activities that have been or will be carried out”) are listed in Table 3.2 and shown on Figure 3.2 (Appendix A).

Table 3.2 was generated based on current knowledge of the area of the Project and professional judgment of the Study Team. The list of potential future projects or activities that will be carried out was generated by consulting PEIDEEF’s list of undertakings (http://www.gov.pe.ca/envengfor/index.php3?number=1005874&lang=E, October 26, 2010 update) as well as CEAR (http://www.ceaa-acee.gc.ca/050/index_e.cfm, November 3, 2010 edition), and selecting projects or activities within reasonable proximity to the Project (e.g., Charlottetown Harbour). The PEIDEEF’s Record of undertaking includes other projects in the Charlottetown area, but these other projects or activities do not overlap spatially with the Project and as such are not included in the list of other projects or activities in Table 3.2. The list of other projects or activities that will be carried out as outlined in Table 3.2 considers only those projects or activities that are proximal to the Project and where a reasonable probability of their environmental effects overlapping with those of the Project would be expected.

The list of other projects or activities in Table 3.2 considers all past and present projects that have been or are currently being carried out, as well as those projects or activities that have been formally proposed by project proponents (i.e., have been registered). Other potential projects, proposals, concepts, ideas, visions, or initiatives that may be under consideration, but which have not been formally registered provincially or federally, are not included in this list; their cumulative environmental effects with the Project are thus not assessed in this EA. Once these other potential projects or activities are formally proposed and assessed provincially and/or federally, their environmental effects that overlap with the Project and would need to be assessed as part of a cumulative environmental effects assessment in those EAs.
Table 3.2 Other Projects and Activities for Consideration of Cumulative Environmental Effects

<table>
<thead>
<tr>
<th>Name of Project or Activity</th>
<th>Brief Description of Project or Activity</th>
<th>Key Environmental Effects that May Overlap with the Potential Environmental Effects of the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past or Present Projects or Activities That Have Been Carried Out</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Riverside Drive Marine Infilling and Road Expansion, Charlottetown, PEI | To facilitate the expansion of Riverside Drive, a portion of the marine environment was infilled along Riverside Drive in Charlottetown. | • Change in Land Use  
• Change in Marine Environment |
| Paoli’s Wharf Condominium Development, Charlottetown, PEI | Redevelopment of Paoli’s wharf to build a condominium on the Charlottetown Harbour. | • Change in Land Use  
• Change in Marine Environment |
| Decommissioning of Oil Supply Pipeline, Charlottetown, PEI | Irving Oil Limited decommissioned an oil supply pipeline located along the Hillsborough River on Riverside Drive in Charlottetown. | • Change in Marine Environment |
| Charlottetown Waste Treatment Facility Upgrade, Charlottetown, PEI | Upgrade to a secondary waste treatment facility on Riverside Drive in Charlottetown. | • Change in Marine Environment |
| Charlottetown Marine Terminal Repair and Expansion and New Marina Development, Charlottetown, PEI | The project involved repairing the existing marine terminal as well as the construction and operation of the expanded marine terminal. | • Change in Marine Environment  
• Change in Labour and Economy |
| The Holman Grand Hotel Development, Charlottetown, PEI | The project involves the construction of a new ten story hotel adjacent to the Confederation Court Mall. The project involves the construction of an underground pedway to the Confederation Centre of the Arts. | • Change in Atmospheric Environment  
• Change in Labour and Economy |
| Holland College Residence Expansion and Addition of Academic Facilities | The project involves the expansion of the existing residence at Holland College as well as the addition of two new buildings to be used for continuing education and sciences. | • Change in Atmospheric Environment |
| Potential Future Projects or Activities That Will Be Carried Out |
| Construction of Parking Lot and Concert Venue Site, Charlottetown, PEI | CADC is proposing to construct a parking lot and develop a concert venue on Water Street Parkway in Charlottetown. | • Change in Marine Environment  
• Change in Land Use |
ENVIRONMENTAL ASSESSMENT (EA):  
Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI

4 SUMMARY OF THE EXISTING ENVIRONMENT

A summary of existing environmental conditions in the vicinity of the Project is provided in this chapter. The summary is based on existing literature and sources of information that are available in the area of the Project, supplemented by field reconnaissance where appropriate.

4.1 Physical Environment

4.1.1 Groundwater Resources

Jacques Whitford conducted a Phase II Environmental Site Assessment at the CCG base in 2002 (Jacques Whitford 2002). Information on groundwater resources collected as part of the Phase II assessment provides the basis for the following characterization of existing groundwater resources.

The regional surface drainage (apparent groundwater flow direction) was found to be towards Charlottetown Harbour, which surrounds the property to the south, east, and west. At each of the three monitor wells installed at the site, the depth to water indicated that the groundwater table is located within the fill layer (refer to Figure 4.1 (Appendix A) for monitor well locations). Based on the depth to water and the calculated groundwater elevation, the groundwater table at the site may be considered to be flat with a slight flow to the east at a horizontal hydraulic gradient of less than one percent. Due to the proximity of the site to Charlottetown Harbour, it may be assumed that the groundwater table has tidal influences.

Groundwater samples were collected from the three monitor wells. The concentrations of arsenic in MW 1, cadmium in MW 1 and MW 2, and naphthalene in MW 1 and MW 3 exceeded the Canadian Council of Ministers of the Environment (CCME) guidelines for Marine Aquatic Life (Table 4.1).

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Units</th>
<th>MW 1</th>
<th>MW 2</th>
<th>MW 3</th>
<th>CCME Guidelines for Marine Aquatic Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>mg/L</td>
<td>47</td>
<td>4</td>
<td>-</td>
<td>12.5</td>
</tr>
<tr>
<td>Cadmium</td>
<td>mg/L</td>
<td>3.2</td>
<td>0.6</td>
<td>-</td>
<td>0.12</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>µg/L</td>
<td>2.9</td>
<td>-</td>
<td>2</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 4.1 Elevated Results of Chemical Analysis of Groundwater Collected at the Canadian Coast Guard Base, Charlottetown, PEI
Samples collected for petroleum hydrocarbons indicated levels of BTEX and/or modified TPH are below the applicable provincial and CCME guidelines. The hydrocarbon products identified in the samples included gasoline, fuel oil, and/or lube oil fractions. The results of analyses for PCBs conducted on groundwater samples collected from MW 1 and MW 3 indicated non-detectable levels. No groundwater sample for PCB analysis was collected from MW 2.

In the vicinity of the proposed convention centre, several geothermal wells have been identified. Table 4.2 outlines the well locations, as well as available information specific to each well.

### Table 4.2  Groundwater Wells on Properties Surrounding the Canadian Coast Guard Base, Charlottetown, PEI

<table>
<thead>
<tr>
<th>Well Location</th>
<th>No. of Wells</th>
<th>Diameter of Well (cm)</th>
<th>Approximate Depth of Well (m)</th>
<th>Depth of Casing (m)</th>
<th>Approximate Extraction (igpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta Prince Edward Hotel</td>
<td>2</td>
<td>15</td>
<td>100</td>
<td>43</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td>27</td>
<td>9</td>
<td>180</td>
</tr>
<tr>
<td>Harbourside</td>
<td>1</td>
<td>No data available</td>
<td>31</td>
<td>No data available</td>
<td>152</td>
</tr>
<tr>
<td>Cambridge Building</td>
<td>2</td>
<td>15</td>
<td>46</td>
<td>No data available</td>
<td>50</td>
</tr>
<tr>
<td>Founders’ Hall</td>
<td>2</td>
<td>15</td>
<td>46</td>
<td>No data available</td>
<td>70</td>
</tr>
<tr>
<td>Provincial Court House</td>
<td>1</td>
<td>No data available</td>
<td>31</td>
<td>No data available</td>
<td>60</td>
</tr>
<tr>
<td>Supreme Court</td>
<td>2</td>
<td>No data available</td>
<td>18</td>
<td>No data available</td>
<td>85</td>
</tr>
</tbody>
</table>

(Source: pers. comm. Wade Arsenault, Frank Callaghan, and Watson MacDonald)

#### 4.1.2 Hydrogeological Setting

The project site is characterized by silty glacial till overburden overlying Permian-aged sedimentary red beds comprised predominantly by red and gray fine to coarse sandstone and minor red siltstone interbeds. The overburden materials are poorly permeable, providing small volumes of groundwater to dug or drilled wells, and may locally act as a confining layer over bedrock. The dominant direction of groundwater flow would be expected to be towards the harbour shoreline. Since the site is located near the shore, it is in a regional groundwater discharge zone, so the bedrock water levels could be higher than the overburden water levels (e.g., net upward vertical hydraulic gradients from bedrock to overburden). Depending on well depth, flowing artesian conditions could be encountered.

The bedrock aquifer underlying this site, and most of PEI, is considered to be a very good aquifer, capable of individual well yields in the order of 909 litres per minute (L/min) (200 igpm) or higher from production wells ranging in depth from 45 to 122 m. Based on over 60 major
pumping tests performed by Stantec on PEI, the groundwater quality is characterized as a moderately hard (mean hardness 130 milligrams per litre (mg/L)), naturally neutral to alkaline (mean alkalinity 118.5 mg/L, mean pH 7.9), neutral to slightly scale forming (mean Langelier Calcite saturation index -0.25 at 4°C and +0.11 at 25°C) calcium-bicarbonate water type of low TDS (mean 156 mg/L). All parameters typically meet Guidelines for Canadian Drinking Water Quality (Health Canada 2008). Potential water quality issues at the proposed site could include iron and manganese if there is any significant degree of organic impact, urban impacts such as road salt, sewerage, etc., and saline intrusion under sustained high pumping rates.

4.1.3 Geological Conditions

Subsurface conditions for the site were reported in a Phase II Environmental Site Assessment (Jacques Whitford 2002). As part of the assessment, eleven (11) boreholes were drilled at the CCG base on February 6 and 7, 2002 (refer to Figures 4.1 and 4.2 for borehole locations). Six (6) boreholes were drilled in the infilled portion of the onsite wharf (western portion of the site). There was a 0.2 to 0.3 m layer of asphalt or concrete at the surface of each of these boreholes. At the eastern portion of the site in the parking/buoy lay down area there were five (5) boreholes that, with the exception of BH-9 (which had no gravel), had a surficial layer of reddish brown silty sand mixed with imported gravel (approximately 0.3 m thick). This surficial layer was underlain by fill materials that ranged in colour and composition from reddish brown, black to brown silty sand to silt and sand with trace to some sandstone gravel/cobbles. The thickness of the fill materials ranged from 4.27 m at BH-1 to at least 6.10 m at BH-2 to BH-7 and BH-11. Marine deposits were found below the fill material at locations BH-1 and BH-8 to BH-10. The marine deposits consisted of very loose to loose reddish brown silty sand to brown and grey silty sand to silt, some sand with trace fragments of wood, shells and/or organics.

A geotechnical investigation was conducted between December 7 and 9, 2010 to establish subsurface conditions at the site of the proposed convention centre (Stantec Consulting Ltd. 2011). Three boreholes were drilled to an average depth of 22.0 m below existing grade (refer to Figure 4.2 for borehole locations). Fill materials were found at the surface of the boreholes and extended to an average depth of 6.3 m below grade. The fill consisted of reddish brown to dark grey gravelly silt containing various amounts of wood (timber) and other debris. The fill was composed of 53% sand, 25% fines, and 23% gravel. Below the fill materials marine deposit was encountered from 7.0 to 11.4 m in thickness. The marine deposits ranged in composition from gravelly silty sand to a fine-grained clayey silt. Grain size analysis showed the silty sand to be composed of 75% sand and 25% fines, while the clayey silt was composed of 81% fines and 19% sand. Below the marine deposit a layer of till was encountered. The till was encountered at depths ranging from 13.3 to 17.8 m below existing grade. Bedrock was encountered below the layer of till at each of the boreholes. The rock core recovered consisted predominantly of very weak to weak, fine grained, reddish brown sandstone inter-bedded with hard reddish brown mudstone. The elevation of the bedrock surface at the site indicates that the rock surface slopes downward across the site from north to south, at a gradient of 10%.
4.1.4 Soil Conditions

The Phase II Environmental Site Assessment (Jacques Whitford 2002) also included an analysis of soils at the site. Soil analysis for petroleum hydrocarbons, metals, PAHs, and PCBs showed concentrations of metals that exceeded acceptable CCME guidelines at BH-8 and BH-9. BH-8 had elevated levels of lead, arsenic, and copper, while BH-9 had elevated levels of lead. PAH concentrations including naphthalene, phenanthrene, pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene exceeded CCME guidelines at BH-8. No other parameters exceeded applicable guidelines.

4.1.5 Atmospheric Environment

In the Charlottetown area, the predominant sources of air contaminants are dominated by exhaust from local road traffic, space heating, and small quantities of mixed industrial emissions from local industry.

The region surrounding the site includes commercial, industrial, and institutional facilities. Steady wind patterns tend to disperse most pollutants released into the region at most times of the year. In most cases, climate conditions provide good dispersion of air contaminants and frequent rainfall scavenges contaminants from the air. The ambient air quality also benefits from the infusion of relatively clean oceanic air masses from the North Atlantic. In general the air quality of the area of the proposed Project meets the regulatory criteria most of the time. Occasionally, however, air masses from central Canada or the eastern seaboard to the south may transport air contaminants into the area, causing poorer air quality. At other times, the weather is dominated by high-pressure air masses that produce low wind speed and poor dispersion of local emissions, which can lead to elevated concentrations of air contaminants and degraded air quality.

It is useful to examine the existing releases of air contaminants from local sources in the Charlottetown airshed, to serve as a benchmark for comparing the emissions related to the Project, and to assist in the assessment of cumulative environmental effects. Conventional air contaminants include particulate matter (TPM, PM$_{10}$, and PM$_{2.5}$) and combustion gases including sulphur dioxide (SO$_2$), nitrogen oxides (NO$_X$), and carbon monoxide.

Major sources of emissions located in the Charlottetown area include the Charlottetown Thermal Generating Station and PEI Energy Systems Energy from Waste Plant. The reported 2009 emissions of SO$_2$, NO$_X$, TPM, PM$_{10}$, PM$_{2.5}$, and volatile organic compounds (VOC) from facilities in PEI are presented in Table 4.3 (Environment Canada 2010a).

The emissions presented in Table 4.3 represent those associated with stationary fuel combustion only and as such do not include all emissions in the Charlottetown area. Only one facility in PEI (Cavendish Farms in New Annan) reported carbon monoxide emissions (15 t) (Environment Canada 2010a).
Table 4.3  Reported Emissions of Criteria Air Contaminants from PEI Facilities – 2009

<table>
<thead>
<tr>
<th>Facility Name</th>
<th>SO₂ (tonnes)</th>
<th>NOₓ (tonnes)</th>
<th>TPM (tonnes)</th>
<th>PM₁₀ (tonnes)</th>
<th>PM₂.₅ (tonnes)</th>
<th>VOC (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioVectra Inc. – Douglas J Hennessey Biochemical Centre</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>14</td>
</tr>
<tr>
<td>BioVectra Inc. – Regis and Joan Duffy Biopharmaceutical Centre</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>14</td>
</tr>
<tr>
<td>Cavendish Farms</td>
<td>726</td>
<td>141</td>
<td>56</td>
<td>45</td>
<td>29</td>
<td>NA</td>
</tr>
<tr>
<td>Irving Oil</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>202</td>
</tr>
<tr>
<td>Irving Shipbuilding Inc.</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0.58</td>
<td>0.55</td>
<td>12</td>
</tr>
<tr>
<td>Maritime Electric - Thermal Generating Station</td>
<td>98</td>
<td>37</td>
<td>NA</td>
<td>4.8</td>
<td>3.5</td>
<td>NA</td>
</tr>
<tr>
<td>McCain Foods (Canada)</td>
<td>126</td>
<td>26</td>
<td>NA</td>
<td>7.9</td>
<td>5.1</td>
<td>NA</td>
</tr>
<tr>
<td>PEI Energy Systems – Energy from Waste Plant</td>
<td>5.0</td>
<td>62</td>
<td>87</td>
<td>54</td>
<td>18</td>
<td>NA</td>
</tr>
<tr>
<td>PEI Energy Systems – UPEI Boiler</td>
<td>7.5</td>
<td>6.1</td>
<td>NA</td>
<td>0.865</td>
<td>0.547</td>
<td>NA</td>
</tr>
<tr>
<td>City of Charlottetown Total</td>
<td>111</td>
<td>105</td>
<td>87</td>
<td>60</td>
<td>22</td>
<td>230</td>
</tr>
<tr>
<td>Prince Edward Island Total</td>
<td>963</td>
<td>272</td>
<td>143</td>
<td>113</td>
<td>57</td>
<td>242</td>
</tr>
</tbody>
</table>

Notes:
NA  Facility did not report emissions
Source  Environment Canada 2010a.
Emissions from the operation of motor vehicles can have a large influence on air quality in the Charlottetown airshed. The contribution of vehicle emissions to air quality depends on a variety of factors including, but not limited to, the local meteorology, the number of vehicles in operation, the average age of the vehicles, and the state of repair of vehicles. Vehicle emissions can be both a local and regional problem, where emissions from large urban centres may also be transported by long-range transport of air pollutants and pose challenges to local air quality in areas hundreds of kilometres (km) from their origin. Air quality monitoring is conducted in downtown Charlottetown, and the contributions of existing vehicle emissions to ambient air quality in Charlottetown are therefore included in the monitoring results from this station.

In addition to emissions from industrial sources and motor vehicles, the emissions resulting from marine vessel traffic in the Charlottetown Harbour may influence the air quality in the Charlottetown airshed. The contribution of marine vessel traffic to air quality depends on several factors including, but not limited to, the local meteorology, the number of vessels in operation at a given time, the vessel size, vessel type, and type of marine fuel used while in the harbour. Similar to vehicles, the environmental effects of emissions from marine vessels on ambient air quality in the Charlottetown area would be included in the monitoring results from the air quality monitoring station in Charlottetown.

PEIDEEF operates an ambient air quality monitoring station at 3 Brighton Road, which is approximately 2 km from the Project site. Ozone, SO$_2$, NO$_x$, (including nitrogen dioxide), and PM$_{2.5}$ were monitored at the station in 2008 and 2009. Data for this period were provided by PEIDEEF for review (PEIDEEF 2010a and PEIDEEF 2009). The maximum 1-hour averages for sulphur dioxide and nitrogen dioxide during this period were 128 µg/m$^3$ (49 ppb) and 64 µg/m$^3$ (34 ppb), respectively, which are quite low compared to the PEI Ambient Air Quality Ground-Level Concentration Standards (PEIDEEF 2010a) for these two contaminants (400 µg/m$^3$ and 900 µg/m$^3$, respectively). The annual average sulphur dioxide and nitrogen oxides concentrations in 2009 were 7.9 µg/m$^3$ (3 ppb) and 5.6 µg/m$^3$ (3 ppb), respectively (PEIDEEF 2010a).

The maximum 1-hour average concentration of PM$_{2.5}$ is 42.5 µg/m$^3$ (PEIDEEF 2009), and the annual average concentration of PM$_{2.5}$ was 6 µg/m$^3$ (PEIDEEF 2010a). Although no ground-level standard exists in the PEI Air Quality Regulations, there is a 24-hour Canada Wide Standard of 30 µg/m$^3$ (98th percentile over three years). Generally, the 1-hour average concentrations of PM$_{2.5}$ are less than 30 µg/m$^3$, with a few exceptions.

The annual average ozone concentration in 2009 was reported to be 61 µg/m$^3$ (31 ppb) (PEIDEEF 2010a). PEIDEEF uses the Canada Wide Standard for comparison to measured ozone concentrations. However, at the time of writing, the ozone data were not analyzed for comparison with the Canada Wide Standard (8-hour, 4th highest value, averaged over 3 years – 128 µg/m$^3$).
4.1.5.1 Greenhouse Gas (GHG) Emissions

The reporting of GHG emissions from sources that release 50,000 t or more of carbon dioxide equivalent (CO₂e) is mandated by Environment Canada. In 2009, only one facility in PEI reported GHG emissions (Cavendish Farms in New Annapolis). The total quantity of GHG released from this facility was 74,103 t CO₂e (Environment Canada 2010c).

For comparison, 14 facilities in the province of New Brunswick reported GHG emissions to Environment Canada for a total of 10,118,213 t CO₂e (Environment Canada 2010c).

Although not all GHG emissions in PEI have been accounted for, it is clear the GHG emissions from PEI sources are low.

In 2008, the national reported emissions of GHGs for Canada were 734,420 kilotonnes CO₂e (Environment Canada 2010b), and globally reported GHG emissions were approximately 49 gigatonnes CO₂e (Baker et al. 2007) in 2007.

4.1.5.2 Sound Quality

The Project site is located in downtown Charlottetown, near the Charlottetown Harbour. Existing sound levels are expected to be dominated by vehicle traffic noise and general urban “hum”. Data on existing sound quality in Charlottetown were not available in the literature, and therefore a baseline noise survey was conducted at one of the buildings scheduled for demolition at the Project site. The purpose of the noise survey was to establish baseline sound pressure levels at the Project site and compare these to the regulatory criteria (Nova Scotia sound levels) for this EA.

The monitoring was conducted from January 5, 2011 to January 6, 2011 (over a period of 23 hours) using a Larson and Davis Type 1 sound level meter. This instrument averages the energy level of sound over a selected period of time and expresses this as an equivalent sound pressure level, L_eq, in dBₐ (A-weighted decibels). The measurement session consisted of a 23-hour period where one-second readings were logged to establish the variation over time. The values were then used to calculate the hourly L_eq value and 23-hour L_eq value.

The measured data are representative of the existing conditions and include environmental effects due to contributions from traffic and any other substantive sources of noise at the baseline monitoring locations, including those that are natural (e.g., wind in trees, birds, and animals).

The data collected from the survey were used to calculate a 23-hour L_eq and 23 1-hour L_eq values. The 1-hour L_eq values are presented in Table 4.4.
Table 4.4  Ambient Sound Monitoring Results

<table>
<thead>
<tr>
<th>Date</th>
<th>Hour Start</th>
<th>1-hour $L_{eq}$ (dBA)</th>
<th>NSE Criteria (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Jan-11</td>
<td>16:08:19</td>
<td>54.5</td>
<td>65</td>
</tr>
<tr>
<td>5-Jan-11</td>
<td>17:08:19</td>
<td>50.3</td>
<td>65</td>
</tr>
<tr>
<td>5-Jan-11</td>
<td>18:08:19</td>
<td>46.4</td>
<td>65</td>
</tr>
<tr>
<td>5-Jan-11</td>
<td>19:08:19</td>
<td>46.6</td>
<td>60</td>
</tr>
<tr>
<td>5-Jan-11</td>
<td>20:08:19</td>
<td>47.8</td>
<td>60</td>
</tr>
<tr>
<td>5-Jan-11</td>
<td>21:08:19</td>
<td>42.5</td>
<td>60</td>
</tr>
<tr>
<td>5-Jan-11</td>
<td>22:08:19</td>
<td>43.6</td>
<td>60</td>
</tr>
<tr>
<td>5-Jan-11</td>
<td>23:08:19</td>
<td>41.3</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>0:08:19</td>
<td>32.8</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>1:08:19</td>
<td>37.8</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>2:08:19</td>
<td>32.6</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>3:08:19</td>
<td>32.7</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>4:08:19</td>
<td>33.5</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>5:08:19</td>
<td>43.5</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>6:08:19</td>
<td>46.2</td>
<td>55</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>7:08:19</td>
<td>49.4</td>
<td>65</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>8:08:19</td>
<td>53.7</td>
<td>65</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>9:08:19</td>
<td>48.0</td>
<td>65</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>10:08:19</td>
<td>47.9</td>
<td>65</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>11:08:19</td>
<td>47.6</td>
<td>65</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>12:08:19</td>
<td>46.5</td>
<td>65</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>13:08:19</td>
<td>47.8</td>
<td>65</td>
</tr>
<tr>
<td>6-Jan-11</td>
<td>14:08:19</td>
<td>47.4</td>
<td>65</td>
</tr>
</tbody>
</table>

The maximum 1-hour $L_{eq}$ was 54.5 dBA, which is well below the NSE criteria of 65 dBA during the day. The 23-hour $L_{eq}$ of the data was 47.6 dBA.

A plot of the measured sound pressure levels (with 1-min, 1-hour, and 23-hour average $L_{eq}$) is presented in Figure 4.3.

The monitoring data suggest that the Project area is in a relatively quiet urban setting. It is noted that the monitoring was conducted shortly after a holiday period, and that normal vehicle movements around the Project area may have decreased. This would be noticed mostly during the morning and evening when vehicle traffic is highest. The decrease in vehicle traffic is not likely to substantively affect the 1-hour $L_{eq}$ values during the daytime.
Figure 4.3  Existing Background Sound Pressure Levels
4.1.6 Climate Change

Mean sea level at Charlottetown is 1.7 m above lower low water, large tide (LLWLT) (Environment Canada 2004c). Higher high water, large tide (HHWLT) in Charlottetown Harbour is recorded as 2.9 m above LLWLT (i.e., 1.2 m above mean sea level) (Environment Canada 2004c). The highest tide recorded at Charlottetown was 3.8 m above LLWLT (i.e., 2.1 m above mean sea level) (Environment Canada 2004c).

Sea level rise along the coast of Prince Edward Island has been projected to be 0.7 m over the next 100 years (Shaw et al. 2001). Currently, water levels along the seaward side of the Project site reach elevation 2.54 m chart datum (i.e., 0.85 m geodetic datum) at ordinary high tide. During higher high water large tide (HHWLT), water levels would be expected to reach 1.2 m above geodetic datum (Environment Canada 2004c). With sea level rise, water levels at HHWLT may reach 1.9 m above geodetic datum 100 years from now. Currently, water levels during storm surges can be expected to exceed 1.9 m above geodetic datum approximately every 7 years (Shaw et al. 2001). Water levels during storm surges may be expected to exceed 2.3 m above geodetic datum every 10 years by the year 2100 (Shaw et al. 2001).

During a study of sea level rise and climate change impacts on Prince Edward Island (Environment Canada 2002), three critical water levels were identified for Charlottetown: 4.23 m above LLWLT (January 2000 storm surge); 4.70 m above LLWLT (higher sea level with lesser storm surge); and 4.93 m above LLWLT (January 2000 storm surge plus 100 years of predicted sea level rise).

4.1.7 Contaminated Sites

A Risk Management Plan and Remedial Action Plan for the CCG base was completed by Jacques Whitford (2010) and included a review of previous environmental assessments and associated reports for the property. The report indicates that asbestos-containing materials (ACMs) were identified in the shops building, stores building, and potentially the buoy building. Lead paint was identified in the shops building and possibly the stores building. Paint samples from each of the buildings were analyzed for mercury content. Mercury was identified at levels between 0.02 parts per million (ppm) and 5.1 ppm.

4.2 Biological Environment

4.2.1 Birds

Information on birds in the vicinity of the project site has been gathered from several sources, including a review of the Maritime Breeding Birds Atlas (MBBA) and a review of information obtained by the Atlantic Canada Conservation Data Centre (ACCDC).
The PDA falls within Square 20MS81 of Region 27 (Prince Edward Island), of the MBBA (MBBA 2010). A summary of breeding birds with the potential to be present within these squares, as listed in the MBBA, is presented in Table 4.5.

**Table 4.5 Maritime Breeding Bird Atlas Region 27 (Prince Edward Island) Square 20 MS81 Bird Species List**

<table>
<thead>
<tr>
<th>Canada Goose</th>
<th>American Bittern</th>
<th>Great Black-backed Gull</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood Duck</td>
<td>Great Blue Heron</td>
<td>Common Tern</td>
</tr>
<tr>
<td>Gadwall</td>
<td>Turkey Vulture</td>
<td>Arctic Tern</td>
</tr>
<tr>
<td>American Wigeon</td>
<td>Osprey</td>
<td>Black Guillemot</td>
</tr>
<tr>
<td>American Black Duck</td>
<td>Bald Eagle</td>
<td>Rock Pigeon</td>
</tr>
<tr>
<td>Mallard</td>
<td>Northern Harrier</td>
<td>Mourning Dove</td>
</tr>
<tr>
<td>Mallard x Am. Black Duck</td>
<td>Sharp-shinned Hawk</td>
<td>Black-billed Cuckoo</td>
</tr>
<tr>
<td>Blue-winged Teal</td>
<td>Northern Goshawk</td>
<td>Eastern Screech Owl</td>
</tr>
<tr>
<td>Northern Shoveler</td>
<td>Broad-winged Hawk</td>
<td>Great Horned Owl</td>
</tr>
<tr>
<td>Northern Pintail</td>
<td>Red-tailed Hawk</td>
<td>Barred Owl</td>
</tr>
<tr>
<td>Green-winged Teal</td>
<td>American Kestrel</td>
<td>Long-eared Owl</td>
</tr>
<tr>
<td>Redhead</td>
<td>Merlin</td>
<td>Short-eared Owl</td>
</tr>
<tr>
<td>Ring-necked Duck</td>
<td>Virginia Rail</td>
<td>Boreal Owl</td>
</tr>
<tr>
<td>Greater Scaup</td>
<td>Sora</td>
<td>Northern Saw-whet Owl</td>
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<tr>
<td>Common Goldeneye</td>
<td>Common Moorhen</td>
<td>Common Nighthawk</td>
</tr>
<tr>
<td>Hooded Merganser</td>
<td>American Coot</td>
<td>Whip-poor-will</td>
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<tr>
<td>Common Merganser</td>
<td>Semipalmated Plover</td>
<td>Ruby-throated Hummingbird</td>
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<tr>
<td>Red-breast Merganser</td>
<td>Piping Plover</td>
<td>Belted Kingfisher</td>
</tr>
<tr>
<td>Ruddy Duck</td>
<td>Killdeer</td>
<td>Yellow-bellied Sapsucker</td>
</tr>
<tr>
<td>Gray Partridge</td>
<td>Spotted Sandpiper</td>
<td>Downy Woodpecker</td>
</tr>
<tr>
<td>Ring-necked Pheasant</td>
<td>Greater Yellowlegs</td>
<td>Hairy Woodpecker</td>
</tr>
<tr>
<td>Ruffed Grouse</td>
<td>Willet</td>
<td>American Three-toed Woodpecker</td>
</tr>
<tr>
<td>Sharp-tailed Pheasant</td>
<td>Upland Sandpiper</td>
<td>Black-backed Woodpecker</td>
</tr>
<tr>
<td>Common Loon</td>
<td>Wilson’s Snipe</td>
<td>Northern Flicker</td>
</tr>
<tr>
<td>Pied-billed Grebe</td>
<td>American Woodcock</td>
<td>Pileated Woodpecker</td>
</tr>
<tr>
<td>Double-crested Cormorant</td>
<td>Ring-billed Bull</td>
<td>Olive-sided Flycatcher</td>
</tr>
<tr>
<td>Great Cormorant</td>
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<td>Eastern Wood Pewee</td>
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<td>Eastern Bluebird</td>
<td>Yellow-bellied Flycatcher</td>
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<td>Veery</td>
<td>Northern Waterthrush</td>
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<tr>
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<td>Swainson’s Thrush</td>
<td>Mourning Warbler</td>
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<td>Hermit Thrush</td>
<td>Common Yellowthroat</td>
</tr>
<tr>
<td>Great Crested Flycatcher</td>
<td>American Robin</td>
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<td>Gray Catbird</td>
<td>Canada Warbler</td>
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<td>Northern Mockingbird</td>
<td>Chipping Sparrow</td>
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<tr>
<td>Warbling Vireo</td>
<td>Brown Thrasher</td>
<td>Vesper Sparrow</td>
</tr>
<tr>
<td>Philadelphia Vireo</td>
<td>European Starling</td>
<td>Savannah Sparrow</td>
</tr>
<tr>
<td>Red-eyed Vireo</td>
<td>Cedar Waxwing</td>
<td>Nelson’s Sharp-tailed Sparrow</td>
</tr>
<tr>
<td>Gray Jay</td>
<td>Tennessee Warbler</td>
<td>Fox Sparrow</td>
</tr>
<tr>
<td>Blue Jay</td>
<td>Nashville Warbler</td>
<td>Song Sparrow</td>
</tr>
<tr>
<td>American Crow</td>
<td>Northern Parula</td>
<td>Lincoln’s Sparrow</td>
</tr>
<tr>
<td>Common Raven</td>
<td>Yellow Warbler</td>
<td>Swamp Sparrow</td>
</tr>
<tr>
<td>Horned Lark</td>
<td>Chestnut-sided Warbler</td>
<td>White-throated Sparrow</td>
</tr>
<tr>
<td>Tree Swallow</td>
<td>Magnolia Warbler</td>
<td>Dark-eyed Junco</td>
</tr>
<tr>
<td>Bank Swallow</td>
<td>Cape May Warbler</td>
<td>Scarlet Tanager</td>
</tr>
</tbody>
</table>
Table 4.5  Maritime Breeding Bird Atlas Region 27 (Prince Edward Island) Square 20 MS81 Bird Species List

<table>
<thead>
<tr>
<th>Barn Swallow</th>
<th>Black-throated Blue Warbler</th>
<th>Northern Cardinal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-capped Chickadee</td>
<td>Yellow-rumped Warbler</td>
<td>Rose-breasted Grosbeak</td>
</tr>
<tr>
<td>Boreal Chickadee</td>
<td>Black-throated Green Warbler</td>
<td>Bobolink</td>
</tr>
<tr>
<td>Red-breasted Nuthatch</td>
<td>Blackburnian Warbler</td>
<td>Red-winged Blackbird</td>
</tr>
<tr>
<td>White-breasted Nuthatch</td>
<td>Palm Warbler</td>
<td>Rusty Blackbird</td>
</tr>
<tr>
<td>Brown Creeper</td>
<td>Bay-breasted Warbler</td>
<td>Common Grackle</td>
</tr>
<tr>
<td>Carolina Wren</td>
<td>Blackpoll Warbler</td>
<td>Brown-headed Cowbird</td>
</tr>
<tr>
<td>Winter Wren</td>
<td>Black and White Warbler</td>
<td>Baltimore Oriole</td>
</tr>
<tr>
<td>Golden-crowned Kinglet</td>
<td>American Redstart</td>
<td>Purple Finch</td>
</tr>
<tr>
<td>Ruby-crowned Kinglet</td>
<td>Ovenbird</td>
<td>House Finch</td>
</tr>
<tr>
<td>Red Crossbill</td>
<td>White-winged Crossbill</td>
<td>Pine Siskin</td>
</tr>
<tr>
<td>American Goldfinch</td>
<td>Evening Grosbeak</td>
<td>House Sparrow</td>
</tr>
</tbody>
</table>

Source: MBBA 2010

The majority of the birds listed within Square 20MS81 would not be found at the project site. Table 4.6 is a list of bird species that have been previously recorded by the ACCDC within a 5 km radius of the PDA.

Table 4.6  Bird Species Recorded within 5 km of PDA Centre (ACCDC 2010)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>COSEWIC Rank</th>
<th>SARA Rank</th>
<th>PEI General Status Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping Plover</td>
<td>Endangered</td>
<td>Endangered</td>
<td>At Risk</td>
</tr>
<tr>
<td>Common Tern</td>
<td>Not at Risk</td>
<td>No Schedule</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Purple Sandpiper</td>
<td>Not Assessed</td>
<td>No Schedule</td>
<td>Secure</td>
</tr>
<tr>
<td>Herring Gull</td>
<td>Not Assessed</td>
<td>No Schedule</td>
<td>Secure</td>
</tr>
</tbody>
</table>

Notes:
Not Assessed - a COSEWIC assessment has not been completed for the species.
No Schedule - the species is not listed on any SARA schedule.

Two bird Species at Risk (SAR) or Species of Conservation Concern (SOCC) (i.e., ranked Sensitive or rarer under the PEI General Status Ranks) have been previously recorded by ACCDC within a 5 km radius of the Project site (Table 4.4). Habitat types generally associated with these species are discussed below.

Piping Plover (*Charadrius melodus*) is listed as Endangered by COSEWIC and on Schedule one of SARA, with a PEI General Status Rank of At Risk. This species nests exclusively on coastal beaches (typically sandy beaches). No suitable habitat for this species is found within the PDA. The nearest known nesting beach for Piping Plover on the south shore of PEI is Wood Islands (pers. comm., Jackie Waddell).

Common Tern (*Sterna hirundo*) is listed as Sensitive under the PEI General Status Ranks. This species commonly nests in coastal and shoreline habitats (Seattle Audubon Society 2008). As
the Project site is currently an operating CCG base, this species is not likely to be found nesting in the immediate vicinity. The nearest known nesting area for Common Terns is located in Pownal Bay (pers. comm., Rosemary Curley).

The ACCDC also identified the range of Barrow’s Goldeneye (eastern population, *Bucephala islandica*) to be in the vicinity of the PDA. The eastern population of Barrow’s Goldeneye has been assessed by COSEWIC and has been designated as Special Concern; this species is also listed on Schedule 1 of SARA as Special Concern. Barrow’s Goldeneye has been listed as Sensitive on the PEI General Status Rank list.

4.2.2 Wildlife (excluding birds)

The project site is currently a paved lot/wharf with several buildings/sheds. There is little natural habitat for mammalian or invertebrate species and none are known to be present in the PDA, other than those that would typically be found in an urban setting. The data provided for the Project area by ACCDC indicated that three invertebrate species have previously been observed in the area. The Black Meadowhawk (*Sympetrum danae*), Striped Hairstreak (*Satyrium liparops*), and Question Mark (*Polygonia interrogationis*) have all been recorded within 1 km of the Project site. Due to the lack of habitat at the site, it is unlikely these species would be found at the site.

4.2.3 Vegetation

As previously noted, the Project site is currently a paved lot/wharf with several buildings/sheds. There is no vegetation on site aside from minor landscaping. A search of the ACCDC database (ACCDC 2010) revealed the following species, including a number of Species of Conservation Concern (*i.e.*, ranked sensitive or rarer under the PEI General Status Ranks) that have been previously recorded by ACCDC within a 5 km radius of the site (Table 4.7). None of the species have been previously assessed by COSEWIC.

### Table 4.7 ACCDC Database Search of Vegetation

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>S-Rank</th>
<th>PEI General Status Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickerelweed</td>
<td><em>Pontederia cordata</em></td>
<td>S1</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Water Whorl Grass</td>
<td><em>Catabrosa aquatica var. lauritania</em></td>
<td>S1</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Short-awned Foxtail</td>
<td><em>Alopecurus aequalis</em></td>
<td>S1</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Holmes’ Hawthorn</td>
<td><em>Crataegus holmesiana</em></td>
<td>S1</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Fowler’s Knotweed</td>
<td><em>Polygonum foleri</em></td>
<td>S1</td>
<td>Undetermined</td>
</tr>
<tr>
<td>One-flowered Broomrape</td>
<td><em>Orobanche uniflora</em></td>
<td>S1</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>American Witch-hazel</td>
<td><em>Hamamelis virginiana</em></td>
<td>S1</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Saltmarsh Starwort</td>
<td><em>Stellaria humifusa</em></td>
<td>S1</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Seaside Alkali Grass</td>
<td><em>Puccinellia americana</em></td>
<td>S1?</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Arrow-leaved Violet</td>
<td><em>Viola sagittata var. ovata</em></td>
<td>S1?</td>
<td>Extirpated</td>
</tr>
</tbody>
</table>
### Table 4.7 ACCDC Database Search of Vegetation

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>S-Rank</th>
<th>PEI General Status Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat-branched Tree-clubmoss</td>
<td>Lycopodium obscurum</td>
<td>S1S2</td>
<td>May be at Risk/Undetermined</td>
</tr>
<tr>
<td>Staghorn Sumac</td>
<td>Rhus typhina</td>
<td>S1S2</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Virginia Chain Fern</td>
<td>Woodwardia virginica</td>
<td>S2</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Small Round-leaved Orchid</td>
<td>Platanthera orbiculata</td>
<td>S2</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Lesser Rattlesnake-plantain</td>
<td>Goodyera repens</td>
<td>S2</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Early Coralroot</td>
<td>Corallorhiza trifida</td>
<td>S2</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Northern Sedge</td>
<td>Carex deflexa</td>
<td>S2</td>
<td>Not rated</td>
</tr>
<tr>
<td>Downy Willowherb</td>
<td>Epilobium strictum</td>
<td>S2</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Pink Corydalis</td>
<td>Corydalis sempervirens</td>
<td>S2</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Cut-leaved Coneflower</td>
<td>Rudbeckia laciniata</td>
<td>S2</td>
<td>Exotic</td>
</tr>
<tr>
<td>Connecticut Beggarticks</td>
<td>Bidens heterodoxa</td>
<td>S2</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Horned Pondweed</td>
<td>Zannichellia palustris</td>
<td>S2?</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Slender Spikerush</td>
<td>Eleocharis tenuis</td>
<td>S2?</td>
<td>Not rated</td>
</tr>
<tr>
<td>Canada Hawkweed</td>
<td>Hieracium canadense</td>
<td>S2?</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Northern Clubmoss</td>
<td>Lycopodium complanatum</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Northern Manna Grass</td>
<td>Glyceria borealis</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Salt Grass</td>
<td>Distichlis spicata</td>
<td>S2S3</td>
<td>Secure</td>
</tr>
<tr>
<td>Green Adder’s-mouth</td>
<td>Malaxis unifolia</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Thread Rush</td>
<td>Juncus filiformis</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Fox Sedge</td>
<td>Carex vulpinoidea</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Mackenzie’s Sedge</td>
<td>Carex mackenziei</td>
<td>S2S3</td>
<td>May be at Risk</td>
</tr>
<tr>
<td>Sea-side Dock</td>
<td>Rumex maritimus</td>
<td>S2S3</td>
<td>Not Ranked</td>
</tr>
<tr>
<td>Bushy Knotweed</td>
<td>Polygonum ramosissimum var. ramosissimum</td>
<td>S2S3</td>
<td>Not rated</td>
</tr>
<tr>
<td>Bushy Knotweed</td>
<td>Polygonum ramosissimum</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Trailing Stitchwort</td>
<td>Stellaria alsine</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Seabeach Sandwort</td>
<td>Honckenya peploides ssp. robusta</td>
<td>S2S3</td>
<td>Not Ranked</td>
</tr>
<tr>
<td>Seabeach Sandwort</td>
<td>Honckenya peploides</td>
<td>S2S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Northern Sweet Coltsfoot</td>
<td>Petasites frigidus var. palmatus</td>
<td>S2S3</td>
<td>Not rated</td>
</tr>
<tr>
<td>Silvery Glade Fern</td>
<td>Deparia acrostichoides</td>
<td>S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>One-flowered Wintergreen</td>
<td>Moneses uniflora</td>
<td>S3</td>
<td>Secure</td>
</tr>
<tr>
<td>Beechdrops</td>
<td>Epifagus virginiana</td>
<td>S3</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Bog Yellowcress</td>
<td>Rorippa palustris ssp. palustris</td>
<td>S3</td>
<td>Undetermined</td>
</tr>
<tr>
<td>Rough Cocklebur</td>
<td>Xanthium strumarium</td>
<td>S3</td>
<td>Secure</td>
</tr>
<tr>
<td>Bebb’s Sedge</td>
<td>Carex bebbii</td>
<td>S3?</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Canada Lettuce</td>
<td>Lactuca canadensis</td>
<td>S3?</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Howell’s Pussytoes</td>
<td>Antennaria howelli ssp.</td>
<td>S3?</td>
<td>Not rated</td>
</tr>
</tbody>
</table>

*Status Rank*: S1 = Sensitive, S2 = May be at Risk, S3 = Secure, S4 = Not Rated, S5 = Undetermined, S6 = Risk/Undetermined.
Table 4.7 ACCDC Database Search of Vegetation

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>S-Rank</th>
<th>PEI General Status Rank*</th>
</tr>
</thead>
<tbody>
<tr>
<td>petaloidea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leafy Pondweed</td>
<td><em>Potamogeton foliosus</em></td>
<td>S3S4</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Knotted Rush</td>
<td><em>Juncus nodosus</em></td>
<td>S3S4</td>
<td>Secure</td>
</tr>
<tr>
<td>Pale Sedge</td>
<td><em>Carex pallescens</em></td>
<td>S3S4</td>
<td>Secure</td>
</tr>
<tr>
<td>Eastern Hemlock</td>
<td><em>Tsuga canadensis</em></td>
<td>S3S4</td>
<td>Secure</td>
</tr>
<tr>
<td>Hairy Lettuce</td>
<td><em>Lactuca hirsuta var. sanguinea</em></td>
<td>SH</td>
<td>Extirpated</td>
</tr>
<tr>
<td>Pale-spiked Lobelia</td>
<td><em>Lobelia spicata</em></td>
<td>SNR</td>
<td>Undetermined</td>
</tr>
</tbody>
</table>

Although several SOCC were identified in the ACCDC search, it is unlikely that they would be found at the project site due to the high degree of disturbance at the site.

4.2.4 Aquatic Environment

4.2.4.1 Physical Oceanography

The Project site is located adjacent to Charlottetown Harbour, which is situated within the Hillsborough River estuary (Figure 4.4, Appendix A). From Hillsborough Bay a deep channel enters Charlottetown Harbour and continues approximately 25 km upstream of the Hillsborough Bridge and includes the North River and West River branches.

4.2.4.2 Bathymetry

Depth sounding values supplied to ADI during a geotechnical investigation at the CCG Base indicates that water depth in the proposed infill area ranges from approximately 0 m to approximately 3 m at low tide (ADI Limited 1994). The location of marine infilling will comprise an area both below the low tide mark and above the high tide mark. Approximately 6 m of fill will be placed in the intertidal zone to bring the area up to existing grade.

4.2.4.3 Sediment Quality

During a Phase II Environmental Site Assessment, Jacques Whitford (2002) sediment samples were collected at eight locations by divers using self contained underwater diving apparatus (SCUBA) (see Figure 4.5 for sample locations). The results of the sediment chemistry identified concentrations of several PAHs above the CCME sediment guidelines for residential/parkland and commercial land use and/or CCME Marine Probable Effects Levels (MPELs) including fluoranthene (Sa 3a, Sa 5a, and Sa 7a), phenanthrene (Sa 3a), and pyrene (Sa 3a). Several metals concentrations at the site also exceeded the CCME guidelines including arsenic (Sa 1a through Sa 8a), cadmium (Sa 8a), copper (Sa 1a through Sa 8a), lead (Sa 4a and Sa 5a), and zinc (Sa 4a and Sa 5a). The Atlantic Region Ocean Disposal Guidelines were also exceeded by cadmium, copper, lead, and zinc.
4.2.4.4 Benthic Environment

Information collected by PWGSC (2002) provided an overview of existing bottom types and marine vegetation. Substrate in the lower areas of the Hillsborough River is predominantly soft mud with scattered patches of firm sand and shellfish beds. The lower areas of the West River are hard clay or sand along the shoreline, transitioning to soft mud towards the channel with eelgrass beds. Hillsborough Bay has areas of firm sand, firm mud, and soft mud with patches of eelgrass beds or kelp.

On August 12, 2010, an underwater marine benthic habitat survey was conducted by Stantec within the area of the proposed infilling (Appendix C). The substrate in the proposed infill area was predominantly silt/sand with patches of rock (boulder, pebble, and gravel). Observations of fauna during the survey included frilled anemone (Metridium senile), unidentified crabs, sea stars (not identified to species), sand shrimp (Cragon septemspinosa), rock crabs (Cancer irroratus), hermit crabs (not identified to species), silversides (Menidia menidia), an unidentified tunicate, barnacles (not identified to species), cunners (Tautogolabrus adspersus), periwinkles (not identified to species), blue mussels (Mytilus edulis), unidentified crabs, unidentified fish, and unidentified fauna. Flora observed during the survey included eelgrass (Zostera marina), unidentified brown algae, sea beard (Pylaiella littoralis), oarweed kelp (Saccharina latissima), rockweed (Fucus sp.), bladder wrack (Fucus vesiculosus), sea lettuce (Ulva lactuca), hollow green weed (Enteromorpha intestinalis), and unidentified vegetation.

4.2.4.5 Water Quality

Water quality monitoring was conducted between 1989 and 1991 by PEIDEEF at a site in the Hillsborough River approximately 200 m off of Confederation Landing Park (PEIDEEF 2010b). During this time the salinity ranged from 24 to 27 parts per thousand (ppt). The maximum water temperature recorded was 23ºC and the minimum temperature recorded was 5ºC. Dissolved oxygen at the site ranged from approximately 6 mg/L to approximately 12 mg/L.

There are secondary sewage treatment plants located in Charlottetown, East Royalty, Stratford, Riverview Estates, and Mount Stewart which discharge into the Hillsborough Bay system.

4.2.4.6 Fish and Fish Habitat

The Hillsborough River and Hillsborough Bay support populations of quahogs (Mercenaria mercenaria), soft-shelled clams (Mya arenaria), American oyster (Crassostrea virginica), blue mussel, rock crab, winter flounder (Pseudopleuronectes americanus), tomcod (Microgadus tomcod), white perch (Morone americana), gaspereau (Alosa pseudoharengus), American eel (Anguilla rostrata), Atlantic salmon (Salmo salar), brook trout (Salvelinus fontinalis), striped bass (Morone saxatilis), rainbow smelt (Osmerus mordax), and Atlantic silverside. PWGSC (2002) collected information that indicates that Atlantic mackerel (Scomber scombrus), Atlantic herring (Clupea harengus), sculpin (Myxocepalhus sp.), rock gunnel (Pholis gunnellus), American
lobster (*Homarus americanus*), starfish, and sea anemone are also found in the Hillsborough River and Hillsborough Bay.

### 4.2.4.6.1 Finfish

Fish species known to occur in the area include species from families of flounders, codfishes, herring, mackerel, smelt, and silverside. Spawning behavior and habitat of common species belonging to these families is presented below.

The codfishes (Family Gadidae) are a family of medium to large sized demersal fish, which have reached their peak of abundance and diversity in the cool and/or deep waters of the Northern Hemisphere (Scott and Scott 1988). A total of 10 species have been recorded in the waters surrounding PEI (ACCDC 2005, Darbyson and Benoît 2003).

The flounders (Family Pleuronectidae) are a large family of highly specialized fishes, characterized by a laterally compressed body plan adapted for life on the seafloor. Many species are valued for food and support important fisheries. Seven species of flounders from the family Pleuronectidae are found in the waters surrounding PEI. Of these, the winter flounder and the windowpane (*Scophthalmus aquosus*) are of particular interest due to their abundance and distribution in the Northumberland Strait.

Atlantic herring are a small, abundant schooling species that are important as a forage species and for commercial value. Herring stocks found in the Northumberland Strait migrate between feeding areas and spawning grounds dependent on season. There are spring and fall spawning components in the Northumberland Strait. Spring spawning takes place from April to June in water depths of less than 20 m (Mallet 2005a). Fall spawning takes place from mid-August to October in water depths from 5 to 20 m (Mallet 2005a). Eggs are deposited on the substrate and attach to gravel and macroalgae until hatching (Breeze et al. 2002). Spring spawning occurs mainly in Escuminac, New Brunswick and the Magdelan Islands while fall spawning mainly occurs in Chaleur Bay, New Brunswick (Mallet 2005a).

Atlantic mackerel are highly migratory seasonal visitors to the southern Gulf of St. Lawrence. Spring migration begins in May and ends by early July and fall migration begins in September and continues into early November. Mackerel are a schooling species that feed on zooplankton, such as amphipods, copepods, and fish eggs by filtering them from the water with their gill rakers. They also actively hunt small pelagic fish, crustaceans, and molluscs (Scott and Scott 1988). Spawning generally occurs in June and early July, with the highest concentrations of eggs generally found in the area west of the Magdalen Islands (DFO 2002).

Rainbow smelt are a pelagic schooling species that inhabit inshore coastal regions in the southern Gulf of St. Lawrence. Populations of rainbow smelt are widely distributed throughout eastern and western North America and can be found in coastal waters as well as inland freshwater lakes. In the spring, both anadromous and landlocked adult smelt migrate upstream to freshwater spawning grounds (DFO 2004a).
Atlantic silverside are small, schooling fish that are found in estuaries, barachois ponds, and open salt water in the southern Gulf of St. Lawrence. PEI has the only commercial silverside fishery in Canada (DFO 2001a). Silversides are also a forage species for many species of birds, fish, and marine mammals. Silversides have a short life cycle, which is typically less than two years, and spend most of their time along the coast and in estuaries; offshore migration may occur during the winter months (DFO 2001a). In the spring, silversides enter marshes, creeks, and estuaries to spawn, which takes place in June in PEI (DFO 2001a). Their eggs are demersal and attach to estuarine vegetation.

American eels are found in estuaries and coastal freshwaters of North America. The American eel was designated as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Eels are catadromous fish that migrate from freshwater to the sea to spawn. The spawning migration occurs between August and December, with peak migration in September and October (DFO 2000). American eels spawn in the western part of the Sargasso Sea.

4.2.4.6.2 Shellfish

According to DFO's Shellfish Closures in the Gulf Region mapping application (2007), the Hillsborough Bay, North River, and portions of the Hillsborough and West Rivers are closed for the harvest of all bivalve molluscs.

In Canada, American oysters are restricted to warm, shallow bays and estuaries of the southwestern Gulf of St. Lawrence and the coves of Cape Breton's Bras d'Or Lakes. PEI is the leading oyster producing province in Canada (DFO 2004b). Both Hillsborough River and West River are considered important oyster areas in PEI. Oysters spawn when the water temperature rises above a minimum temperature of 20°C (DFO 2004b), typically between July and early August. For approximately three weeks the oyster larvae swim and drift in tidal currents, after which they settle on suitable substrate, preferably mollusc shells (DFO 2004b).

Quahogs are the second most commercially important species in Hillsborough Bay. They are abundant in the soft mud along the intertidal and subtidal zones of coastal areas (DFO 1996). The start of spawning season is triggered by an increase in water temperature. During the summer through to autumn, the free-floating larvae develop slowly in the water column and may drift for more than 90 days before settling on the bottom.

The soft-shell clam inhabits mud and clay substrates between the intertidal zone and the subtidal zone in sheltered coastal bays. In the southern Gulf of St. Lawrence, spawning usually occurs between late June and early July, when the water temperatures increase. The larvae are free-swimming for approximately four weeks before settling on a suitable benthic substrate (DFO 2001b).
Blue mussels are generally found in bays and estuaries that have elevated levels of nutrients from land runoff (DFO 2003). In the southern Gulf of St. Lawrence, mussels are found in rocky shores along the coastlines, bays, and river mouths, where the mussels attach themselves to submerged surfaces. Spawning generally occurs between May and August, triggered by environmental changes such as high food levels, temperature fluctuations, and physical disturbance (DFO 2003).

American lobsters are a commercially important species of crustacean in the Northumberland Strait, including Hillsborough Bay. Lobsters are found in water depths up to 40 m (Mallet 2005b). Lobster eggs hatch between late June and early September, after which the larvae are free-swimming and remain in the water column for three to 12 weeks, at which time they settle to the substrate (Mallet 2005b). Crevices or burrows are important habitat components for juvenile lobsters to avoid predation.

Rock crabs are found from the intertidal zone to a water depth of 40 m. Rock crab larvae are planktonic from mid-June to mid-September.

4.2.4.6.3 Marine Mammals

Information collected by PWGSC (2002) from aquaculture leaseholders in the Hillsborough Bay area indicates that porpoises and seals can be found in Hillsborough River/Bay. Marine mammal species known to occur in Northumberland Strait are described below.

Grey seals (*Halichoerus grypus*) can be found year-round in Northumberland Strait (Davis and Browne 1996). Northwest Atlantic population estimates from 1997 indicate a population of 195,000 grey seals (DFO 2008). In the Northumberland Strait grey seals whelp near Pictou Island (Davis and Browne 1996).

Harbour seals (*Phoca citulina concolor*) can be found year-round in Northumberland Strait (Davis and Browne 1996). They are the least abundant of three seal species found in the southern Gulf of St. Lawrence.

Harbour porpoise (*Phocoena phocoena*) can be found year-round in the eastern portion of Northumberland Strait (Davis and Browne 1996).

Atlantic white-sided dolphins (*Leucopleurus acutus*) may be present in Northumberland Strait (Davis and Browne 1996). Records indicate that 15 white-sided dolphins were stranded in Bedeque Bay in the fall of 1990 (PWGSC 2002).

There is potential for other marine species to be present in the study area; however, these species would be uncommon transients given their preference for deeper waters, and would likely enter the study area in pursuit of prey. For example, in June of 2009 a beluga whale (*Delphinapterus leucas*) was sighted in Hillsborough Bay and Hillsborough River. The beluga whale has been designated as Threatened by COSEWIC and is listed on Schedule 1 of the
Species at Risk Act (SARA) as Threatened. Other marine mammals that may be found in Northumberland Strait include killer whale (*Orcinus orca*), pilot whale (*Globicephala melaena*), blue whale (*Balaenoptera musculus*), minke whale (*Balaenoptera acutorostrata*), fin whale (*Balaenoptera physalus*) and white-beaked dolphin (*Lagenorhynchus albirostris*) (Davis and Browne 1996). Two of these species, the blue whale and the fin whale, are protected under SARA. The blue whale has been designated by COSEWIC as Endangered and is listed on Schedule 1 of SARA as Endangered and the fin whale is designated by COSEWIC as Special Concern and is listed on Schedule 1 of the SARA as Special Concern.

4.2.4.6.4 Environmentally Sensitive Areas

The Hillsborough River is located in the vicinity of the Project site and is listed as a Canadian Heritage River. The natural heritage of the river includes a major nesting colony of Great-blue Herons (*Ardea Herodias*) located on Glenfinnan Island in the Hillsborough River. There are also designated natural areas within the watershed; Royalty Oaks, a mature oak stand located in East Royalty and a wetland located in Johnson’s River are both protected under the provincial *Natural Areas Protection Act* (Hillsborough River nd).

4.3 Human Environment

Charlottetown is the major economic centre in PEI and is a busy tourist area of the province. It hosts many restaurants, tourist shops, marinas, a shopping centre, and the Confederation Centre of the Arts as well as other local attractions.

4.3.1 Population

Based on Census data, the population of PEI in 2006 was 135,851. The population of the City of Charlottetown was 32,174, a 0.3% decrease from 2001.

4.3.2 Land Use

The Project site is located in the City of Charlottetown, on the waterfront of Charlottetown Harbour. The site is surrounded by a mixture of commercial, residential, and recreational properties including the Harbourside Complex, Delta Prince Edward Hotel, a boardwalk, Confederation Landing Park, and Peakes Quay Marina (Figure 4.6). Table 4.8 outlines the properties within 100 m of the Project site.
Table 4.8  Properties within 100 m of the PEI Convention Centre Project Site

<table>
<thead>
<tr>
<th>Direction</th>
<th>Current Land Use</th>
<th>Current Occupant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>Recreational</td>
<td>Quarter Master Marine</td>
</tr>
<tr>
<td>Northeast</td>
<td>Recreational</td>
<td>Confederation Landing Park</td>
</tr>
<tr>
<td>Northeast</td>
<td>Commercial</td>
<td>Peakes Quay Restaurant and Bar</td>
</tr>
<tr>
<td>Northeast</td>
<td>Commercial</td>
<td>Various Shops at Peaks Quay Marina</td>
</tr>
<tr>
<td>North</td>
<td>Commercial</td>
<td>Delta Prince Edward</td>
</tr>
<tr>
<td>Northwest</td>
<td>Commercial</td>
<td>Merchantman Pub</td>
</tr>
<tr>
<td>Northwest</td>
<td>Government</td>
<td>Public Works and Government Services Canada</td>
</tr>
<tr>
<td>Northwest</td>
<td>Commercial</td>
<td>Various Private Businesses</td>
</tr>
<tr>
<td>Northwest</td>
<td>Government</td>
<td>PEI Supreme Court</td>
</tr>
<tr>
<td>Northwest</td>
<td>Residential</td>
<td>Harbourside Apartments</td>
</tr>
<tr>
<td>West</td>
<td>Commercial</td>
<td>Seasonal Restaurant</td>
</tr>
<tr>
<td>West</td>
<td>Recreational</td>
<td>Charlottetown Yacht Club</td>
</tr>
</tbody>
</table>

4.3.3  Archaeological, Heritage, or Cultural Resources

Letters were sent to the Aboriginal Affairs Secretariat and Culture, Heritage and Libraries requesting information concerning the potential for archaeological, heritage, or cultural resources to be located in the vicinity of the Project. No known heritage or other resources are known to be present within the Project area. Field investigations for Archaeological, Heritage, or Cultural resources were not carried out for this Project because of the lack of such known resources in the area as documented by provincial agencies. Any discovery of an archaeological, heritage, or cultural resource as part of the Project would be an unplanned event; however, given the disturbed context of the site and the minimal amount of excavation, such discoveries are highly unlikely to occur.

Charlottetown Tide Gauge (station numbers 1700) is located on the CCG property (shown on Figure 2.1) and is owned and operated by the Canadian Hydrographic Service (DFO). This the only tide gauge in PEI and it has one of the longest tide gauge records in the Atlantic Region. There will be no interaction with the tide gauge during Construction or Operation activities.

4.3.4  Transportation

The Project site is located at 1 Queen Street, in Charlottetown. Queen Street experiences large volumes of traffic daily as it is a main street in Charlottetown. From the intersection of Queen Street and Water Street, trucks will have access to the Charlottetown Perimeter Highway by following Water Street northeast to connect with Riverside Drive, which is part of the highway.
The Charlottetown Marine Terminal provides berthing for commercial and cargo vessels. Access to the Marine Terminal wharf is restricted through security fencing and a security gate.

4.3.5 Commercial Fishery

There is a rock crab fishery in Charlottetown Harbour that is open from the first Monday in August until November or until the quota has been met. The lobster fishing season is open from May 7 to July 7, however, lobster is not historically fished in Charlottetown Harbour (pers. comm. Colin MacIsaac). Quahogs and oysters are harvested from May through July, however the area between the Charlottetown Waste Treatment Facility and Victoria Park is closed due to contamination.

A sensitive period for oyster spat occurs from mid-June through mid-July when settling occurs. Project activities affecting the marine environment will be completed to avoid oyster spatfall. There is a commercial silverside fishery that operates off of the CCG wharf each fall. The nets are located on the west side of the wharf, opposite the location of marine infilling, and all work being conducted in the marine environment will be completed by the time the fishery is open (October 1 – December 31). In the event that delays in the Project schedule result in Project activities taking place in the marine environment during the sensitive period for oyster or the silverside fishery, a strategy will be developed in consultation with DFO to provide further mitigation and/or compensation for the affected fisheries.
5 ENVIRONMENTAL EFFECTS ASSESSMENT

5.1 Project Interactions with the Environment

To determine the potential for and nature of interactions between the Project and the environment, the Study Team employed a qualitative rating system. The Study Team rated each interaction between the Project and each VEC based on the following rating system, with a rating assigned for each interaction based on the professional judgment and experience of the Study Team, as follows.

0 = No interaction. The environmental effects are not significant and not considered further in this report.

1 = Interaction occurs; however, based on past experience and professional judgment the interaction would not result in a significant environmental effect, even without mitigation; or interaction would not be significant due to application of codified environmental protection practices that are known to effectively mitigate the predicted environmental effects. The environmental effects are not significant and not considered further in this report.

2 = Interaction could result in an environmental effect of concern even with mitigation; the potential environmental effects are considered further in this report.

Where a potentially significant Project-VEC interaction (i.e., a rating of 2) may occur, further discussion is provided to evaluate the environmental effect more thoroughly. Where no interaction or no significant interaction is identified (i.e., a rating of 0 or 1) the rationale of why no interaction exists, or why a limited interaction can be adequately mitigated without resulting in significant environmental effects, is provided, but the environmental effects are (by definition) rated not significant and are not discussed further in this report.

The evaluation is tabular for ease in evaluation and communication.

5.1.1 Project-Environment Interaction Matrix

Based on the Project Description and the methodology described briefly above, the potential interactions between the Project and the environment are summarized in Table 5.1.
Table 5.1  Potential Interactions of the Project with the Environment

<table>
<thead>
<tr>
<th>Project Phase, or Activities/Physical Works Associated with the Project</th>
<th>Atmospheric Environment</th>
<th>Freshwater Environment</th>
<th>Terrestrial Environment</th>
<th>Marine Environment</th>
<th>Groundwater Resources</th>
<th>Labour and Economy</th>
<th>Land Use</th>
<th>Archaeology and Heritage Resources</th>
<th>Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons</th>
<th>Transportation</th>
<th>Public Health and Safety</th>
<th>Effects of Environment on the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Operation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Decommissioning and Abandonment</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**KEY**

0 = No interaction. The environmental effects are not significant and not considered further in this report.

1 = Interaction occurs; however, based on past experience and professional judgment the interaction would not result in a significant environmental effect, even without mitigation; or interaction would not be significant due to application of codified environmental protection practices that are known to effectively mitigate the predicted environmental effects. The environmental effects are not significant and not considered further in this report.

2 = Interaction could result in an environmental effect of concern even with mitigation; the potential environmental effects are considered further in this report.

* = First Nations groups are in the process of preparing their responses and this section will be updated once those responses are received.

### 5.1.2 VECs with No Interaction, or No Significant Interaction, with the Project

#### 5.1.2.1 VECs with No Interaction with the Project (Ranking of 0)

Based on the ratings provided in Table 5.1 above, the Project is not expected to result in any interaction (*i.e.*, a ranking of 0) with the following VECs:

- Freshwater Environment;
- Wetland Environment;
- Groundwater Resources; and
- Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons.

Further discussion is provided in the sub-sections that follow.

**Freshwater Environment**

Interactions between the Project and the Freshwater Environment have been ranked as a 0 in Table 5.1 because there are no Project-related activities that will be conducted in the vicinity of the Freshwater Environment. There will be no direct or indirect discharges from the Project into the Freshwater Environment, and no Project activities will occur in the Freshwater Environment. The environmental effects of the Project on the Freshwater Environment during all phases of the
Project (including cumulative environmental effects) are thus rated not significant. The Freshwater Environment will not be assessed further in the EA.

**Wetland Environment**

Interactions between the Project and the Wetland Environment have been ranked as a 0 in Table 5.1 because there are no Project-related activities that will be conducted in the vicinity of a wetland. There will be no direct or indirect discharges from the Project into the Wetland Environment, and no Project activities will occur in the Wetland Environment. The environmental effects of the Project on the Wetland Environment during all phases of the Project (including cumulative environmental effects) are thus rated not significant. The Wetland Environment will not be assessed further in the EA.

**Groundwater Resources**

Interactions between the Project and Groundwater Resources have been ranked as 0 in Table 5.1 because there are no Project-related activities that will interact with groundwater. The environmental effects of the Project on Groundwater Resources during all phases of the Project (including cumulative environmental effects) are thus rated not significant. Groundwater Resources will not be assessed further in the EA.

**Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons**

Interactions between the Project and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons have been ranked as 0 in Table 5.1 because consultation conducted by federal authorities indicated that there was no potential for infringement on the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons. Therefore, the environmental effects of the Project on the Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons during all phases of the Project (including cumulative environmental effects) are thus rated not significant. Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons will not be assessed further in the EA.

**5.1.2.2 VECs with No Significant Interaction with the Project (Ranking of 1)**

The Project is not expected to result in an interaction that could lead to significant environmental effects (*i.e.*, a ranking of 1) for the following VECs:

- Terrestrial Environment;
- Labour and Economy;
- Land Use;
- Archaeology and Heritage Resources;
- Transportation; and
- Public Health and Safety.
Further discussion is provided in the sub-sections that follow.

**Terrestrial Environment**

Interactions between the Project and the Terrestrial Environment have been ranked as 1 in Table 5.1 because of potential Project-related disturbance of terrestrial habitat during Construction and Decommissioning and Abandonment of the Project.

During Construction, including site and structure development, heavy equipment, such as earthmovers, excavators, and graders will be operated and may potentially cause interactions with the Terrestrial Environment, including birds and bird habitat and species of special conservation concern (birds).

Construction activity may affect some bird species by increasing sound levels, but the duration will be restricted to the construction window. Increased traffic during Construction may have similar interactions; however, the main roadways to the site already exist, and increases in noise levels would be limited to that of construction equipment.

The ACCDC data obtained for a 5 km radius of the Project included four avian species of conservation concern. One species, the Piping Plover, is listed as Endangered on SARA while another species, the Common Tern, is listed provincially as May be at Risk. Due to the ongoing amount of activity at the site, and absence of preferred habitat, neither species is likely to be found nesting in the vicinity.

During Construction and Operation of the convention centre the on-site soils will be retained at the site behind the steel sheet pile wall. The subsurface geology of the Project site was assessed during recent and previous geotechnical studies of the area (see Section 4 for details). The design of the seawall and foundations for the convention centre was based on the presence of weak compressible soils at the site. The subsurface geology and soils at the site will be contained on site. The installation of the steel sheet pile seawall around the site will address any potential concerns associated with soil erosion and/or embankment stability and will prevent the release of any existing or new fill materials to the surrounding marine environment.

The environmental effects of the Project on the Terrestrial Environment during all phases of the Project (including cumulative environmental effects) are thus rated not significant and will not be assessed further in the EA.

**Labour and Economy**

Interactions between the Project and Labour and Economy have been ranked as 1 in Table 5.1 because the Project will require a financial investment by the Proponent, and will result in job creation and other business expenditure. During Construction, the Project is expected to create...
construction employment for tradespersons and specialty contractors throughout the one- to two-year Construction period. The Project is also expected to generate additional employment during Operation. Other economic spin-offs include opportunities for local manufacturing industries, contractors, and supply firms. The increased demand for labour and anticipated employment opportunities and related economic spin-offs of the Project are expected to positively affect Labour and Economy; however, the Project is not expected to substantially affect the economy of Charlottetown or PEI as a whole.

Project activities will be taking place in the vicinity of an area leased for commercial silverside fishery and in the vicinity of important oyster spatfall areas in Charlottetown Harbour. It is not expected that Project activities taking place in the marine environment will be conducted during oyster spatfall (mid-June to mid-July) or the silverside fishery (October 1 to December 31). In the event delays in Project activities result in temporal overlap of construction activities in the marine environment and either oyster spatfall or silverside fishery, a strategy will be developed in consultation with DFO and those affected fisheries.

Accordingly, in consideration of existing policies in respect of Labour and Economy, the environmental effects of the Project on Labour and Economy during all phases of the Project (including cumulative environmental effects) are rated not significant. Labour and Economy is therefore not considered further in this EA.

**Land Use**

Interactions between the Project and Land Use have been ranked as 1 in Table 5.1 because the Project is compatible with existing land uses in the vicinity of the site.

The Project site is located on a developed site in the City of Charlottetown. Adjacent to the site there is an operating hotel (the Delta Prince Edward). While the Project will interact with the hotel, there is not expected to be any negative impacts. There are also offices, restaurants, a marina, a park, and residences in the vicinity of the site; however, the Proponent has committed to limiting Construction activities to day time hours in order to minimize potential disturbance to Project neighbours. Also, in accordance with the Official Plan for Charlottetown, the Project will be opening up the viewscape of the waterfront in the area.

Accordingly, with the appropriate permits with respect to demolition and building, no substantive interactions between the Project and Land Use are anticipated. Therefore, in consideration of existing regulatory frameworks and policies in respect of Land Use, the environmental effects of the Project on Land Use are rated not significant for all phases of the Project (including cumulative environmental effects). Land Use is not considered further in this EA.

**Archaeology and Heritage Resources**

Interactions between the Project and Archaeology and Heritage Resources have been ranked as 1 in Table 5.1 because the Project involves ground disturbance in an area that has been
previously infilled. The Project will require excavation to allow for site grading and installation of piles. Due to the highly disturbed nature of the site, the amount of historic infilling and the small amount of excavation it is very unlikely that the Project will interact with Archaeology and Heritage Resources. In the event an item of archaeological importance is unearthed, construction would stop and the appropriate authorities would be contacted. Accordingly, in consideration of existing regulatory frameworks and policies in respect of Archaeology and Heritage Resources, the environmental effects of the Project on Archaeology and Heritage Resources during all phases of the Project are thus rated not significant. Archaeology and Heritage Resources will not be assessed further in this EA.

Transportation

Interactions between the Project and Transportation have been ranked as 1 in Table 5.1 because Construction will be on existing roads.

During Construction, materials and supplies will be transported to the site by truck and construction workers will travel to the site by passenger vehicle. Truck traffic due to Construction is expected to be very nominal, with the exception of the delivery of fill to the site. Traffic control will be implemented at the site as necessary. It is expected that approximately 250 truckloads of select borrow will be transported to the site over a one to two week period. The Project site will be accessed by existing roadways and all Project related vehicles will obey traffic laws.

In consideration of existing regulatory frameworks and policies with respect to the management of Transportation, the environmental effects of the Project (including cumulative environmental effects) on Transportation are therefore rated not significant and are not considered further in the EA.

Public Health and Safety

Interactions between the Project and Public Health and Safety have been ranked as 1 in Table 5.1 because Project activities, if not carried out in a careful and safe manner, could result in risks to the public or workers. Because Construction of the Project will involve the use of heavy equipment, there are a number of health and safety concerns inherently associated with the Project, which are subject to provincial occupational health and safety legislation.

The Project will necessarily comply with all requirements of the PEI Occupational Health and Safety Act and regulations, thus the environmental effects of the Project on Public Health and Safety will not be significant from the perspective of worker safety and occupational exposure. Site preparation will involve demolishing on-site buildings that contain asbestos, lead, and mercury. As a result, there is the potential for the Project to interact with Public Health and Safety if it is not carried out in a careful manner. The contractor will follow all applicable regulations and best management practices while removing the contaminated materials from the buildings and will dispose of them in a provincially approved manner. Only asbestos
abatement contractors licensed by the provincial government will remove and dispose of asbestos containing materials. It should be noted that in the case of surfaces with lead based paints, there may be additional requirements by the provincial government for disposal and therefore the contractor will be responsible for securing all permits and approvals prior to disposal. The soil at the site is also contaminated with PAHs and metals. Dust at the site will be kept to a minimum, stockpiles of excavated material will be covered until used as fill at the site, and the contaminated material will be capped and remain at the site.

Workers on site should be made aware of the potential risks associated with the metals and PAH impacted soil at the subject site. They should be advised that direct dermal contact with the site impacted soil should be minimized. All workers with the potential to contact these materials should be required to wear appropriate CSA approved personal protection equipment (i.e., gloves, safety boots, hard hats, work clothing, etc.) to reduce the potential for dermal contact with the contaminants. In the event that dermal contact is made, the workers are to ensure that they adequately wash the affected area(s) with soap and water. In addition, during all construction activities in areas of potential contact with impacted materials all workers must have access to properly fitting respirators if conditions warrant. The respirators should be equipped with multi-purpose organic vapour cartridges with dust filters of the same brand as the face piece. Please note that the above outlined health and safety requirements do not supersede any requirements outlined in the PEI Occupational Health and Safety Act.

Based on the above, no substantive interactions between the Project and Public Health and Safety are anticipated. Therefore, in consideration of existing regulatory frameworks and policies in respect of Public Health and Safety, the environmental effects of the Project on Public Health and Safety during all phases of the Project (including cumulative environmental effects) are rated not significant, and are not considered further in this EA.

5.1.2.3 Determination of Significance

As identified in Table 5.1, all VECs for which no interaction (i.e., ranked as 0) or no substantive interaction (i.e., ranked as 1) with the Project is foreseen during Construction, Operation, and Decommissioning and Abandonment, the environmental effects of the Project are rated not significant, with a high level of confidence. This includes the Freshwater Environment, Terrestrial Environment, Wetland Environment, Groundwater Resources, Labour and Economy, Land Use, Archaeology and Heritage Resources, Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons, Transportation, and Public Health and Safety. The environmental effects of the Project on these VECs are thus not carried forward or discussed further in this EA.

5.1.3 VECs Which May Result in an Interaction with the Project that Requires Further Evaluation (Ranking of 2)

Based on the ratings provided in Table 5.1 above, the Project may result in an interaction with the following VECs that requires further evaluation in this EA:
Atmospheric Environment; Marine Environment; and Effects of the Environment on the Project.

These potential Project-environment interactions require further evaluation, and are thus discussed in the sections that follow.

5.2 Atmospheric Environment

The Atmospheric Environment is considered a VEC for a number of reasons, as follows:

- The atmosphere has an intrinsic or natural value, in that the atmosphere and its constituents are needed to sustain life.

- The atmosphere is a pathway for the transport of air contaminants to the freshwater, marine, and terrestrial environments, presenting the contaminants in the form of varying atmospheric concentrations or particle phase or gas phase deposition.

- If not properly managed, releases of air contaminants to the atmosphere from the Project may cause adverse environmental effects on the air, the land and the waterways in the vicinity of the Project.

- Emissions of GHGs accumulate in the atmosphere and are a major factor in producing the greenhouse effect which is believed to influence climate.

- If not properly managed, sound emissions in the form of unwanted sound (noise) from the Project may cause adverse environmental effects on the sound quality in the vicinity of the Project.

5.2.1 Scope of Assessment

This environmental assessment of Atmospheric Environment includes consideration of the potential environmental effects associated with the Project over the life of the Project.

The potential environmental effects to be assessed are associated with Project-related emissions of air contaminants, GHG, and noise to the atmosphere during Construction, Operation, and Decommissioning and Abandonment of the Project.

In this EA, the approach is to select the environmental effects, the associated measurable parameters to be considered (concentrations and/or emissions rates of air contaminants, GHG and noise emissions), establish boundaries for the environmental effects assessment, establish the significance criteria, characterize the environmental effects, assess the residual environmental effects (with mitigation such as emissions control equipment in place), determine
the significance of the environmental effects, and prepare a follow-up and monitoring program, as applicable.

5.2.1.1 Rationale for Selection of Valued Environmental Component and Regulatory Setting

The Atmospheric Environment has been selected as a VEC for reasons noted above and due to the potential for interactions between the Project and Atmospheric Environment.

On this basis, the potential environmental effects on Atmospheric Environment associated with the Project-related emissions to the atmosphere have been selected as: a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality. The potential environmental effects to the Atmospheric Environment are summarized in Table 5.2.

<table>
<thead>
<tr>
<th>Environmental Effect</th>
<th>Issues Considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Air Quality</td>
<td>The following will be assessed:</td>
</tr>
<tr>
<td></td>
<td>• emissions of air contaminants, including total suspended particulate matter (TSP), particulate matter less than 10 microns (PM&lt;sub&gt;10&lt;/sub&gt;), particulate matter less than 2.5 microns (PM&lt;sub&gt;2.5&lt;/sub&gt;), SO&lt;sub&gt;2&lt;/sub&gt;, NO&lt;sub&gt;x&lt;/sub&gt;, carbon monoxide (CO), VOCs, PAHs, metals and asbestos; and</td>
</tr>
<tr>
<td></td>
<td>• ambient air quality, including the ground-level concentrations of TSP, PM&lt;sub&gt;10&lt;/sub&gt;, PM&lt;sub&gt;2.5&lt;/sub&gt;, SO&lt;sub&gt;2&lt;/sub&gt;, NO&lt;sub&gt;x&lt;/sub&gt;, and CO; and the potential environmental effects of Project-related Construction and Operation and Maintenance activities on air quality.</td>
</tr>
<tr>
<td>Change in GHG Emissions</td>
<td>The following will be assessed:</td>
</tr>
<tr>
<td></td>
<td>• emissions of GHGs, expressed as CO&lt;sub&gt;2&lt;/sub&gt;e, from the Project.</td>
</tr>
<tr>
<td>Change in Sound Quality</td>
<td>The following will be assessed:</td>
</tr>
<tr>
<td></td>
<td>• ambient sound pressure levels in the Assessment Area; and</td>
</tr>
<tr>
<td></td>
<td>• the potential environmental effects of Project-related Construction and Operation and Maintenance activities on sound quality.</td>
</tr>
</tbody>
</table>

Emissions of GHGs are not currently regulated in PEI; however, in 2008, the provincial government released a strategy for dealing with climate change titled “Prince Edward Island and Climate Change - A Strategy for Reducing the Impacts of Global Warming”. As part of this publication, PEI has committed to reduce CO<sub>2</sub>e emissions to 75-85% below 2001 levels by 2050 (Government of PEI 2008). The Ozone Layer Protection Regulation under the Environmental Protection Act also exists to protect global air quality in respect of emissions of these types of substances; however, in the context of the Project, this regulation is not applicable.

Air quality in PEI is subject to the Air Quality Regulation issued under the Environmental Protection Act. The requirements for facilities that are sources of air contaminants are
described in the regulation and the permit application process. Ambient air quality objectives for regulated air contaminants are presented in Schedule B of the regulation.

Federally, the *Canadian Environmental Protection Act (CEPA)* and its suite of regulations (i.e., National Ambient Air Quality Objectives (Government of Canada 1999)) is the main regulatory instrument for managing air quality. Canada Wide Standards (CWS) developed by the CCME are also applied and overseen federally, in concert with the provinces. The CWS may include qualitative or quantitative standards, guidelines or objectives for protecting the environment and human health. A number of these exist to protect air quality, including those for benzene (not an ambient standard); dioxin and furans for specific industries, mercury for specific industries, and ambient air quality objectives for PM$_{2.5}$ and ozone. National Ambient Air Quality Objectives (NAAQO) have also been developed and implemented federally through the Canadian Environmental Quality Guidelines of the CCME. Recently, Environment Canada and stakeholders released a proposed strategy to improve air quality in Canada (Comprehensive Air Management Steering Committee 2010). This is an alternative to the Turning the Corner Plan issued in 2008. In this new framework, there are plans to develop new Canadian Ambient Air Quality Standards, to establish air zones and regional air sheds, to establish base level industrial requirements, to control emissions from transportation, and to use CEPA as the instrument to provide regulatory assurance. This approach and associated regulatory direction are presented for information purposes, however, these are proposed at this stage and are therefore considered only briefly in this assessment.

Noise is not defined as an air contaminant, nor are there any regulations or requirements in place regarding ambient sound pressure levels. There does exist a Nuisance Bylaw for the City of Charlottetown, pursuant to provisions of Section 64 of the “Charlottetown Area Municipalities Act R.S.P.E.I., 1988 CAP C-4.1”, and amendments to October 23, 2007. However, this by-law represents a broad requirement for noise and public nuisance (City of Charlottetown 1989).

5.2.1.2 Selection of Environmental Effects and Measurable Parameters

The Atmospheric Environment is the component of the environment that comprises the layer of air near the earth’s surface to a height of approximately 10 km. The Atmospheric Environment is typically categorized by:

- air quality, which is characterized by the measure of the constituents of ambient air, and includes the presence and the quantity of air contaminants in the atmosphere. The relevant air contaminants selected as measurable parameters are TSP, PM$_{10}$, PM$_{2.5}$, SO$_2$, NO$_x$, CO, VOCs, PAHs, metals and asbestos;

- climate, which is characterized by the composite or generally prevailing meteorological conditions of a region, including temperature, air pressure, humidity, precipitation, sunshine, cloudiness, winds and sea state, throughout the seasons, averaged over a series of years (typically a 30-year period). The emissions of GHGs from the Project are used in this EA as an indicator of potential environmental effects on climate. The potential environmental
effects of a change in climate on the Project are addressed in Section 5.4 (Effects of the Environment on the Project). The measurable parameters for Climate are GHG emissions CO$_2$, N$_2$O and CH$_4$; and

- sound quality, which is characterized by the type, character, frequency, intensity, and duration of noise (unwanted sound) in the outdoor environment. The measurable parameters for Sound are A-weighted sound pressure levels in decibels (dBA).

5.2.1.3 Temporal Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Atmospheric Environment include the periods of Construction (approximately two years beginning March 1, 2011), Operation (several decades or longer, following Construction), and Decommissioning and Abandonment (at the end of its useful service life).

5.2.1.4 Spatial Boundaries

The spatial boundaries for the characterization of potential environmental effects, including cumulative environmental effects, for each key aspect of the Atmospheric Environment are formed by the zone of influence associated with the Construction and Operation of the Project. The spatial boundaries have been defined based on a combination of experience with similar projects and professional judgment, as detailed below.

5.2.1.4.1 Change in Air Quality

The potential for environmental effects associated with a Change in Air Quality is generally not expected to extend beyond approximately 1 km (1,000 m) around the perimeter of the Project Site. This area will generally provide for sufficient dispersion of emissions generated by Project-related activities, such as dust and combustion gas emissions from heavy equipment and vehicle traffic.

As such, the Local Assessment Area (LAA) for the characterization of a Change in Air Quality is identified as a zone extending to approximately 1 km (1,000 m) around the perimeter of the PDA. The PDA is located at 1 Queen Street in Charlottetown (Figure 1.1, Appendix A).

5.2.1.4.2 Change in GHG Emissions

With respect to a Change in GHG Emissions, in recognition of the global nature of the potential environmental effects of a Change in GHG Emissions on global climate, the Assessment Area for the assessment of the environmental effects of a Change in GHG Emissions on the Atmospheric Environment is, by definition, the global environment. However, carbon sequestration and Project-related changes to carbon sinks are assessed on a regional and provincial basis.
5.2.1.4.3 Change in Sound Quality

The potential for a Change in Sound Quality due to the Project is generally not expected to extend beyond approximately 1 km around the perimeter of the PDA. At a distance of 1 km from Project-related sources of sound emissions (heavy equipment, trucks, passenger vehicles), there is sufficient distance for the sound to naturally attenuate such that it would be (for the most part) not detectable over background sound pressure levels, even in the case of low background sound pressure levels (e.g., in rural and isolated areas). Thus, the LAA for the assessment of a Change in Sound Quality is identified as a zone extending to approximately 1 km around the perimeter of the PDA.

5.2.1.5 Administrative and Technical Boundaries

The technical and administrative boundaries for Atmospheric Environment and its key aspects pertain mainly to regulatory limits and standards for ambient concentrations of air contaminant and ambient sound pressure levels, where such limits and standards exist. These limits are set by regulatory authorities to reflect environmental protection objectives, with the intent of being protective of air quality and human and environmental health.

5.2.1.5.1 Change in Air Quality

A Change in Air Quality is assessed in the context of both the release of potential Project-related air contaminants to the atmosphere and the concentrations of these at ground level in the Assessment Area. For the purposes of this EA, the Project-related air contaminants of interest consist of TSP (including dust), PM$_{10}$, PM$_{2.5}$, SO$_2$, NO$_X$, and CO. Due to regulatory interest as demonstrated in past EAs for other projects in PEI, these are further augmented by total emissions of VOCs and PAHs from Project-related sources, even though there are currently no PEI regulatory limits or standards for emissions or ground-level concentrations of these parameters.

The federal National Ambient Air Quality Objectives and the provincial PEI Maximum Permissible Ground-Level Concentrations for the selected air contaminants are presented in Table 5.3. These are supplemented, where required or available, by other national initiatives such as the CWS from the CCME, as well as standards and objectives from other provincial jurisdictions.

Ambient air quality is monitored in PEI at three locations. These locations are Charlottetown, Southampton, and Wellington. The nearest ambient air quality monitoring station to the Project is located in Charlottetown, approximately 2 km from the Project site.
Table 5.3 Canadian and Prince Edward Island Ambient Air Quality Objectives

<table>
<thead>
<tr>
<th>Air Contaminant</th>
<th>Averaging Period</th>
<th>PEI Maximum Permissible Ground-Level Concentrations(^1) (µg/m³)</th>
<th>National Ambient Air Quality Objectives, Maximum Desirable/Acceptable Levels(^2) (µg/m³)</th>
<th>Other Ambient Air Quality Standards or Objectives (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Suspended Particulate Matter (TSP)</td>
<td>24-hour Annual</td>
<td>120</td>
<td>--/120</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70</td>
<td>60/70</td>
<td>--</td>
</tr>
<tr>
<td>Particulate Matter Less than 10 Microns (PM(_{10}))</td>
<td>24-hour</td>
<td>--</td>
<td>--</td>
<td>50(^3)</td>
</tr>
<tr>
<td>Particulate Matter Less than 2.5 Microns (PM(_{2.5}))</td>
<td>24-hour</td>
<td>--</td>
<td>--</td>
<td>30(^4)</td>
</tr>
<tr>
<td>Sulphur dioxide (SO(_2))</td>
<td>1-hour</td>
<td>900</td>
<td>450/900</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>24-hour Annual</td>
<td>300</td>
<td>150/300</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60</td>
<td>30/60</td>
<td>--</td>
</tr>
<tr>
<td>Nitrogen dioxide (NO(_2))</td>
<td>1-hour</td>
<td>400</td>
<td>--/400</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>100</td>
<td>--/--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60/100</td>
<td>--</td>
</tr>
<tr>
<td>Carbon monoxide (CO)</td>
<td>1-hour</td>
<td>35,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>8-hour</td>
<td>15,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOCs)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Polycyclic Aromatic Hydrocarbons (PAHs)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Ozone (O(_3))</td>
<td>1-hour</td>
<td>--</td>
<td>100 (50 ppb)/163 (82 ppb)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>8-hour</td>
<td>--</td>
<td>--</td>
<td>130 (65 ppb)(^4)</td>
</tr>
<tr>
<td></td>
<td>24-hour</td>
<td>--</td>
<td>30 (15 ppb)/50 (25 ppb)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>--</td>
<td>--/30 (15 ppb)</td>
<td>--</td>
</tr>
</tbody>
</table>

Notes:
-- No standard or objective available.

Source:
\(^1\) Government of PEI (2004).
\(^2\) CCME (1999), National Ambient Air Quality Objectives, Maximum Acceptable Levels.
\(^3\) BCWLAP (1995), Interim Air Quality Standard for Fine Particulate PM\(_{10}\).
\(^4\) CCME (2000), Canada Wide Standards for Particulate Matter and Ozone.

5.2.1.5.2 Change in GHG Emissions

There are currently no standards or guidelines for GHG concentrations in ambient air (provincial or federal), nor are there any emission limits with respect to GHG releases from individual sources or sectors in place provincially or federally at this time. The provincial government has prepared A Strategy for Reducing the Impacts of Global Warming (Government of PEI 2008) which outlines plans to reduce GHG emissions by 500,000 tonnes of CO\(_2\)e per year to meet its target to reduce GHG emissions to 75 to 85% below 2001 levels by 2050. The plan includes reductions in GHG emissions in the following areas: Energy Efficiency and Conservation;
Renewable Energy; Transportation; Agriculture; Adaptation and Resilience; Public Education and Awareness and; Government Leading by Example (Government of PEI 2008).

The federal government released the Regulatory Framework for Industrial Greenhouse Gas Emissions in 2008 (Government of Canada 2008). This framework outlines a regulatory regime involving 18 target industrial sectors and the draft regulations were scheduled to be published in the Canada Gazette in the fall of 2008. This was followed by an announcement in July 2009, that the GHG reporting threshold for emitters was reduced to 50,000 t CO₂e. Any facility emitting more than the 50,000 t CO₂e threshold in the 2010 calendar year must report to Environment Canada via the Electronic Data Reporting (EDR) a system managed by Statistics Canada. In May 2010, the House of Commons passed the proposed Climate Change Accountability Act (NDP 2010); however, in November 2010, the proposed Act did not receive Senate approval (Galloway 2010). While the status of these proposed acts, regulations, and frameworks are uncertain at this time, no additional federal regulations have been issued in this regard as of December 2010.

The scope of this Project does not contain any aspects that are currently regulated for GHG emissions provincially or federally. The latest guidance from the Canadian Environmental Assessment Agency titled Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners (CEA Agency 2003) was followed for this EA. As summarized in the introduction of that document, greenhouse gases as precursors to climate change constitute a global phenomenon rather than a local issue, and the science of this phenomenon is not yet developed to the stage where global contributions from a single project of this nature can be measured against the problem. This presents a technical boundary in that the contribution of the Project to global climate change ultimately cannot be known at this time; therefore the determination of the significance of the contribution of the Project to global climate change is not possible under current guidance. In consideration of this, the Agency recommends that significance criteria not be set for the assessment of GHG within an environmental assessment conducted under CEAA. Instead, the steps outlined in the Agency’s guidance document are followed for the assessment.

In consideration of the relatively limited scale of the Project as defined in the Project Description (Section 2), the potential environmental effects of the Project on local, regional, and global climate are not expected to be measurable. The emissions of GHGs from Construction and Operation will nonetheless be quantified and considered in the context of the Project’s contributions to GHG emissions in PEI.

5.2.1.5.3 Change in Sound Quality

Sound quality is assessed in the context of the potential environmental effects caused by increased sound pressure levels in the Assessment Area resulting from Project-related activities.
Sound quality is typically characterized in terms of the type, character, frequency, intensity, and duration of sound emissions. Since the human ear does not respond to sound on a linear scale, ambient sound pressure levels are characterized using a logarithmic decibel (dB) scale, with the A-weighted (dB_A) scale being the most commonly used for environmental sound assessments. Measured parameters for environmental sound or noise (defined as unwanted sound) are often expressed as an “equivalent sound level” (Leq) which represents an equivalent energy level over a specified period of time (e.g., 1-hour or 24-hours).

Natural factors typically influence sound pressure levels in the outdoor environment (e.g., wind, waves, birds, other wildlife) and human activities generally also have an influence (e.g., construction equipment, vehicle traffic, sporting events). Weather conditions such as temperature, humidity, wind direction and wind speed also affect the distance that sound travels through the atmosphere. In addition, changes in the physical properties of the environment (such as a change in land cover, or the removal or construction of physical structures such as buildings) can also result in changes to the sound propagation characteristics of the environment. Sound levels naturally decrease with increasing distance from the sound emission source and local topographical features such as hills or heavily wooded areas may also serve to reduce the transmission of sound.

A number of jurisdictions, including the province of Ontario and the United States Environmental Protection Agency (USEPA), have established specific regulatory limits for sound pressure levels from industrial or construction activities. Although noise from specific industrial sources in PEI is sometimes regulated under the Certificates of Approval (COA), PEIDEEF has not established an ambient sound pressure level guideline or limit for general application in the province. Generally, provincial requirements dictate that noise should be controlled such that it does not cause substantial loss of enjoyment of the normal use of any property, or substantial interference with the normal conduct of business. The City of Charlottetown Nuisance Bylaw states that persons who use gas-powered or electrical tools or equipment are guilty of an offense if it generates excessive noise (City of Charlottetown, 1989); however, the term “excessive noise” is not formally defined. In some specific cases, COA for specific point sources of industrial sound emissions have established noise limits for different times of the day.

The Health Canada EA guidance recommends the separate assessment of potential environmental effects on sound quality for daytime and nighttime (Health Canada 2009). Noise during the nighttime hours is sometimes perceived as more intrusive and is also of concern with regard to the potential for sleep disturbance. The World Health Organization establishes a guideline of 30 dB_A inside a dwelling to avoid sleep disturbance (WHO 1999).

Nova Scotia Environment (NSE), formerly the Nova Scotia Department of Environment and Labour (NSEL), has established a guideline with criteria for ambient sound levels based on time of day (NSE 1989). The criteria are written in terms of Leq, which is used to indicate the overall sound levels or the average sound level for a given time period. It is an equivalent continuous
sound level, which, in a stated time, and at a stated location, has the same energy as the time varying signal. The criteria established by the NSE are as follows:

- an $L_{eq}$ of 65 dB$_A$ between 0700 to 1900 hours;
- an $L_{eq}$ of 60 dB$_A$ between 1900 to 2300 hours; and
- an $L_{eq}$ of 55 dB$_A$ between 2300 to 0700 hours.

For the purpose of this EA, sound pressure levels as a result of Project activities will be compared to the Nova Scotia criteria.

### 5.2.1.6 Residual Environmental Effects Rating Criteria

With respect to a Change in Air Quality, a *significant residual adverse environmental effect* is one that causes a Change in Air Quality such that the maximum Project-related emissions of the air contaminants of interest (as defined in Table 5.2) result in ambient concentrations that frequently exceed the PEI or federal ambient air quality standards, as defined in Table 5.3. Frequently is defined for 1-hour standards as once per week, and for 24-hour standards, once per month.

With respect to a Change in GHG Emissions, following the CEA Agency guidance, “the environmental assessment process cannot consider the bulk of GHG emitted from already existing developments. Furthermore, unlike most project-related environmental effects, the contribution of an individual project to climate change cannot be measured” (CEA Agency 2003). Therefore, while it is not possible to assess significance related to a measured environmental effect on climate change on a project-specific basis, it is recognized that global emissions of GHG and consequent changes to global climate generally represent a significant cumulative environmental effect. Project emissions of GHG will contribute to these significant cumulative environmental effects, but will be very small in a regional or provincial context, and immeasurable in a global context. Thus, a Change in GHG Emissions is assessed by considering the magnitude, intensity and duration of Project emissions as directed by the Agency guidance (CEA Agency 2003), without specifically identifying a significance criterion for environmental effects of a Change in GHG Emissions. Three categories are described in the CEA Agency guidance: low, medium, and high. In this EA, these categories are attributed to numerical values (on a tonnes CO$_2$e per annum basis) of less than $10^5$, greater than $10^5$ and less than $10^6$, and greater than $10^6$, for low, medium and high categories, respectively.

With respect to a Change in Sound Quality, a *significant residual adverse environmental effect* is one that causes a Change in Sound Quality where the noise guideline level is frequently exceeded at a NSA, with “frequent” defined as an aggregate period of 12 days per year. As noted above, the current criteria established by the NSE between 55 dB$_A$ and 65 dB$_A$ (Section 5.2.1.5.3) are used as the noise guideline levels in this EA.
ENVIRONMENTAL ASSESSMENT (EA): Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI

5.2.2 Existing Conditions

The existing conditions of the Atmospheric Environment were discussed in Section 4.1.5.

5.2.3 Potential Project-VEC Interactions

The Project activities during Construction, Operation, and Decommissioning and Abandonment may result in emissions of air contaminants, GHG, and sound to the atmosphere in the vicinity of the Project. These emissions may cause adverse environmental effects on the Atmospheric Environment, specifically a Change in Air Quality, Change in GHG Emissions, and/or a Change in Sound Quality.

The Project interactions on each environmental effect are ranked as 0, 1, and 2 based on anticipated quantities of emissions, project experience, and on the professional judgment of the Study Team. Some of the Project activities result in nominal (i.e., essentially zero) emissions of air contaminants, GHG, or sound and are ranked as 0. Other activities have measurable emissions but are not considered to be substantive and these are ranked as 1. Some activities are anticipated to have substantive emissions and have the potential to cause significant environmental effects; these require more in-depth analysis and discussion, and are ranked as 2.

Each Project activity and physical work for the Project is listed in Table 5.4 below. Each interaction is ranked as 0, 1, or 2 based on the level of interaction each activity or physical work will have with the Atmospheric Environment.

During Construction, dust and noise from heavy equipment and heavy trucks, as well as noise from pile driving, are the main concerns.

During Operation and Maintenance, a small increase in the emissions of air contaminants, GHGs, and sound may occur locally, primarily as a result of the emissions of combustion gases (including greenhouse gases) from the boiler(s) and from vehicles in the immediate vicinity of the Project. The Project presence is not expected to substantively increase vehicle traffic locally during Operation and Maintenance these emissions are therefore expected to be nominal. During Operation, the main concern is associated with the emission of air contaminants and GHGs from the combustion of fuel oil in the boiler(s) planned for heating during use of the facility.
Table 5.4 Potential Project Environmental Effects to the Atmospheric Environment

<table>
<thead>
<tr>
<th>Project Activities and Physical Works</th>
<th>Potential Environmental Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change in Air Quality</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>Site preparation</td>
<td>2</td>
</tr>
<tr>
<td>Seawall extension</td>
<td>1</td>
</tr>
<tr>
<td>Marine infilling</td>
<td>2</td>
</tr>
<tr>
<td>Pile driving</td>
<td>1</td>
</tr>
<tr>
<td>Additional parking area construction</td>
<td>1</td>
</tr>
<tr>
<td>Construction of convention centre</td>
<td>1</td>
</tr>
<tr>
<td>Renovations to the existing Delta Prince Edward convention space</td>
<td>1</td>
</tr>
<tr>
<td>Boardwalk Construction</td>
<td>1</td>
</tr>
<tr>
<td>Landscaping</td>
<td>1</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
</tr>
<tr>
<td>Use of the Facility</td>
<td>2</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0</td>
</tr>
<tr>
<td>Decommissioning and Abandonment</td>
<td>1</td>
</tr>
</tbody>
</table>

**KEY**

Project-Related Environmental Effects were ranked as follows:

0 No interaction. The environmental effects are not significant and not considered further in this report.

1 Interaction will occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices. The environmental effects are not significant and not considered further in this report.

2 Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EA.

The ranking of these Project interactions including the selection of 0, 1 or 2 is described in more detail in the following sections.

**Interactions Ranked as 0**

During Operation, the emissions of sound from the activities associated with the use of the facility and maintenance are expected to be nominal (essentially zero) and are not substantive. These interactions with a Change in Sound Quality are thus ranked as 0.

During Operation, air contaminant, GHG, and sound emissions from the activities associated with Maintenance are expected to be nominal (essentially zero) and are not substantive. These interactions with a Change in Air Quality, Change in GHG Emissions, and a Change in Sound Quality are thus ranked as 0.

In summary, these activities described and ranked as 0 in Table 5.4 do not interact with the Atmospheric Environment and thus are not expected to cause significant adverse environmental effects. Therefore, the potential environmental effects of the Project-related activities that were ranked as 0 in Table 5.4 on Atmospheric Environment including a Change in Air Quality,
Change in GHG Emissions, and a Change in Sound Quality, including cumulative environmental effects, are rated not significant and are not considered further in the EA.

**Interactions Ranked as 1 and 2**

Site preparation activities during Construction involve earth movement and demolition of the two existing buildings. These activities are likely to generate emissions of air contaminants (primarily as dust) from heavy equipment operation, and GHG from fuel combustion. Further, these activities will also generate sound associated with the use of heavy equipment. These interactions with a Change in Air Quality, a Change in GHG Emissions and a Change in Sound Quality may be substantive and are ranked as 2, and are discussed in more detail in the next section.

Seawall extension activities during Construction involve the extension of a steel sheet pile wall, to be completed from land. These activities are likely to generate some emissions of air contaminants and GHG from heavy equipment operation, and fuel combustion. As well as, some sound emissions associated with the use of heavy equipment operation and pile driving are likely to occur. Based on past experience, the emissions of air contaminants and GHGs are expected to be nominal and are unlikely to:

- cause the ambient air quality standards to be exceeded; or
- result in GHG emissions that are considered important on the regional or provincial scale.

These interactions with a Change in Air Quality and a Change in GHG Emissions are therefore ranked as 1, and not discussed further in the EA. However, the potential interactions of these activities, specifically the associated pile driving, on a Change in Sound Quality may be substantive and are ranked as 2, and are discussed in more detail in the next section.

Marine infilling activities during Construction involve earth movement and infilling. These activities are likely to generate emissions of air contaminants (primarily as dust) and GHG from earth movement, heavy equipment operation, and fuel combustion. As well as, there may be some sound emissions associated with the use of heavy equipment operation (i.e., heavy trucks). These interactions with a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality may be substantive and are ranked as 2, and are discussed in more detail in the next section.

Pile driving activities during Construction involve some earth movement and minor excavation for pile caps and pile driving. These activities are likely to generate emissions of air contaminants and GHG from earth movement, heavy equipment operation, and fuel combustion. Based on past experience, these are expected to be nominal and are very unlikely to cause the ambient air quality standards to be exceeded or GHG emissions that are considered important on the regional or provincial scale. These interactions with a Change in Air Quality or a Change in GHG Emissions are therefore ranked as 1. However, the potential
interactions of these activities, specifically pile driving, on a Change in Sound Quality may be substantive and are ranked as 2, and are discussed in more detail in the next section.

Additional parking area construction activities during Construction involve an extension of the existing parking facility (i.e., an additional 80 parking spaces) and will include earth movement, some steel construction, and the pouring of concrete. These activities are likely to generate some emissions of air contaminants (primarily as dust) and GHG from earth movement, heavy equipment operation, and fuel combustion. Further, these activities will also generate sound associated with the use of heavy equipment operation. Based on past experience, these emissions are expected to be nominal and are very unlikely to cause the ambient air quality standards to be exceeded, result in GHG emissions that are considered important on the regional or provincial scale, or cause sound quality objectives to be exceeded. These interactions with a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality are therefore ranked as 1.

The activities associated with the building of convention centre involve erecting the structural steel frame, exterior steel walls, roof trusses, and a steel deck. These are followed by installation of a two-ply modified bitumen roof, interior walls, and suspended acoustic ceilings. These activities are likely to generate some emissions of air contaminants and GHG from heavy equipment operation and fuel combustion. Further, these activities will also generate sound associated with the use of heavy equipment operation. Based on past experience, these emissions are expected to be nominal and are very unlikely to cause the ambient air quality standards to be exceeded, result in GHG emissions that are considered important on the regional or provincial scale, or cause sound quality objectives to be exceeded. These interactions with a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality are therefore ranked as 1.

Renovations to the existing Delta convention space during Construction involve installation of new carpeting, wall coverings, paint, new light fixtures, and a sound system. These activities are likely to generate small quantities of air contaminants, GHGs, and minimal sound. Based on past experience, these emissions are expected to be nominal and are very unlikely to cause the ambient air quality standards to be exceeded, result in GHG emissions that are considered important on the regional or provincial scale, or cause sound quality objectives to be exceeded. These interactions with a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality are therefore ranked as 1.

Boardwalk Construction activities during Construction may involve some earth movement, along with the construction of the wooden boardwalk itself. These activities are likely to generate minimal emissions of air contaminants, GHG emissions, and sound. Based on past experience, these emissions are expected to be nominal and are very unlikely to cause the ambient air quality standards to be exceeded, result in GHG emissions that are considered important on the regional or provincial scale, or cause sound quality objectives to be exceeded. These interactions with a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality are therefore ranked as 1.
Landscaping activities during Construction may involve some earth movement for leveling and proper slope placement, along with the laying of sod and the planting of vegetation. These activities are likely to generate minimal emissions of air contaminants, GHG emissions, and sound. Based on past experience, these emissions are expected to be nominal and are unlikely to cause the ambient air quality standards to be exceeded, result in GHG emissions that are considered important on the regional or provincial scale, or cause sound quality objectives to be exceeded. These interactions with a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality are therefore ranked as 1, and as with all other interactions ranked as 1, are not discussed further in the EA.

During Operation of the Project, fuel oil boiler(s) are planned to meet the heating needs of the facility. The boiler will consume approximately 100,000 litres of No. 2 fuel oil annually. The operation of the fuel oil boiler will therefore result in releases of air contaminants (SO$_2$, NO$_x$, CO, and PM) and GHGs to the atmosphere. The potential interactions of this activity on a Change in Air Quality and a Change in GHG Emissions may be substantive and are ranked as 2, and are discussed in more detail in the next section.

For Decommissioning and Abandonment, the Project will be operated for several decades and its lifetime will be extended by maintenance and refurbishment. It is intended that a Plan would be prepared at the time of decommissioning to minimize the release of air contaminants, GHG, or unwanted sound to the environment, to the extent possible. In considering Removal of Facilities and Site Reclamation for both Project components, the activities involve removal of physical structures, structure disassembly, management of recyclable materials, disposal of wastes, and rehabilitation and re-vegetation of the site. Some energy and fuel would be used in forklifts, trucks, cutting equipment, and portable generators. The timeframe for this phase is anticipated to be less than that required for Construction. These activities are likely to generate measurable emissions of air contaminants, GHG, and sound. The quantities of fuel and power are expected to be low, relative to Construction. Therefore, the emissions are not considered to be substantive and the interactions with a Change in Air Quality, Change in GHG Emissions, and a Change in Sound Quality are therefore ranked as 1, and not discussed further in the EA. It is emphasized that further assessment would be done prior to the Project being decommissioned.

5.2.4 Assessment of Project-Related Environmental Effects

The Project interactions with those aspects of Atmospheric Environment that were previously ranked as 0 or 1 were assessed to be not significant due to no interaction or no substantive interaction with the Atmospheric Environment or because of planned mitigation that would result in the environmental effects being rated as not significant. Only the interactions ranked as 2 in Table 5.4 are considered further in the environmental effects assessment.
A summary of the environmental effects assessment and prediction of residual environmental effects resulting from interactions with the Atmospheric Environment that are ranked as 2 is provided below. The activities assessed include construction, site preparation (air contaminants, GHG, noise), marine infilling (air contaminants, GHG, noise), pile driving (noise), and for operation, the use of the facility (air contaminants, GHGs) (refer to Table 5.4).
<table>
<thead>
<tr>
<th>Potential Residual Project-Related Environmental Effects</th>
<th>Project Phases, Activities, and Physical Works</th>
<th>Proposed Mitigation / Compensation Measures</th>
<th>Residual Environmental Effects Characteristics</th>
<th>Recommended Follow-up and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Air Quality</td>
<td>Construction:</td>
<td>• Contaminated fill from the Project site will be contained and encapsulated;</td>
<td>• Contaminated fill from the Project site will be contained and encapsulated;</td>
<td>None recommended.</td>
</tr>
<tr>
<td></td>
<td>• Site Preparation; and</td>
<td>• Apply dust suppressants as required;</td>
<td>• Follow equipment maintenance schedules;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Marine Infilling.</td>
<td>• Environmental awareness training with Key Contract Personnel will include vehicle idling; and</td>
<td>• Minimize activities that generate large quantities of dust during high winds.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Direction</th>
<th>Magnitude</th>
<th>Geographic Extent</th>
<th>Duration and Frequency</th>
<th>Reversibility</th>
<th>Ecological/Socio-economic Context</th>
<th>Significance</th>
<th>Prediction Confidence</th>
<th>Likelihood</th>
<th>Cumulative Environmental Effects?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>L</td>
<td>L</td>
<td>ST / O</td>
<td>R</td>
<td>D</td>
<td>N</td>
<td>H</td>
<td>L</td>
<td>N</td>
</tr>
</tbody>
</table>

A: Ambient; L: Local; ST/O: Short-Term/Occasional
### Table 5.5 Summary of Residual Project-Related Environmental Effects on the Atmospheric Environment

<table>
<thead>
<tr>
<th>Potential Residual Project-Related Environmental Effects</th>
<th>Project Phases, Activities, and Physical Works</th>
<th>Proposed Mitigation / Compensation Measures</th>
<th>Residual Environmental Effects Characteristics</th>
<th>Recommended Follow-up and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in GHG Emissions</td>
<td>Construction: • Site Preparation; and • Marine Infilling.</td>
<td>• Contaminated fill from the Project site will be contained and encapsulated; • Apply dust suppressants as required; • Follow equipment maintenance schedules; • Environmental awareness training with Key Contract Personnel will include vehicle idling; and • Minimize activities that generate large quantities of dust during high winds.</td>
<td>Direction</td>
<td>Magnitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>L</td>
</tr>
</tbody>
</table>

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## Table 5.5 Summary of Residual Project-Related Environmental Effects on the Atmospheric Environment

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<thead>
<tr>
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<th>Project Phases, Activities, and Physical Works</th>
<th>Proposed Mitigation / Compensation Measures</th>
<th>Residual Environmental Effects Characteristics</th>
<th>Recommended Follow-up and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Sound Quality</td>
<td>Construction: • Site Preparation; • Seawall Extension; and • Marine Infilling.</td>
<td>• Work will be limited to the hours between 7 am and 7 pm; • Use well maintained equipment with quality mufflers; • Notify residents at NSAs of major Construction activities and update on progress; and • Complaint follow-up and response procedure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential Residual Project-Related Environmental Effects</td>
<td>Project Phases, Activities, and Physical Works</td>
<td>Proposed Mitigation / Compensation Measures</td>
<td>Residual Environmental Effects Characteristics</td>
<td>Recommended Follow-up and Monitoring</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Change in Sound Quality</td>
<td>Construction: • Pile Driving (including Seawall Extension).</td>
<td>• Use of high frequency vibro-hammer with controlled variable eccentricity for majority of pile driving time; • Work will be limited to the hours between 7 am and 7 pm; • Use well maintained equipment with quality mufflers; • Notify residents at NSAs of major Construction activities and update on progress; and • Complaint follow-up and response procedure.</td>
<td>Direction</td>
<td>Magnitude</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td>L</td>
</tr>
</tbody>
</table>
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<tr>
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<th>Residual Environmental Effects Characteristics</th>
<th>Recommended Follow-up and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Air Quality</td>
<td>Operation: Use of the Facility.</td>
<td>• Follow boiler maintenance schedules; and</td>
<td>Direction</td>
<td>Magnitude</td>
</tr>
<tr>
<td>Change in GHG Emissions</td>
<td></td>
<td>• Contaminated fill from the Project site will be contained and encapsulated.</td>
<td>A</td>
<td>L</td>
</tr>
</tbody>
</table>

**Legend:**
- **A**: Approaching
- **N**: Not Applicable
- **L**: Low
- **ST/O**: Short Term/Open
- **R**: Rare
- **D**: Daily
Table 5.5  Summary of Residual Project-Related Environmental Effects on the Atmospheric Environment

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Direction</td>
<td>Magnitude</td>
<td>Geographic Extent</td>
<td>Duration and Frequency</td>
<td>Reversibility</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| TABLE 5.5 -- Table of Contents

**KEY**

**Direction:**
P Positive  
A Adverse

**Magnitude:**
L Low: GHG Emissions <10^5 t/a CO₂e; Air Quality or Sound Quality is not affected or slightly affected but is well below objectives, guidelines or standards.  
M Medium: GHG Emissions >10^5 and <10^6 t/a CO₂e; Air Quality or Sound Quality is affected to values that are near but largely below the objectives, guidelines or standards.  
H High: GHG Emissions >10^6 t/a CO₂e; Air Quality or Sound Quality is degraded to values that may substantively exceed objectives, guidelines or standards.

**Geographic Extent:**
S Site-specific: Within the PDA.  
L Local: Within the LAA.

**Duration:**
ST Short term  
MT Medium Term  
LT Long Term  
P Permanent – will not change back to original condition

**Frequency:**
O Occasionally, once per month or less.  
S Sporadic, once per week  
R Regular, more than once per week intervals.  
C Continuous.

**Reversibility:**
R Reversible  
I Irreversible

**Ecological/Socio-economic Context:**
U Undisturbed: Area relatively or not adversely affected by human activity  
D Developed: Area has been substantially previously disturbed by human development or human development is still present  
N/A Not Applicable

**Significance:**
S Significant  
N Not Significant

**Prediction Confidence:**
Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation  
L Low level of confidence  
M Moderate level of confidence  
H High level of confidence

**Likelihood:**
Based on professional judgment  
L Low probability of occurrence  
M Medium probability of occurrence  
H High probability of occurrence

**Cumulative Environmental Effects?**
Y Potential for environmental effect to interact with other past, present or foreseeable projects or activities in the area of the Project  
N Environmental effect will not or is not likely to interact with other past, present or foreseeable projects or activities in the area of the Project.
5.2.4.1 Project Environmental Effects Mechanisms

The Project-related activities that were ranked as 2 in Table 5.4 have the potential to cause significant environmental effects on the Atmospheric Environment, and are discussed below.

During Construction, the potential for adverse environmental effects exists due to the release of combustion gases, GHGs, and sound emissions from heavy equipment (including earth movers, excavation equipment, and grading equipment) as well as from fugitive dust (particulate matter) that may be generated during the earth-moving activities and building demolition associated with Site Preparation. Particulate matter emissions may occur during unloading and spreading of aggregate and the demolition of the DFO office area and the CCG buildings. Overall, Site preparation activities may result in emissions of air contaminants, GHG, and noise. The interactions of site preparation with a Change in Air Quality, Change in GHG Emissions, and a Change in Sound Quality are therefore ranked as 2.

Also during Construction, the potential for adverse environmental effects exists due to sound emissions associated with pile driving. The interaction of pile driving with a Change in Sound Quality is therefore ranked as 2.

During Operation of the Project, a fuel oil boiler is planned to meet the heating needs of the facility. The operation of the fuel oil boiler will result in the release of air contaminants and GHGs to the atmosphere. The potential interactions of this activity on a Change in Air Quality and a Change in GHG Emissions may be substantive and are therefore ranked as 2.

5.2.4.1.1 Construction

5.2.4.1.1.1 Site Preparation

As described in Section 2.3.1, activities associated with site preparation have the potential to cause changes in Air Quality, GHG Emissions, and Sound Quality. These are described below.

Change in Air Quality

In addition to combustion gases, there is potential for fugitive dust emissions from activities during Construction. Fugitive dust is particulate matter that originates primarily from the movement of mobile equipment on unpaved surfaces, especially during dry and windy periods. These activities include site preparation (e.g., clearing), excavation, and similar earth-moving activities. The activities are transient in nature (both in time and space) and are dependent on factors such as the moisture in the soil, the level of activity at a particular location, and meteorological conditions at the time. The potential for dust generation would occur most frequently during periods of high winds or extreme dry periods. Mitigation during dry periods or high wind events, such as water application or other approved dust suppressants, would be used to reduce the generation of fugitive dust. In light of mitigation, these episodes are
expected to be of low frequency and relatively short duration at the site. The emissions are therefore predicted to be nominal, and are expected to occur intermittently.

Emissions of sulphur dioxide, carbon monoxide, nitrogen oxides, particulate matter, and total hydrocarbons from fossil fuel combustion were estimated using preliminary construction information on equipment types and counts and emission factors from the USEPA. For each type of construction equipment, the corresponding motor horsepower, average load factor, and hours of operation per day were estimated. The majority of horsepower values were estimated using the “Caterpillar Performance Handbook” (Caterpillar 1998) and Transport Canada’s Urban Transportation Emissions Calculator (Transport Canada 2007). Load factors and hours of operation for each day were estimated using standard engineering practices. These three parameters were used to determine the total horsepower-hours for each type of equipment. The USEPA NONROAD2005 computer model was used to generate emission factors with units of grams of contaminant per horsepower-hour for each equipment type and engine size category (USEPA 2005).

It has been assumed that demolition of the buildings on site (one part of the construction phase) will be done using an excavator or similar sized equipment. Combustion emissions are assumed to take place over the course of two months.

Using these emission factors and fuel consumption, estimates of emissions were made. The estimated emissions from fuel combustion due to site preparation are provided in Table 5.6.

Table 5.6 Estimated Combustion Emissions from Site Preparation Activities

<table>
<thead>
<tr>
<th>Air Contaminant</th>
<th>Estimated Total Emissions (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>3.8</td>
</tr>
<tr>
<td>NOₓ</td>
<td>12.1</td>
</tr>
<tr>
<td>SO₂</td>
<td>1.5</td>
</tr>
<tr>
<td>TSP</td>
<td>0.7</td>
</tr>
<tr>
<td>VOC</td>
<td>0.7</td>
</tr>
</tbody>
</table>

During Construction, fugitive dust emissions may be generated from the movement of trucks on unpaved surfaces as well as site preparation activities such as grading, loading of debris/material, and unloading of fill material. Emissions of particulate matter from these activities were estimated using an estimated area of ground disturbance and an emission factor from the USEPA (USEPA 1995). It has been conservatively assumed that the entire Project area is worked on continuously throughout one year of Construction. A 90% reduction in the emissions has been applied in the estimate to account for the effective use of water as a dust suppressant.
The estimate of emissions of fugitive particulate matter due to site preparation is 6.5 t; therefore, the total release of particulate matter (fuel combustion and fugitive emissions) during site preparation is 7.2 t.

The buildings that are to be demolished are known to contain asbestos and lead. Removal of asbestos containing materials will be conducted by a contractor holding a valid asbestos contractor’s certificate as per Part 49 – Asbestos Regulations, of the Occupational Health and Safety Act General Regulations. To remove the lead based paint, the painted structural steel will be removed from the buildings and cut, under controlled conditions, into lengths suitable for transport and transported to an off-island steel recycling facility located in Quebec. All cuttings will be contained and collected for approved disposal. Releases of asbestos or lead to the atmosphere for these activities are therefore not expected to be substantive.

The Study Team reviewed publically available literature (including the USEPA AP 42 compilation) for fugitive particulate matter emission factors from the demolition of buildings. Very little applicable information was found. Nevertheless, based on past experience, emissions of particulate matter from these sources are expected to be low in magnitude and of short duration.

The soil at the Project site is contaminated by PAHs through the past activities conducted at the site. A search of publically available literature on emissions of PAH-contaminated dust was conducted. The sources consulted included, but were not limited to, the USEPA, the National Institute of Occupational Health and Safety (NIOSH), and the CCME. Very little information on rates or concentrations of soil contaminant emissions to the atmosphere was found; however, qualitative information on contaminated soil was obtained regarding naphthalene and benzo(a)pyrene.

Naphthalene is more volatile than benzo(a)pyrene, thus, when evaluating vapour-phase PAHs, naphthalene was chosen for the assessment as a conservative evaluation of volatile PAHs that may be present in the air at the site.

Naphthalene is a volatile PAH that readily degrades in the environment by physicochemical processes. These include oxidation in air and microbial action in soils. Further, this compound volatilizes from soil relatively quickly, in comparison to other soil contaminants. In one study, it was estimated that the volatilization half-life of naphthalene in soil (at a depth of 10 cm) is 14 days (Jury et al. 1984). As soil depth increases the volatilization of naphthalene becomes less important (Phillip 1989) compared with biodegradation. In addition to the volatilization pathway, naphthalene is broken down by microorganisms. Biodegradation may result in a half-life in soil as long as 3.6 months, but may be shorter depending on the soil and the other contaminants present (Phillip 1989).

In the Phase II Site Assessment (Jacques Whitford 2002) it was noted that concentrations of naphthalene measured at most of the locations tested were low; however, at one location a value of 130 mg/kg was reported at a depth between 3.4 to 4 m. Given that this assessment
was conducted nine years ago, it is likely that naphthalene present in the soil at that time would have, by now, either escaped from the soil by volatilization or have been broken down in the soil by microbial action. As a result, it is estimated that the concentration of naphthalene is essentially zero in the soil at the Project site today.

It is also noted that planned excavation depth is down to 2 m. which is not likely to disturb soil material at 4 m.

The province of Prince Edward Island does not have an ambient air quality standard for naphthalene; however the Ontario Ministry of Environment (OMOE) has a 10-minute standard of 50 µg/m³ and a 24-hour standard of 22.5 µg/m³ (OMOE 2008). The 10-minute standard is based on the odour threshold of naphthalene, while the 24-hour standard is health-based. Naphthalene has a characteristic odour that is detectable at 50 µg/m³.

Based on the assessment described above, the OMOE standards for naphthalene are not expected to be exceeded.

Benzo(a)pyrene, a polycyclic aromatic hydrocarbon, binds strongly to soil and the USEPA does not consider volatilization of benzo(a)pyrene to be a major pathway into the atmosphere (USEPA nd). The quantities of gaseous benzo(a)pyrene released to the atmosphere are expected to be low and it is reasonable to assume that this is valid for most PAHs.

While the release of PAHs from the soil during Operation of the Project is expected to be very low, the potential for this release to degrade the quality of the indoor air will never-the-less be mitigated through follow-up and monitoring of the air via sub-slab sampling ports to be installed in the concrete slab upon which the Project will be constructed.

Metals were found to be present in the soil, specifically copper, arsenic, and lead. These are part of the soil matrix and may therefore be present in airborne dust. Therefore, the control of the generation of airborne dust is essential to minimizing exposure to the metals.

In summary, the effective mitigation and control of the generation of airborne dust is essential and will be used, as noted above to minimize the generation of airborne dust and thereby minimize the exposure of the PAHs and metals.

During site preparation activities, it is recommended that approved dust suppressants such as water be applied as needed to minimize emissions of dust. It is recommended, for Occupational Health and Safety purposes, that the Proponent periodically conduct breathing zone testing to confirm that mitigation methods are successful.

In light of the mitigation noted above, the concentrations of airborne PAHs and/or metals during construction are not expected to be substantive.
A Change in GHG Emissions

Greenhouse gases are released during fuel combustion in vehicles and heavy machinery associated with site preparation activities. The quantities of GHGs released depend on a number of factors, including the type of equipment/vehicle, the age of the equipment, and the type of fuel being combusted.

An estimate of carbon dioxide emissions from fossil fuel combustion was based on preliminary construction information on equipment types and counts and emission factors from the NONROAD 2005 model (USEPA 2005).

The estimated release of carbon dioxide to the atmosphere from site preparation activities is 1,062 t CO₂. This represents 0.05% of the GHG emissions reported provincially for 2008, <0.001% of the GHG emissions reported nationally for 2008, and <0.0001 % of the GHG emissions reported globally for 2008.

A Change in Sound Quality

The use of heavy machinery during Construction may increase sound pressure levels in the vicinity of the Project.

Since an increase of 3 dBA is considered to be the minimum perceptible change in sound levels for humans, an increase in background sound pressure level from the measured daily average L_{eq} of 48 dBA to 61 dBA (from a 23-hour monitoring period) would be considered perceptible (Hoover & Keith Inc. 1981).

Typical sound pressure levels of some commonly used construction equipment is provided in Table 5.7.
Preliminary construction information indicates that excavators, cranes, loader, bulldozers, pile drivers, and various trucks will be required over the Construction period.

Based on the typical sound pressure levels provided in Table 5.7 and the heavy machinery assumed to be in use during site preparation, sound levels during the daytime may on occasion reach 70 dB$_A$ on the street in front of the Delta. In this analysis, it has been conservatively assumed that all equipment is running continuously near the centre of the Project site and the background sound level is conservatively 55 dB$_A$.

Mitigation of noise has been considered and the following practices will be implemented during construction:

- use scheduling restrictions where warranted;
- all equipment shall be maintained in good working order for noise suppression standards;
- include in tenders, employment contracts, subcontractor agreements and work method statements clauses that assure the minimization of noise and compliance with directions from management to minimize noise;

### Table 5.7 Typical Construction Equipment Sound Pressure Levels

<table>
<thead>
<tr>
<th>Equipment Powered By Internal Combustion Engines</th>
<th>Sound Pressure Level (dB$_A$ at 15 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller</td>
<td>85</td>
</tr>
<tr>
<td>Front loader</td>
<td>80</td>
</tr>
<tr>
<td>Backhoe</td>
<td>80</td>
</tr>
<tr>
<td>Excavator</td>
<td>85</td>
</tr>
<tr>
<td>Bulldozer</td>
<td>85</td>
</tr>
<tr>
<td>Scraper, grader</td>
<td>85</td>
</tr>
<tr>
<td>Paver</td>
<td>85</td>
</tr>
<tr>
<td>Pickup Truck</td>
<td>55</td>
</tr>
<tr>
<td>Concrete Mixer Truck</td>
<td>85</td>
</tr>
<tr>
<td>Concrete Pump Truck</td>
<td>82</td>
</tr>
<tr>
<td>Crane</td>
<td>85</td>
</tr>
<tr>
<td>Pump</td>
<td>81</td>
</tr>
<tr>
<td>Generator</td>
<td>82</td>
</tr>
<tr>
<td>Generator (&lt;25KVA, VMS signs)</td>
<td>70</td>
</tr>
<tr>
<td>Compressor (air)</td>
<td>80</td>
</tr>
<tr>
<td>Pneumatic Tools</td>
<td>85</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>89</td>
</tr>
<tr>
<td>Blasting</td>
<td>94</td>
</tr>
<tr>
<td>Effect Pile drivers (peak levels)</td>
<td>101</td>
</tr>
<tr>
<td>Concrete Saw</td>
<td>90</td>
</tr>
<tr>
<td>Chain Saw</td>
<td>84</td>
</tr>
<tr>
<td>Welder</td>
<td>74</td>
</tr>
</tbody>
</table>

Source: Federal Highway Administration (FHWA) 2006
Environmental Assessment (EA):
Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI

- give preference to the use of quieter technologies or other mitigation methods rather than lengthening construction duration;
- regularly discuss noise minimization practices with workers and contractors;
- ensure that site managers periodically check the site, nearby receptors and other sensitive receptors for noise issues so that they can be quickly addressed;
- keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours, and other relevant practices such as minimizing the use of engine brakes and engine idling;
- notify residents at NSAs of major Construction activities and provide updates on progress; and
- conduct frequent and open communication with nearby residents to identify and address any noise complaints. Consideration would be given to each complaint on a case by case basis, several mitigation options would be investigated, up to and including temporary relocation during high sound generating Construction activities (i.e., pile driving).

At the edge of the PDA, the sound levels are estimated to decrease to 60 dBₐ and are likely to be indistinguishable from background noise levels.

5.2.4.1.1.2 Seawall Extension

A Change in Sound Quality

Two types of pile driving hammers will be used during Construction of the seawall extension. A vibratory hammer consists of a system of counter-rotating weights such that only vertical vibration is transmitted through the stationary hammer to the pile being installed. A hydraulic impact hammer has a descending mass that delivers energy to drive the piles into the soil. Both types of hammers can be mounted on a crane over the piles to be driven.

A typical hydraulic impact hammer has a sound level of 101 dBₐ at a distance of 15 m from the source, and a vibratory hammer has a sound level of 96 dBₐ 15 m from the source. Since pile driving will take place in an urban area, the Proponent has selected a set of impact hammers that are less noisy than typical impact hammers. In addition, the vibratory hammer selected is of the high frequency type, such that the sounds they produce are of a lower intensity.

The main mitigation measure for the noise due to pile driving is the use of a combination of pile drivers that includes both the vibratory pile driver and the impact hammer. The vibratory pile driver will be used for approximately 75% of the time spent pile driving, with the impact hammer used for the remainder of the time. It is emphasized that the sound pressure levels from the vibratory pile driver are less than those for the impact hammer pile driver (up to 10%). Further,
operating times will be limited to 10 hours or less per day, and will not take place in the early morning or evenings. Additional mitigation described in Section 5.2.4.1.1 may be applied as required.

Based on the types of equipment proposed, the time frame of operation, and the distance between the active construction site and nearby receptors, the noise levels at off-site receptors are expected to be discernable over the existing urban noise, but are not expected to be objectionable, nor are these sound levels expected to exceed the guideline.

### 5.2.4.1.1.3 Marine Infilling

#### A Change in Air Quality

The marine infilling portion of Construction involves the use of heavy machinery to truck in and deposit fill, and install the steel sheet piling. Emissions of air contaminants will result from fossil fuel combustion and truck traffic on unpaved roads.

Conservative estimates of these emissions have been made using preliminary construction information and emission factors from USEPA (AP 42 and NONROAD2005). Additional assumptions made in the preparation of the estimate include:

- excavator emission factors are the same as those for a loader;
- dump trucks drive 300 m (roundtrip) on-site for 27 trips;
- mean weight of vehicles is represented by an empty Caterpillar 772 Construction and Mining truck (82,100 kg) (Caterpillar 2004); and
- unpaved soil silt content is 8.5% (USEPA 2006).

The estimated emissions of air contaminants from fuel combustion and fugitive dust emissions are presented in Table 5.8.

### Table 5.8 Estimated Emissions of Air Contaminants from Marine Infilling

<table>
<thead>
<tr>
<th>Activity</th>
<th>CO</th>
<th>SO₂</th>
<th>NOₓ</th>
<th>VOC</th>
<th>TPM</th>
<th>PM₁₀</th>
<th>PM₂.₅</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fossil fuel combustion</td>
<td>2.0</td>
<td>0.8</td>
<td>6.6</td>
<td>0.3</td>
<td>0.3</td>
<td>NQ</td>
<td>NQ</td>
</tr>
<tr>
<td>Fugitive dust due to vehicle traffic</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>1.2</td>
<td>0.4</td>
<td>0.04</td>
</tr>
<tr>
<td>Total</td>
<td>2.0</td>
<td>0.8</td>
<td>6.6</td>
<td>0.3</td>
<td>1.6</td>
<td>0.4</td>
<td>0.04</td>
</tr>
</tbody>
</table>

NA – not applicable
NQ – not quantified due to lack of data
Overall, the emissions from marine infilling are estimated to be low in magnitude, and considerably lower than those estimated for site preparation. The total estimated emissions from site preparation and marine infilling are also low in comparison to the total emissions of air contaminants reported to NPRI for PEI (Table 5.9).

Table 5.9 Comparison of Emissions from Construction Activities with NPRI

<table>
<thead>
<tr>
<th>Air Contaminant</th>
<th>Estimated Total Emissions During Construction (tonnes)</th>
<th>Total Emissions Reported to NPRI for Charlottetown (tonnes)</th>
<th>Site Preparation as a Percent of Total Reported to NPRI from Charlottetown (%)</th>
<th>Site Preparation as a Percent of Total Reported to NPRI Provincially (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>5.8</td>
<td>--</td>
<td>--</td>
<td>38.3</td>
</tr>
<tr>
<td>NOx</td>
<td>18.7</td>
<td>105</td>
<td>17.8</td>
<td>6.9</td>
</tr>
<tr>
<td>SO2</td>
<td>2.3</td>
<td>111</td>
<td>2.0</td>
<td>0.24</td>
</tr>
<tr>
<td>TPM</td>
<td>2.3</td>
<td>87</td>
<td>2.6</td>
<td>1.6</td>
</tr>
<tr>
<td>VOC</td>
<td>0.97</td>
<td>230</td>
<td>0.42</td>
<td>0.40</td>
</tr>
<tr>
<td>PM10</td>
<td>0.40</td>
<td>60</td>
<td>0.67</td>
<td>0.35</td>
</tr>
<tr>
<td>PM2.5</td>
<td>0.04</td>
<td>22</td>
<td>0.18</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Notes:
-- No data available.
1 Environment Canada 2010a.

Based on previous experience, and the low magnitudes of the estimates, the contribution of the Project-related releases of air contaminants to the atmosphere to the ambient ozone concentration is expected to be nominal.

A Change in GHG Emissions

As with site preparation, GHGs are released during fuel combustion in vehicles and heavy machinery associated with marine infilling activities. The estimate of carbon dioxide (CO2) emissions from fossil fuel combustion was based on preliminary construction information on equipment types and counts and emission factors from the NONROAD 2005 model.

The estimated quantity of CO2 released from marine infilling activities is 571 t CO2. This represents approximately 0.03% of the GHG emissions reported provincially, and substantially smaller fractions as a percentage of the emissions reported nationally, and globally.

A Change in Sound Quality

Given that the distance between Queen Street and the nearest edge of the marine infill area is approximately 100 m, the expected noise levels at Queen Street are likely to be discernable over existing background. The Study Team estimated the sound level 100 m from the marine infill area, based on the assumption that heavy equipment would be operating continuously
during the day. It is noted that changes to sound levels due to obstacles or terrain change (i.e., reductions in sound) were not considered when making the estimate. The estimated sound pressure level of 70 dB_A, which may occur on occasion, is therefore conservative. Further, mitigation in the form of engine mufflers and anti-idling policies will be put in place. Additional mitigation as described in Section 5.2.4.1.1 will be applied as required. Therefore it is not expected that the sound pressure guideline of 65 dB_A will be frequently exceeded.

5.2.4.1.4 Pile Driving

A Change in Sound Quality

As stated above, two types of pile driving hammers will be used during Construction.

The main mitigation measure for the noise due to pile driving is the use of a combination of pile drivers that includes both the vibratory pile driver and the impact hammer. The vibratory pile driver will be used for approximately 75% of the time spent pile driving, with the impact hammer used for the remainder of the time. It is emphasized that the sound pressure levels from the vibratory pile driver are less than those for the impact hammer pile driver (up to 10%). Further, operating times will be limited to 10 hours or less per day, for a total of 30 days and will not take place in the early morning or evenings.

Based on the types of equipment proposed, the time frame of operation, and the distance between the active construction site and nearby receptors, and in light of mitigation, the noise levels at off-site receptors are expected to be discernable over the existing urban noise but are not expected to be frequently objectionable, nor are these sound levels expected to frequently exceed the guideline.

5.2.4.1.2 Operation

5.2.4.1.2.1 Use of the Facility

The boiler(s) planned for heating are expected to consume approximately 100,000 Litres of No. 2 fuel oil annually to meet the heating needs of the Project. The operation of the fuel oil boiler will therefore result in the release of air contaminants (SO_2, NO_X, CO, and PM) and GHGs to the atmosphere.

A Change in Air Quality

Emissions of air contaminants from operation of the fuel oil boiler were estimated (Table 5.10) using an estimated annual fuel consumption and US EPA AP 42 emission factors for commercial fuel oil boilers (US EPA 2010).
Table 5.10 Estimated Annual Emissions of Air Contaminants

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Tonnes/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO₂</td>
<td>1.70¹</td>
</tr>
<tr>
<td>NOₓ</td>
<td>0.24</td>
</tr>
<tr>
<td>CO</td>
<td>0.06</td>
</tr>
<tr>
<td>PM</td>
<td>0.02</td>
</tr>
</tbody>
</table>

¹ Based on an assumed fuel sulphur content of 1%

The releases of air contaminants, associated with operation of the fuel oil boiler, are low and are not expected to substantively change ambient concentrations of SO₂, NOₓ, CO, and PM. As a result, the contribution of air contaminant emissions associated with activities during operation is expected to be nominal.

A Change in GHG Emissions

GHG Emissions from operation of the fuel oil boiler were estimated (Table 5.11) using an estimated annual fuel consumption and US EPA AP 42 emission factors for commercial fuel oil boilers (US EPA 2010).

Table 5.11 Estimated Annual Emissions of GHG

<table>
<thead>
<tr>
<th>GHG</th>
<th>Tonnes/year</th>
<th>Tonnes CO₂e/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>267</td>
<td>267</td>
</tr>
<tr>
<td>CH₄</td>
<td>0.003</td>
<td>0.05</td>
</tr>
<tr>
<td>N₂O</td>
<td>0.003</td>
<td>0.97</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>269</td>
</tr>
</tbody>
</table>

The estimated quantity of CO₂ released from operation of the fuel oil boiler is 269 t CO₂. This represents less than 0.02% of the GHG emissions reported provincially, and substantially smaller fractions as a percentage of the emissions reported nationally, and globally.

In comparison to other sources of GHG emissions on PEI (Table 4.3), this boiler is not a substantive source of GHG emissions.

5.2.4.2 Mitigation of Project Environmental Effects

The mitigation measures that will be implemented during the Project are described previously and listed in Table 5.5. The key mitigation measures to reduce environmental effects of the Project, including cumulative environmental effects, on the Atmospheric Environment are noted below. These mitigation measures will be implemented wherever technically and economically feasible to minimize potential adverse environmental effects of the Construction of the Project on the Atmospheric Environment:
• contaminated fill from the Project site will be contained and encapsulated;
• apply dust suppressants as required;
• follow equipment maintenance schedules;
• environmental awareness training with Key Contract Personnel will include vehicle idling;
• minimize activities that generate large quantities of dust during high winds;
• use well maintained equipment with quality mufflers;
• notify residents at NSAs of major Construction activities and update on progress;
• use of high frequency vibro-hammer with controlled variable eccentricity for majority of time spent pile driving;
• use scheduling restrictions where warranted;
• minimize the use of engine brakes and engine idling;
• discuss noise minimization practices with workers and contractors; and
• complaint follow-up and response procedure.

5.2.5 Assessment of Cumulative Environmental Effects

The Project environmental effects discussed above may overlap with other past, present, and reasonably foreseeable projects and activities. As a result, an assessment of the potential cumulative environmental effects was conducted. The potential cumulative environmental effects to Atmospheric Environment are presented in Table 5.12 below, and include a ranking of each interaction with other projects. The ranking is indicated as 0, 1, or 2 with respect to the nature and degree to which the Project-related environmental effects may overlap with those of other projects or activities.
Table 5.12  Potential Cumulative Environmental Effects to the Atmospheric Environment

<table>
<thead>
<tr>
<th>Other Projects and Activities With Potential for Cumulative Environmental Effects</th>
<th>Potential Cumulative Environmental Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change in Air Quality</td>
</tr>
<tr>
<td>Riverside Drive Marine Infilling and Road Expansion, Charlottetown, PEI</td>
<td>0</td>
</tr>
<tr>
<td>Paoli’s Wharf Condominium Development, Charlottetown, PEI</td>
<td>1</td>
</tr>
<tr>
<td>Decommissioning of Oil Supply Pipeline, Charlottetown, PEI</td>
<td>1</td>
</tr>
<tr>
<td>Charlottetown Waste Treatment Facility Upgrade, Charlottetown, PEI</td>
<td>0</td>
</tr>
<tr>
<td>Charlottetown Marine Terminal Repair and Expansion and New Marina Development, Charlottetown, PEI</td>
<td>1</td>
</tr>
<tr>
<td>The Holman Grand Hotel Development, Charlottetown, PEI</td>
<td>1</td>
</tr>
<tr>
<td>Holland College Residence Expansion and Addition of Academic Facilities</td>
<td>1</td>
</tr>
<tr>
<td>Construction of Parking Lot and Concert Venue Site, Charlottetown, PEI</td>
<td>1</td>
</tr>
</tbody>
</table>

**KEY:**
Cumulative environmental effects were ranked as follows:
0 Project environmental effects do not act cumulatively with those of other Projects and Activities.
1 Project environmental effects act cumulatively with those of other Project and Activities, but are unlikely to result in significant cumulative environmental effects OR Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects but will not measurably change the state of the VEC.
2 Project environmental effects act cumulatively with those of other project and activities, and may result in significant cumulative environmental effects OR Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects and may measurably change the state of the VEC.

The following projects or activities were ranked 0, as shown in Table 5.10, as no interaction between the Project and these projects or activities are expected which would result in a cumulative environmental effect to the Atmospheric Environment.

- Riverside Drive Marine Infilling and Road Expansion; and
- Charlottetown Waste Treatment Facility Upgrade.

These activities, listed above, are not likely to act cumulatively with the Project because the distances to the Project site are large (more than 2 km). Since these projects and activities are located outside the assessment area, these interactions are ranked as 0 and the cumulative environmental effects on a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality are rated not significant. These interactions are not carried forward in the cumulative environmental effects assessment.
The following projects or activities were ranked 1 as shown in Table 5.10, as these other projects and activities may contribute to cumulative environmental effects in the Assessment Area:

- Paoli’s Wharf Condominium Development;
- Decommissioning of Oil Supply Pipeline;
- Charlottetown Marine Terminal Repair and Expansion and New Marina Development;
- The Holman Grand Hotel Development, Charlottetown, PEI;
- Holland College Residence Expansion and Addition of Academic Facilities; and
- Construction of Parking Lot and Concert Venue Site.

The potential cumulative environmental effects in the Assessment Area are primarily related to the air contaminant and GHG emissions of other existing or planned projects and activities, and the sound pressure levels due to existing and planned projects and activities in the area (including changes in vehicle traffic). Emissions from the projects listed above are measurable and may act cumulatively with the Project.

There may be emissions of air contaminants, GHG, and noise during construction of these projects. With planned mitigation such as scheduling work during day time hours and the use of dust suppressants, the emissions are expected to be nominal and not act cumulatively with the Change in Air Quality, the Change in GHG Emission or the Change in Sound Quality. The emissions of air contaminants, GHG, and noise during operation of these projects are not likely to be substantive and are not likely to act cumulatively with the Project.

Although Paoli’s Wharf Condominium Development and the Charlottetown Marine Terminal Repair and Expansion and New Marina Development projects are within 500 m of the Project (Figure 3.2, Appendix A), construction is completed for these projects and there is no overlap temporally with Construction of the Project. Further to this, regarding Project Operation, the air contaminant and GHG emissions, along with the noise emissions from the operation of these projects are expected to be nominal and well below the standards and guidelines. As a result, the emissions from the Project and the emissions from the other past, present, and reasonably foreseeable projects and activities are not expected to combine cumulatively to cause any ambient standards to be exceeded.

The Decommissioning of Oil Supply Pipeline, the Holman Grand Hotel, the Holland College Residence Expansion and Addition of Academic Facilities and the Construction of Parking Lot and Concert Venue Site projects are bordering the Assessment Area for the Project. The emissions from these projects and activities are also not likely to be substantive and are not expected to combine cumulatively to cause any ambient standards to be exceeded.

Therefore, the interactions are ranked as 1 and the cumulative environmental effects on a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality are rated not significant. These interactions are not carried forward in the cumulative environmental effects assessment and not discussed further in the EA.
5.2.5.1 Characterization of Residual Project Environmental Effects

If not carefully carried out or suitably mitigated, the Project could affect the Atmospheric Environment due to a Change in Air Quality, a Change in GHG Emissions, and/or a Change in Sound Quality. Effective Project planning, design, avoidance, and the application of known and proven mitigation measures will reduce the environmental effects of the Project on the Atmospheric Environment so that they are not substantive.

In summary, with the proposed mitigation, the residual environmental effects of a Change in Air Quality, a Change in GHG Emissions, and a Change in Sound Quality during all phases of the Project are not substantive. This conclusion has been established with a high level of confidence as a result of the planned implementation of proposed proven mitigation measures described above.

5.2.6 Determination of Significance

In determining the significance of the potential environmental effects (including cumulative environmental effects) on Atmospheric Environment, consideration is given to a Change in Air Quality, Change in GHG Emissions, and a Change in Sound Quality.

5.2.6.1 Residual Project Environmental Effects

The residual environmental effects for Construction and Operation are characterized by the following descriptors: Direction; Magnitude; Geographic Extent; Duration and Frequency; Reversibility; Ecological/Socio-economic Context, Significance, and Prediction Confidence. These descriptors are further explained in Table 5.5.

The residual environmental effects of Construction (site preparation and marine infilling) on a Change in Air Quality are expected to be adverse, of low magnitude, limited to the site in extent, short term duration, occasional frequency, and reversible. The Project is occurring in an already developed area. The environmental effects are not significant and there is a high level of confidence in the prediction of these ratings, low level of likelihood, and no anticipated cumulative environmental effects.

The residual environmental effects of Construction (site preparation and marine infilling) on a Change in GHG Emissions are expected to be adverse, of low magnitude, global in extent, continuous duration, occasional frequency, and reversible. The Project is occurring in an already developed area. The quantities of emissions are low in the context of the CEAA (2003) guidance and are very small fractions of the city and provincial totals.

The residual environmental effects of Construction (site preparation and marine infilling) on a Change in Sound Quality are expected to be adverse, of low magnitude, limited to the site in extent, short term duration, occasional frequency, and reversible. The Project is occurring in an already develop area. The environmental effects are not significant and there is a high level of
confidence in the prediction of these ratings, low level of likelihood, and no anticipated cumulative environmental effects.

The residual environmental effects of Construction (pile driving) on a Change in Sound Quality are expected to be adverse, of low magnitude, limited to the site in extent, short term duration, sporadic frequency, and reversible. The Project is occurring in an already developed area. The environmental effects are not significant and there is a high level of confidence in the prediction of these ratings, low level of likelihood, and no anticipated cumulative environmental effects.

The residual environmental effects of Operation (use of the facility) on a Change in Air Quality are expected to be adverse, of low magnitude, limited to the site in extent, long term duration, occasional frequency, and reversible. The Project is occurring in an already developed area. The environmental effects are not significant and there is a high level of confidence in the prediction of these ratings, low level of likelihood, and no anticipated cumulative environmental effects.

The residual environmental effects of Operation (use of the facility) on a Change in GHGs are expected to be adverse, of low magnitude, global in extent, continuous duration, occasional frequency, and reversible. The Project is occurring in an already developed area. The quantities of emissions are low in the context of the CEAA (2003) guidance and are very small fractions of the city and provincial totals.

Overall, given the nature of the Project and the proposed mitigation, the potential environmental effects of the Project-related activities on Atmospheric Environment during all phases of the Project are rated not significant, with a high level of confidence.

5.2.6.2 Residual Cumulative Environmental Effects

The potential environmental effects of the Project on the Atmospheric Environment will not overlap with those of other projects or activities that have been or will be carried out, in any substantive way (Table 5.10). Therefore, the residual cumulative environmental effects of a Change in Air Quality, Change in GHG Emissions, and a Change in Sound Quality as a result of past, present and reasonably foreseeable projects and activities, in combination with the environmental effects of the Project during all phases, are rated not significant. This determination has been made with a high level of confidence because of the limited nature and extent of the Project and the lack of substantive overlapping with other projects or activities that have been or will be carried out.

5.2.7 Follow-up and Monitoring

A detailed comprehensive monitoring program is not recommended or warranted for this Project because, as noted above, the emissions from the Project are likely to be nominal. Therefore, a detailed program to verify the predictions of the environmental effects assessment on the Atmospheric Environment, or to verify the effectiveness of mitigation, is not proposed. Should
complaints about noise or dust be filed on occasion during Construction, these would be addressed on a case by case basis.

The magnitude of release of PAHs from the soil at the site during Operation is expected to be very low. Never-the-less, the potential for this release to degrade the quality of the indoor air, will be mitigated through follow-up and monitoring of the air via sub-slab sampling ports to be installed in the concrete slab upon which the Project will be constructed.

5.3 Marine Environment

In this section, the environmental effects of the Project activities on the Marine Environment resulting from Construction and Operation are assessed. The Marine Environment refers to all marine fish and fish habitat that may interact with Project activities. The federal Fisheries Act defines “fish” to mean all fish, shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans, or marine animals, and the eggs, sperm, spawn, larvae, spat, and juvenile stages of fish, shellfish, crustaceans, and marine animals. The federal Fisheries Act defines “fish habitat” as spawning grounds, nursery, rearing, food supply, and migration areas on which fish directly or indirectly depend on. Fish habitat includes physical (e.g., substrate, temperature, flow velocity and volumes, water depth), chemical (e.g., dissolved oxygen, pH, nutrients), and biological (e.g., fish, benthic invertebrates, plankton, aquatic plants) attributes of the environment that are required by fish to carry out life cycles processes (e.g., spawning, rearing, feeding, overwintering, migration). Project activities are not anticipated to have significant environmental effects on the Marine Environment because of planned mitigation.

5.3.1 Scope of Assessment

The scope of the environmental assessment of the Marine Environment in consideration of the regulatory setting, potential Project-VEC interactions, and existing knowledge, is defined in the sections that follow.

5.3.1.1 Rationale for Selection of Valued Environmental Component and Regulatory Setting

The Marine Environment was selected as a VEC based on anticipated interactions between Project activities and the marine environment (e.g., water quality, sediment quality, mortality, habitat loss, underwater sound levels).

5.3.1.2 Selection of Environmental Effect and Measurable Parameter

The environmental assessment of the Marine Environment is focused on the following environmental effect:

- change in marine populations.
Marine Environment was selected as a VEC because of its intrinsic importance to aquatic biota. The Project has the potential to affect the Marine Environment through changes in marine habitat, water quality, and sediment quality. Changes of these aspects of the Marine Environment, if unmitigated, have potential to change marine populations (e.g., adult fish, eggs, larvae, invertebrates) through direct mortality or indirectly through alteration, disruption, or destruction of habitat. In this section, the environmental effects of the Project activities, including cumulative environmental effects, resulting from all phases of the Project, will be assessed.

Table 5.13 provides the measurable parameters used for the assessment of the selected environmental effect, and the rationale for selection.

**Table 5.13 Measurable Parameters for Marine Environment**

<table>
<thead>
<tr>
<th>Environmental Effect</th>
<th>Measurable Parameter</th>
<th>Rationale for Selection of the Measurable Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in marine populations</td>
<td>Mortality (loss of individuals attributable to the Project)</td>
<td>Infilling in the marine environment could result in finfish and shellfish mortality.</td>
</tr>
<tr>
<td></td>
<td>Habitat alteration, disruption, or destruction (HADD): - habitat area (m²); - water quality (assessed using CCME guidelines); and - sediment quality (assessed using CCME guidelines).</td>
<td>Due to infilling, a small portion of the marine environment will be lost. This activity will require a subsection 35 (2) authorization under the federal <em>Fisheries Act</em>. All Project activities will be required to follow section 36 of the <em>Fisheries Act</em> which prohibits “anyone from depositing or permitting the deposit of a deleterious substance of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter such water”. If water or sediment quality need to be assessed during Project activities, CCME Sediment Quality Guidelines, Protection of Aquatic Life Guidelines, and Marine Probable Effects Levels will be used.</td>
</tr>
<tr>
<td></td>
<td>Underwater sound levels: - sound level; and - effects of vibration.</td>
<td>Increased noise (frequency, duration, magnitude) and vibration resulting from construction may affect the behaviour of marine populations within 100 m of the project development area.</td>
</tr>
</tbody>
</table>

The selection of the measurable parameters in Table 5.13 was based on the professional judgment of the Study Team and discussions with regulatory agencies for similar projects.

**5.3.1.3 Temporal Boundaries**

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Marine Environment include the periods of Construction (approximately two years beginning March 1 2011), Operation (several decades or longer, following Construction), and Decommissioning and Abandonment (at the end of its useful service life).
5.3.1.4 Spatial Boundaries

The spatial boundaries for the environmental effects assessment of Marine Environment include the Project Development Area (PDA) and Local Assessment Area (LAA) as described below.

**Project Development Area (PDA):** The PDA includes the project site located at 1 Queen Street (Figure 1.1, Appendix A).

**Local Assessment Area (LAA):** The LAA is defined as the PDA plus an additional 100 m radius around that area. With respect to the Marine Environment, the LAA represents the area where indirect or secondary environmental effects of Construction and Operation of the convention centre on the Marine Environment are likely to be most pronounced or discernable.

5.3.1.5 Administrative and Technical Boundaries

The administrative boundaries for changes to water quality and sediment quality pertain to the legislated protection of fish habitat through federal legislation and policy.

Marine water quality is protected federally under the *Canada Shipping Act* and Regulations, which is administered by Transport Canada. The CCME Water Quality Guidelines for marine aquatic life provide benchmarks against which to compare water quality measures. Both marine water quality and sediment quality are components of fish habitat. Any discharges from the project that could affect marine benthic habitat are subject to regulations under the federal *Fisheries Act*. Federal Policy for Management of Fish Habitat applies to projects with potential to alter, destroy, or disrupt fish habitat (Section 35) and to activities that may cause the deposition of a deleterious substance (Section 36). Environment Canada administers Section 36 of the *Fisheries Act*, while DFO administers the other sections of the *Fisheries Act*. Project related disturbances and/or deposition of material on the seafloor are regulated under the ocean disposal provisions of *CEPA*. The CCME Sediment Quality Guidelines for the Protection of Aquatic Life offer a point of reference to compare sediment quality measures.

With respect to provincial legislation, fish habitat and water quality are protected by PEI's Watercourse, Wetland, and Buffer Zone Activity Permit. Permits are required to conduct any temporary or permanent change made at, near, or to a watercourse or wetland. Permits are required for activities within 10 m of any watercourse or wetland boundary, including marine environments.

The technical boundaries for a Change in Marine Populations were based on a review of available information for the study area.

5.3.1.6 Residual Environmental Effects Rating Criteria

The EA methodology for the Marine Environment is based on the determination of whether significant adverse residual environmental effects are likely to occur from the Project.
For fish habitat, as defined in the *Fisheries Act*, a significant adverse residual environmental effect is one that results in an unmitigated or non-compensated net loss of fish habitat as required in a *Fisheries Act* HADD authorization. It would also occur where a deleterious substance is released into the marine environment that is not authorized under the *Fisheries Act* or *Canadian Environmental Protection Act*.

A significant residual adverse environmental effect on secure marine species is one that results in a Change in Marine Populations in such a way as to cause a decline in abundance or change in distribution such that populations will not be sustainable within the region.

A significant adverse residual environmental effect on the Marine Environment is one that degrades the water and/or sediment quality in such a way as to cause a Project related increase in the suspended sediments or other contaminants, to a level that is higher than typically observed within Charlottetown Harbour and/or to a level that is unacceptable, as per relevant water quality guidelines, such that water and/or sediment quality does not return to previous levels within one season.

### 5.3.2 Existing Conditions

The existing conditions of the Marine Environment were discussed in Section 4.2.4.

### 5.3.3 Potential Project-VEC Interactions

Table 5.14 below lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1, or 2 based on the level of interaction each activity or physical work will have with the Marine Environment.

Interactions between the Renovations to the Existing Delta Convention Space, Landscaping, Use of the Facility, Maintenance, and the Marine Environment were ranked as 0 in Table 5.14 as no interactions are anticipated. No components of this activity will result in changes to marine populations in the PDA or LAA.

Interactions between Site Preparation and the Marine Environment have been ranked as 1 in Table 5.14 as site preparation in the vicinity of the Charlottetown Harbour may have interactions with the Marine Environment. Silt fencing will be installed around the work site during building demolition and excavation to contain potential runoff of sediments that could be associated with earthworks at the site. Visual monitoring of the Marine Environment will be conducted and if project related runoff is observed, work will stop and sedimentation control measures will be re-evaluated and Ms. Delephina Keen, Area Chief, Fisheries and Oceans Canada, Oceans and Habitat, Charlottetown, PEI will be contacted at 902-566-7823. Substantive interactions between Site Preparation and the Marine Environment are not anticipated.
Table 5.14  Potential Project Environmental Effects to the Marine Environment

<table>
<thead>
<tr>
<th>Project Activities and Physical Works</th>
<th>Potential Environmental Effect Change in Marine Populations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
</tr>
<tr>
<td>Site preparation</td>
<td>1</td>
</tr>
<tr>
<td>Seawall extension</td>
<td>2</td>
</tr>
<tr>
<td>Marine infilling</td>
<td>2</td>
</tr>
<tr>
<td>Pile driving</td>
<td>1</td>
</tr>
<tr>
<td>Additional parking area construction</td>
<td>1</td>
</tr>
<tr>
<td>Construction of convention centre</td>
<td>1</td>
</tr>
<tr>
<td>Renovations to the existing Delta Prince Edward convention space</td>
<td>0</td>
</tr>
<tr>
<td>Boardwalk Construction</td>
<td>1</td>
</tr>
<tr>
<td>Landscaping</td>
<td>0</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td></td>
</tr>
<tr>
<td>Use of the Facility</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0</td>
</tr>
<tr>
<td><strong>Decommissioning and Abandonment</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

KEY

Project-Related Environmental Effects were ranked as follows:

0  No interaction. The environmental effects are not significant and not considered further in this report.
1  Interaction will occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices. The environmental effects are not significant and not considered further in this report.
2  Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EA.

Interactions between land-based Pile Driving and the Marine Environment have been ranked as 1 in Table 5.14. The foundation of the convention centre, including the parking facility will be situated on steel H-piles. Pile driving will be conducted using a high frequency vibratory hammer to decrease noise and vibration, with an impact hammer being used only to drive the piles into the bedrock at the end of the process. The use of the vibratory hammer will be required to minimize noise levels given the proximity of existing buildings and also to avoid impacts to fish in the vicinity of the site. Due to the limited amount of pile driving and the use of the vibratory hammer, there are no anticipated substantive interactions between land-based Pile Driving and the Marine Environment.

Interactions between Additional Parking Area Construction and the Marine Environment have been ranked as 1 in Table 5.14. The additional parking area will be an addition to the existing underground parking at the Delta. During construction sedimentation controls structures will be used, as required, at the site. Visual monitoring of the Marine Environment will be conducted and if project related runoff is observed, work will stop and sedimentation control measures will be re-evaluated and Ms. Delephina Keen, Area Chief, Fisheries and Oceans Canada, Oceans and Habitat, Charlottetown, PEI will be contacted at 902-566-7823. Accordingly, substantive interactions between Additional Parking Area Construction and the Marine Environment are not anticipated.
Interactions between Construction of the Convention Centre and the Marine Environment have been ranked as 1 in Table 5.14. The convention centre will be constructed on pile foundations with suspended concrete slabs for the parking level and main level floors. During construction silt fencing will be installed around the site (as necessary) to stop the entry of sediment laden water into the Marine Environment. Visual monitoring of the Marine Environment will be conducted and if project related runoff is observed, work will stop and sedimentation control measures will be re-evaluated and Ms. Delephina Keen, Area Chief, Fisheries and Oceans Canada, Oceans and Habitat, Charlottetown, PEI will be contacted at 902-566-7823. Substantive interactions between Construction of the Convention Centre and the Marine Environment are not anticipated.

Interactions between Boardwalk Construction and the Marine Environment have been ranked as 1 in Table 5.14. During construction waste and materials will not be allowed to enter the Marine Environment. In the event materials enter the water, they will be retrieved immediately and disposed of according to provincial regulations. There are no anticipated interactions between Boardwalk Construction and the Marine Environment.

Interactions between Decommissioning and Abandonment and the Marine Environment have been ranked as 1 in Table 5.14. Removal of facilities and site reclamation will involve many of the same types of activities and associated environmental effects as during Construction. The same mitigation used during Construction may also assist in minimizing environmental effects during decommissioning and abandonment. At the time of decommissioning and abandonment, a Decommissioning and Abandonment Plan would be developed at the end of the Project’s service life to guide decommissioning efforts.

Overall, given the nature of the Project and the proposed mitigation, the potential environmental effects of all Project-related activities that were ranked as 0 or 1 in Table 5.14, are rated not significant with a high level of confidence, and are not considered further in this EA.

5.3.4 Assessment of Project-Related Environmental Effects

All other interactions that were previously ranked as 0 or 1 were determined to be not significant due to no interaction or no substantive adverse interaction with the Marine Environment or because of planned implementation of mitigation of well-established and proven effectiveness that would result in the environmental effects being rated as not significant.

A summary of the environmental effects assessment and prediction of residual environmental effects resulting from interactions with the Marine Environment that were ranked as 2 in Table 5.14 is provided below in Table 5.15. Only the interactions ranked as 2 in Table 5.14 were considered further in the environmental effects assessment. The only activities with the potential to result in substantive residual environmental effects are Marine Infilling and seawall extension.
Table 5.15 Summary of Residual Project-Related Environmental Effects on the Marine Environment

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Change in marine populations</td>
<td>Construction:</td>
<td>• The Project will result in the harmful alteration, disruption, or destruction (HADD) of fish habitat, requiring an Authorization under Section 35(2) of the Fisheries Act. As such, a habitat compensation plan will be developed and implemented by the proponent pending DFO-Habitat approval. • Prior to and during work in the marine environment, an EEM program will be implemented to monitor the TSS levels in the vicinity of the Project to ensure they do not exceed applicable guidelines. • Sheet pile seawall will be lined with geotextile filter</td>
<td>Direction</td>
<td>Magnitude</td>
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<tr>
<td></td>
<td>• Marine Infilling; and</td>
<td>A</td>
<td>M</td>
<td>S</td>
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<tr>
<td></td>
<td>• Seawall Extension.</td>
<td>M</td>
<td>M</td>
<td>S</td>
</tr>
</tbody>
</table>

Recommended Follow-up and Monitoring:
• Compliance monitoring to confirm that mitigation measures are carried out correctly during construction.
• Monitoring of habitat compensation implementation.
Table 5.15 Summary of Residual Project-Related Environmental Effects on the Marine Environment

<table>
<thead>
<tr>
<th>Potential Residual Project-Related Environmental Effects</th>
<th>Project Phases, Activities, and Physical Works</th>
<th>Proposed Mitigation / Compensation Measures</th>
<th>Residual Environmental Effects Characteristics</th>
<th>Recommended Follow-up and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>fabric prior to infilling.</td>
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<td></td>
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<td>• A silt curtain will be installed around the perimeter of the infill area prior to pile driving and marine infilling. The construction manager will monitor the stability of the structure on a daily basis to ensure the silt curtain is functioning properly;</td>
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<td></td>
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<td>• Fish rescue will be conducted from the area enclosed by the silt curtain;</td>
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<td></td>
<td></td>
<td>• Fish rescue will comply with all regulations and mitigations set out in the Licence to Fish for Experimental, Scientific, Educational Purpose, and/or Public Display Permit;</td>
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<tr>
<td></td>
<td></td>
<td>• Clean fill material (i.e., from a provincially approved</td>
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<tr>
<td>Potential Residual Project-Related Environmental Effects</td>
<td>Project Phases, Activities, and Physical Works</td>
<td>Proposed Mitigation / Compensation Measures</td>
<td>Residual Environmental Effects Characteristics</td>
<td>Recommended Follow-up and Monitoring</td>
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<td></td>
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<td>source will be used for the initial metre along the base of the infill.</td>
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<td>• A metre of clean fill will be placed along the entire inside face of the seawall.</td>
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<td></td>
<td></td>
<td>• Visual monitoring in the vicinity of the project to ensure the turbidity is limited; if an excessive change occurs due to construction activities, work will stop and Ms. Delephina Keen, Area Chief, Fisheries and Oceans Canada, Oceans and Habitat, Charlottetown, PEI will be contacted at 902-566-7823.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Any construction debris or other material (e.g., plastic, food scraps, etc.) enter the marine environment, they</td>
<td></td>
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</tbody>
</table>
Table 5.15 Summary of Residual Project-Related Environmental Effects on the Marine Environment

<table>
<thead>
<tr>
<th>Potential Residual Project-Related Environmental Effects</th>
<th>Project Phases, Activities, and Physical Works</th>
<th>Proposed Mitigation / Compensation Measures</th>
<th>Residual Environmental Effects Characteristics</th>
<th>Recommended Follow-up and Monitoring</th>
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<tbody>
<tr>
<td></td>
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<td>must be removed immediately and disposed in</td>
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<td>a provincially approved manner.</td>
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<td>• The Proponent will consult</td>
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<td>with DFO to ensure that Project activities</td>
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<td>will be conducted, where possible, outside</td>
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<td>of biologically sensitive life stages of</td>
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<td>silversides. If construction activities</td>
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<td>are required in waters during these periods,</td>
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<td></td>
<td></td>
<td>DFO may require additional mitigation.</td>
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</tbody>
</table>
### Table 5.15 Summary of Residual Project-Related Environmental Effects on the Marine Environment

<table>
<thead>
<tr>
<th>Potential Residual Project-Related Environmental Effects</th>
<th>Project Phases, Activities, and Physical Works</th>
<th>Proposed Mitigation / Compensation Measures</th>
<th>Residual Environmental Effects Characteristics</th>
<th>Recommended Follow-up and Monitoring</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Direction</td>
<td>Magnitude</td>
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<td></td>
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<td></td>
<td>P</td>
<td>L</td>
</tr>
<tr>
<td>KEY</td>
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</tr>
<tr>
<td>Direction:</td>
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</tr>
<tr>
<td>P Positive</td>
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</tr>
<tr>
<td>A Adverse</td>
<td></td>
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<tr>
<td>Magnitude:</td>
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<tr>
<td>L Low: No change in marine populations.</td>
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</tr>
<tr>
<td>M Moderate: Changes in marine populations that are reversible.</td>
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<tr>
<td>H High: Changes in marine populations that are not reversible.</td>
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</tr>
<tr>
<td>Geographic Extent:</td>
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<tr>
<td>S Site-specific: Within the PDA.</td>
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<tr>
<td>L Local: Within the LAA.</td>
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<tr>
<td>Duration:</td>
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</tr>
<tr>
<td>ST Short term</td>
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<tr>
<td>MT Medium Term</td>
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<tr>
<td>LT Long Term</td>
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<tr>
<td>P Permanent – will not change back to original condition</td>
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<tr>
<td>Frequency:</td>
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<tr>
<td>O Occasionally, once per month or less.</td>
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<tr>
<td>S Sporadic, once per week</td>
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<tr>
<td>R Regular, more than once per week intervals.</td>
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<tr>
<td>C Continuous.</td>
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</tr>
<tr>
<td>Reversibility:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R Reversible</td>
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</tr>
<tr>
<td>I Irreversible</td>
<td></td>
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</tr>
<tr>
<td>Ecological/Socio-economic Context:</td>
<td></td>
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<tr>
<td>U Undisturbed: Area relatively or not adversely affected by human activity</td>
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<tr>
<td>D Developed: Area has been substantially previously disturbed by human development or human development is still present</td>
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<tr>
<td>N/A Not Applicable</td>
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<tr>
<td>Significance:</td>
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<tr>
<td>S Significant</td>
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<td></td>
</tr>
<tr>
<td>N Not Significant</td>
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<tr>
<td>Prediction Confidence:</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Based on scientific information and statistical analysis, professional judgment and effectiveness of mitigation</td>
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</tr>
<tr>
<td>L Low level of confidence</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>M Moderate level of confidence</td>
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<td></td>
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<tr>
<td>H High level of confidence</td>
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<tr>
<td>Likelihood:</td>
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<tr>
<td>Based on professional judgment</td>
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</tr>
<tr>
<td>L Low probability of occurrence</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>M Medium probability of occurrence</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>H High probability of occurrence</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cumulative Environmental Effects?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y Potential for environmental effect to interact with other past, present or foreseeable projects or activities in the area of the Project</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>N Environmental effect will not or is not likely to interact with other past, present or foreseeable projects or activities in the area of the Project.</td>
<td></td>
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</tr>
</tbody>
</table>
5.3.4.1 Project Environmental Effects Mechanisms

During construction Changes in Marine Populations could occur as a result of marine infilling and also due to pile driving associated with the seawall extension.

Finfish accidentally trapped inside the silt curtain could be injured during pile driving and infilling activities.

Marine infilling will have localized environmental effects on benthic habitat. Benthic habitat within the footprint of the infilling will be destroyed, which constitutes a HADD, pursuant to Section 35(2) of the *Fisheries Act*. A habitat compensation plan will be developed by the Proponent for acceptance by DFO and in consultation with DFO and local stakeholders and in accordance with the DFO Policy for the Management of Fish Habitat and the no net loss guiding principle.

While pile driving using a vibratory hammer is not expected to result in injury to fish, it has the potential to interfere with fish behaviour during sensitive life stages such as spawning and migration. Pile driving creates sound waves in the marine environment and studies have shown that fish injury occurs at sound levels greater than 180 dB and behavioural effects at 150 dB (ICF Jones & Stokes and Illingworth and Rodkin, Inc 2009). Underwater sound levels from vibratory pile driving of steel sheet pile have been recorded as averaging between 166 to 185 dB 10 m from the source, which suggests that behavioural effects (*e.g.*, startle response, movement from important habitat) can be expected (ICF Jones & Stokes and Illingworth and Rodkin, Inc 2009). At the PDA fish would be accustomed to relatively high background noise levels due to the degree of commercial and recreational boat use in the area.

A literature review didn’t show any negative effects on survival or behavior of marine invertebrates, however, there is little current knowledge on the subject. Snow crab showed no mortality and no behavioural effects when exposed sound levels of 201 dB produced by seismic testing (Christian *et al*. 2003); lobster showed no mortality when exposed to 202 dB sound produced by seismic air guns, however, the study found that lobster did show changes in serum chemistry and feeding (increased feeding) after seismic exposure (Payne *et al*. 2007). There may be environmental effects on individual invertebrates in the vicinity of the pile-driving, but they are not expected to be lethal and are not expected to have a measurable effect on the invertebrate populations in the assessment area.

5.3.4.2 Mitigation of Project Environmental Effects

An alternative option was considered during the design of the convention centre. Constructing the convention centre on a pier above the water was considered; however, this option was not selected due to the requirement for additional parking, concerns with respect to the lateral movement of contaminated onsite soils, and the increased overall cost of the project.
Redesign of the Project during the planning stages reduced the area to be infilled. At present, redesign of the infill area has reduced the area to be infilled from 2,081 m$^2$ to 1,552 m$^2$. As previously stated, a habitat compensation plan will be prepared by the Proponent to compensate for the loss of habitat in the infill area.

The installation of the steel sheet pile wall/seawall with geo-textile material lining the inside will minimize the movement of suspended solids and the movement/exchange of seawater through the seawall. The marine infill will be completed with the placement of an initial metre of clean fill material along the base and directly adjacent to the interior of the seawall face with the remainder of the area being backfilled with a combination of clean fill and material excavated from on-site.

To minimize the effects of noise and vibration associated with driving piles, a high frequency vibratory hammer will be used for the majority of pile driving. Vibratory hammers dampen noise and vibration, which are associated with harmful affects to fish and marine mammals. To avoid behavioural effects during sensitive life stages of silversides (e.g., spawning and migration), the Proponent will consult with DFO regarding the timing of the installation of the steel sheet pile wall. If the work must be conducted during a sensitive life stage, DFO may require the implementation of additional mitigation.

Prior to and during work in the marine environment, an EEM program will be conducted to monitor levels of TSS in the vicinity of the Project site to ensure that levels do not exceed applicable guidelines. During pile driving and marine infilling a silt curtain will be installed around the perimeter of the infill area to ensure that sediment will not extend beyond the infill area. Finfish rescue will be conducted inside the area of the silt curtain to avoid fish injury or mortality during pile driving and infilling activities. The silt curtain may also have a dampening effect on the sound waves during pile driving. The construction manager will monitor the stability of the structure on a daily basis to ensure the silt curtain is functioning properly.

5.3.5 Assessment of Cumulative Environmental Effects

In association with the Project environmental effects discussed above, an assessment of the potential cumulative environmental effects was conducted for other projects or activities that have potential to interact with the Project. Table 3.1 identified the potential for overlap between the Project activities and cumulative environmental effects of other projects or activities conducted or to be conducted in the LAA. Table 5.16 below presents the potential cumulative environmental effects to the Marine Environment, and ranks each interaction with other projects as 0, 1, or 2 with respect to the nature and degree to which important Project-related environmental effects overlap with those of other projects or activities.

The following projects or activities were ranked 0 in Table 5.16, as no interaction between the Project and these projects or activities are expected which would result in a Cumulative Environmental Effect to the Marine Environment.

- Decommissioning of Oil Supply Pipeline, Charlottetown, PEI;
• Charlottetown Waste Treatment Facility Upgrade, Charlottetown, PEI;
• Construction of Parking Lot and Concert Venue Site, Charlottetown, PEI;
• The Holman Grand Hotel Development, Charlottetown, PEI; and
• Holland College Residence Expansion and Addition of Academic Facilities.
Table 5.16  Potential Cumulative Environmental Effects to the Marine Environment

<table>
<thead>
<tr>
<th>Other Projects and Activities With Potential for Cumulative Environmental Effects</th>
<th>Potential Cumulative Environmental Effects Change in Marine Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riverside Drive Marine Infilling and Road Expansion, Charlottetown, PEI</td>
<td>1</td>
</tr>
<tr>
<td>Paoli’s Wharf Condominium Development, Charlottetown, PEI</td>
<td>1</td>
</tr>
<tr>
<td>Decommissioning of Oil Supply Pipeline, Charlottetown, PEI</td>
<td>0</td>
</tr>
<tr>
<td>Charlottetown Waste Treatment Facility Upgrade, Charlottetown, PEI</td>
<td>0</td>
</tr>
<tr>
<td>Charlottetown Marine Terminal Repair and Expansion and New Marina Development, Charlottetown, PEI</td>
<td>1</td>
</tr>
<tr>
<td>Construction of Parking Lot and Concert Venue Site, Charlottetown, PEI</td>
<td>0</td>
</tr>
<tr>
<td>The Holman Grand Hotel Development, Charlottetown, PEI</td>
<td>0</td>
</tr>
<tr>
<td>Holland College Residence Expansion and Addition of Academic Facilities</td>
<td>0</td>
</tr>
</tbody>
</table>

Key:
Cumulative environmental effects were ranked as follows:
0  Project environmental effects do not act cumulatively with those of other Projects and Activities.
1  Project environmental effects act cumulatively with those of other Project and Activities, but are unlikely to result in significant cumulative environmental effects OR Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects but will not measurably change the state of the VEC.
2  Project environmental effects act cumulatively with those of other project and activities, and may result in significant cumulative environmental effects OR Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects and may measurably change the state of the VEC.

Interactions between the Project and Decommissioning of Oil Supply Pipeline, Charlottetown Waste Treatment Facility Upgrade, Construction of Parking Lot and Concert Venue Site, development of the Holman Grand Hotel, and residence expansion and addition of facilities at Holland College were ranked as 0 in Table 5.16 because Cumulative Environmental Effects are not anticipated due to the geographic distance of these projects from the PDA and LAA. There is no spatial overlap between these projects and the convention centre. There will be temporal overlap between the construction of the Parking Lot and Concert Venue Site and the proposed PEI Convention Centre, however, as CADC is also the proponent they have committed to ensuring that sedimentation control is in place around the concert venue as needed and will be routinely checked for damage and monitored prior to and during heavy rainfall events. Therefore, there are no anticipated interactions between the Project and other projects that could result in a cumulative environmental effect. There will be no temporal overlap for decommissioning of the oil supply pipeline, the upgrade to the waste treatment facility, and the work at Holland College as those projects have been or will be completed before construction of the convention centre begins.
The following projects or activities were ranked 1 in Table 5.16, as there was a loss of fish habitat due to marine infilling associated with each of these projects; however, no significant interactions between the proposed convention centre and these projects or activities are expected which would result in a Cumulative Environmental Effect to the Marine Environment.

- Riverside Drive Marine Infilling and Road Expansion, Charlottetown, PEI;
- Paoli’s Wharf Condominium Development, Charlottetown, PEI; and
- Charlottetown Marine Terminal Repair and Expansion and New Marina Development, Charlottetown, PEI.

Interactions between the Project and Riverside Drive Marine Infilling and Road Expansion, Paoli’s Wharf Condominium Development, and Charlottetown Marine Terminal Repair and Expansion and New Marine Development were ranked as 1 in Table 5.16 as these projects involved marine infilling which resulted in the loss of fish habitat. The habitat in the area of Paoli’s Wharf, the marine terminal, and the shoreline along Riverside Drive was characterized as “low sensitivity” and there have been no known environmental effects since the projects were completed in 2006, 2007, and 2010, respectively. Compensation measures were also conducted for the loss of fish habitat associated with the marine infilling conducted for each of these projects. No behavioural effects were anticipated due to these projects and therefore no cumulative environmental effects due to pile driving are anticipated. There are no anticipated interactions between the Project and other projects that could result in a cumulative environmental effect.

Therefore, the potential cumulative environmental effects of the Project in combination with all other projects or activities that have been or will be carried out that were ranked as 0 or 1 in Table 5.16 are rated not significant.

5.3.5.1 Characterization of Residual Project Environmental Effects

Effective Project planning, design, and the application of habitat compensation will reduce the environmental effects of the Project on the Marine Environment so that they are not significant. With mitigation, including compensation, the Project will result in no net loss of fish habitat. The use of a vibratory hammer during pile driving and avoidance of sensitive life stages of fish will minimize behavioural effects associated with pile driving in the marine environment.

With the proposed habitat compensation and avoidance of pile driving during sensitive life stages of fish, the residual environmental effects of a Change in Marine Populations during all phases of the Project are rated not significant. This conclusion has been determined with a high level of confidence as a result of Project planning, design, and mitigation measures described above.
5.3.6 Determination of Significance

5.3.6.1 Residual Project Environmental Effects

The residual environmental effects for Construction are characterized by the following descriptors: Direction; Magnitude; Geographic Extent; Duration and Frequency; Reversibility; Ecological/Socio-economic Context, Significance, and Prediction Confidence. These descriptors are further explained in Table 5.15.

The residual environmental effects of Construction (installation of the steel sheet pile wall and marine infilling) on a Change in Marine Populations are expected to be adverse, of low magnitude, limited to the site in extent, short term duration, occasional frequency, and reversible. The Project is occurring in an already developed area. The environmental effects are not significant and there is a high level of confidence in the prediction of these ratings, low level of likelihood, and no anticipated cumulative environmental effects.

With the proposed mitigation, the residual environmental effects of a Change in Marine Populations during all phases of the Project are rated not significant. There is a high level of confidence in the assessment of environmental effects and significance prediction because of the nature of mitigation outlined in this assessment and the collective professional judgment of the Study Team, which has local knowledge based on involvement with other projects within the region.

5.3.6.2 Residual Cumulative Environmental Effects

The potential environmental effects of the Project on the Marine Environment will not overlap with those of other projects or activities that have been or will be carried out in any substantive way. Therefore, the residual cumulative environmental effect of a Change in Marine Populations as a result of past, present, and reasonably foreseeable projects and activities, in combination with the environmental effects of the Project during all phases, is rated not significant. This determination has been made with a high level of confidence because of the limited nature and extent of the Project and the lack of substantive overlapping environmental effects with other projects or activities that have been or will be carried out.

5.3.7 Follow-up and Monitoring

Follow-up and monitoring programs for the Marine Environment will consist of compliance monitoring during construction and monitoring of the HADD compensation project after its implementation.
5.4 Effects of the Environment on the Project

5.4.1 Scope of Assessment

This section defines the scope of the assessment of Effects of the Environment on the Project in consideration of the regulatory setting, potential Project-VEC interactions, and existing knowledge.

5.4.1.1 Rationale for Selection and Regulatory Setting

Effects of the Environment on the Project refers to the environmental forces and/or forces of nature that could affect the Project physically or hamper the ability to carry out the Project activities in their normal, planned manner.

Typically, potential effects of the environment on any project are a function of project or infrastructure design and the risks of natural hazards and influences of nature. These effects may result from physical conditions, land forms, and general site characteristics that may act on the Project such that Project components, schedule and/or costs could be substantively and adversely changed.

While environmental forces (e.g., severe weather, climate change) have the potential to adversely affect the Project, good engineering design considers and accounts for these effects and the associated loadings or stresses on the Project that may be caused by these environmental forces. The methodologies used for mitigating potential effects of the environment on the Project are inherent in the planning, engineering design, construction, and planned operation of a well-designed Project expected to be in service for several decades or longer.

During higher high water large tide (HHWLT), water levels would be expected to reach 1.2 m above geodetic datum (Environment Canada 2004c). With sea level rise, water levels at HHWLT may reach 1.9 m above geodetic datum 100 years from now. Currently, water levels during storm surges can be expected to exceed 1.9 m above geodetic datum approximately every 7 years (Shaw et al. 2001). Water levels during storm surges may be expected to exceed 2.3 m above geodetic datum every 10 years by the year 2100 (Shaw et al. 2001).

5.4.1.2 Environmental Attributes

A variety of environmental attributes have the potential to have an effect on the Project. These were determined based on a review of known past and existing conditions and knowledge gained through projections of potential future conditions, such as the potential effects of climate change. The environmental attributes selected for consideration in this EA include the following:

- severe weather events; and
- climate change.
These environmental attributes are considered to be those of highest likelihood or of highest consequence if they were to occur; other lesser events such as storm surges, soil erosion, or other environmental stressors are less likely to occur and as such their effects on the Project are inherently assessed by addressing those higher likelihood or higher consequence events. Environmental factors such as wind and other environmental forces will be addressed as part of the Project design.

5.4.1.3 Selection of Effects

For the purpose of this EA, the effects assessment of potential Effects of the Environment on the Project is focused on the following effects:

- delays in Construction and/or Operation; and
- damage to Infrastructure.

5.4.1.4 Temporal Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Effects of the Environment on the Project include the periods of Construction (approximately two years beginning March 1, 2011), Operation (several decades or longer following Construction), and Decommissioning and Abandonment of the Project (at the end of its useful life).

5.4.1.5 Spatial Boundaries

The spatial boundaries for the assessment of effects of the environment on the Project are limited to the Project Development Area (PDA) as described below.

Project Development Area (PDA): The PDA includes the project site located at 1 Queen Street (Figure 1.1, Appendix A).

5.4.1.6 Residual Effects Rating Criteria

A significant adverse residual effect of the environment on the Project would be one that directly results in:

- a long-term (i.e., greater than six months) delay in the Construction or Operation of the Project; or
- substantive damage to Project infrastructure requiring repairs that could not be technically or economically implemented.
5.4.2 Effects Analysis

The Effects of the Environment on the Project considers any change to the Project that may be caused by the environment (e.g., weather). There are no environmental factors that are expected to interact substantially with the Construction of the Project. While some weather related delays are possible, they would not adversely affect the Project Construction, schedule or cost.

During Operation, the convention centre will be exposed to the harsh weather conditions of the area, including high winds, ice, and snow during the winter, but its good engineering design has taken these factors into consideration to minimize adverse effects of the environment on the Project. While the new seawall will remain at the same elevation as the existing seawall, the boardwalk will be constructed to withstand overtopping conditions and to avoid risk to the seawall. To protect against storm surge, there will be an elevated outdoor patio surrounding the building with an elevation of approximately 5.8 m with a stacked block retaining wall sloping down to the boardwalk level (4.3 m). If a storm surge breaks over the seawall, the retaining wall will be in place to protect the building and keep the surge waters away from the building perimeter.

Compliance with best management practices inherently accounts for environmental forces that, had they not been accounted for, could cause a significant adverse effect on the Project. Environmental factors such as severe weather and other environmental forces, as relevant, will be addressed by adhering to the relevant best management practices that are intended to protect infrastructure against these environmental forces.

As discussed previously, Decommissioning and Abandonment will not occur for several decades or longer, and a Decommissioning and Abandonment Plan will be developed in accordance with the regulations applicable at that time. While environmental attributes listed above may have an effect on the decommissioning of the convention centre as a whole (e.g., resulting in delays), the variability and uncertainty in the predictions of such activities will be addressed as part of a decommissioning plan that will consider the environmental conditions and potential effects that are current to and appropriate for that time period. As a result, the Effects of the Environment on the Project during Decommissioning and Abandonment will be assessed as part of a Decommissioning and Abandonment Plan to be developed at the end of the service life of the Project. Until then, Effects of the Environment on the Project during Decommissioning and Abandonment are not considered further in this EA.

Overall, in consideration of the nature of the environmental forces and planned mitigation, a significant adverse residual effect of the environment on the Project that would result in substantive damage to infrastructure, resulting in a long-term interruption in service or in repairs that could not be technically or economically implemented is not expected.

5.4.3 Determination of Significance

Mitigation measures include, applying best engineering practices and scheduling of activities to account for possible weather disruptions. Based on the above, the Effects of the Environment
on the Project during all phases of the Project are rated not significant. This prediction is made with a moderate level of confidence, because of the uncertainty in the potential changes to local, regional, and global climate that could occur over the life of the Project.

5.4.4 Follow-up and Monitoring

No specific follow-up or monitoring measures are required or recommended.

5.5 Accidents, Malfunctions, and Unplanned Events

Accidents, Malfunctions, and Unplanned Events are accidents or upset events or conditions that are not planned as a part of routine Project activities during any Project phase. Even with the best planning and application of mitigation, Accidents, Malfunctions, and Unplanned Events could occur during any phase of the Project. These could occur as a result of abnormal operating conditions, wear and tear, human error, equipment failure, and other possible causes. Many accidents, malfunctions, and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, equipment selection, hazards analysis and corrective action, emergency response planning, and mitigation.

5.5.1 Methodology

In this section, the potential Accidents, Malfunctions, and Unplanned Events that could occur during any phase of the Project and potentially result in significant adverse environmental effects are described, discussed, and assessed. The focus is on credible accidents that have a reasonable probability of occurrence, and for which the resulting environmental effects could be significant in relation to the identified thresholds of significance for each VEC (previously identified, as applicable).

It is noted that Accidents, Malfunctions and Unplanned Events are evaluated individually, in isolation of each other, as the probability of a series of accidental events occurring in combination with each other is not likely to occur. It is not credible to assess the occurrence of a series of accidental events occurring in parallel or as a result of each other, nor would it be possible to predict or prevent such occurrences, even with the best of planning. These possible events, on their own, generally have a very low probability of occurrence and thus their environmental effects are of low likelihood. They have an even lower probability or likelihood of occurring together - thus their combination is not considered credible, nor of any measurable likelihood of occurrence.

Various credible accidents, malfunctions, and unplanned events have been selected by the Study Team to complete the assessment. Since it is impossible to review and assess all possible accidents, malfunctions, and upset conditions, the Study Team has conservatively selected scenarios that represent higher consequence events that would more than adequately address the consequences of less likely or lower consequence scenarios.
5.5.2 Identification of Accidents, Malfunctions, and Unplanned Events

The Accidents, Malfunctions, and Unplanned Events that have been selected by the Study Team, based on its experience and professional judgment, are as follows.

- **Worker Accident**: Worker accidents may occur during either Construction or Operation, and may result in harm, injury, or death to one or more Project workers.

- **Erosion and Sediment Control Failure**: The temporary failure or loss of effectiveness of erosion and sedimentation control measures that may release sediment into the marine environment, or result in soil erosion.

- **Fire**: Includes a fire in a Project component or facility. The focus is on the consequence, and not the mechanism by which it occurs.

- **Hazardous Materials Spill**: Spills of fuel, petroleum products, and/or other chemicals used on site or in Project components.

- **Vehicle Accident**: Project-related vehicle accidents that could occur on road transportation network.

5.5.3 Environmental Effects Assessment

The potential interactions between the selected Accidents, Malfunctions, and Unplanned Events that could occur during the Construction, Operation, or Decommissioning and Abandonment of the Project and each relevant VEC are identified in Table 5.17 below.
### Table 5.17 Potential Interactions of Project-Related Accidents, Malfunctions, and Unplanned Events with the Environment

<table>
<thead>
<tr>
<th>Accident, Malfunction, or Unplanned Event</th>
<th>Atmospheric Environment</th>
<th>Groundwater Resources</th>
<th>Freshwater Environment</th>
<th>Terrestrial Environment</th>
<th>Wetland Environment</th>
<th>Marine Environment</th>
<th>Labour and Economy</th>
<th>Land Use</th>
<th>Archaeology and Heritage Resources</th>
<th>Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons</th>
<th>Transportation</th>
<th>Public Health and Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worker Accident</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Erosion and Sediment Control Failure</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fire</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hazardous Material Spill</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vehicle Accident</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**KEY**

0  No interaction. The environmental effects are not significant and not considered further in this report.

1  Interaction will occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices. The environmental effects are rated not significant and are not considered further in this report.

2  Interaction may, even with codified mitigation, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EA.

### 5.5.3.1 Interactions Ranked as 0

Some Project-related Accidents, Malfunctions, or Unplanned Events will not interact with the various VECs ranked as 0 in Table 5.17 during any phase. These include interactions with Freshwater Environment, Wetland Environment, Labour and Economy, Land Use, Archaeology and Heritage Resources, and Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons. By definition, the environmental effects of these Accidents, Malfunctions, and Unplanned events on each of these VECs are rated not significant and will not be discussed further.

### 5.5.3.2 Interactions Ranked as 1

#### 5.5.3.2.1 Worker Accident

A Worker Accident has the potential to interact only with Public Health and Safety as it may result in harm, injury, or death to workers. A Worker Accident will not interact with any other VEC and thus its environmental effects on these other VECs for which the interactions were ranked as 0 in Table 5.17 are rated not significant, and are not discussed further.

All workers will be properly trained in practices to prevent workplace accidents including workplace hazardous materials (WHMIS), first aid, and other training programs. These
procedures are designed to prevent serious injury to staff and the general public as well as to minimize the occurrence of unplanned events and minimize any potential damage to the environment.

Interactions between a Worker Accident and Public Health and Safety will be mitigated by compliance with health and safety legislation, safety by design, and implementation of environmental management measures aimed at protecting human health. Safety risks to workers will be reduced by complying with the requirements of various governing standards including the federal *Canada Labour Code*, the federal *Transportation of Dangerous Goods Act*, the Prince Edward Island *Occupational Health and Safety Act*, and the Prince Edward Island *Workers Compensation Act* and all associated regulations. Adherence to public safety codes and regulations will help ensure that the Project is carried out in a safe manner to protect workers and the public.

With the application of, and compliance with, these Acts, regulations, and standards, including the application of safety and security measures that are known to effectively mitigate the potential environmental effects, the potential environmental effects of a Worker Accident on Public Health and Safety during Construction, Operation, and Decommissioning and Abandonment of the Project are rated not significant.

### 5.5.3.2.2 Failure of Erosion or Sedimentation Control Measures

A Failure of Erosion or Sedimentation Control Measures has the potential to interact with the Marine Environment, as indicated by their ranking of 1 in Table 5.17. A Failure of Erosion or Sedimentation Control Measures would not interact with any other VEC and thus their environmental effects on these other VECs for which the interactions were ranked as 0 in Table 5.9 are rated not significant, and are not discussed further.

A failure of erosion or sedimentation control structures could occur as a result of human error or heavy precipitation events, particularly during construction activities. Such failures could result in the release of sediment-laden runoff to the surrounding environment, with potential adverse environmental effects on marine fish and fish habitat.

Temporary erosion and sediment control measures will be installed prior to initial disturbance in areas susceptible to erosion, and will be properly maintained throughout Construction until restoration is completed. Temporary measures may include, but are not limited to, the following:

- installing sediment traps to contain sediment eroded from slopes such as at the base of lower slopes;
- seeding with non-invasive native species; and
- grading exposed faces to a slope which minimizes the potential for erosion.
When necessary, work will be scheduled or suspended to avoid periods of heavy precipitation or prolonged periods of saturated ground conditions. Erosion and sediment control measures will be monitored during Construction by personnel, particularly after a heavy precipitation event that results in the visible overland flow of water. Remedial action will be taken as necessary.

With these mitigation measures and emergency response procedures implemented, and because of the low likelihood of such events, the potential environmental effects of Failures of Erosion or Sedimentation Control Measures on the Marine Environment during all phases of the Project are rated not significant.

5.5.3.2.3 Fire

A Fire at the Project location could interact with the Atmospheric Environment (because of smoke emissions), Public Health and Safety (because of potential safety risks to workers), and the Terrestrial and Marine Environments (because of potential contamination with sediment-laden water used in extinguishing the fire). A Fire will not interact with any other VEC and thus its environmental effects on these other VECs for which the interactions were ranked as 0 in Table 5.17 are rated not significant, and are not discussed further.

A Fire may arise from Project heavy equipment or from natural causes such as a lightning strike. In the unlikely event that a Fire occurred, the immediate concern for a fire would be for human health and safety. Local air quality conditions may deteriorate through the duration of the fire.

Personnel will take the necessary precautions to prevent fire hazards when at the work site and will keep the site free of all flammable waste. The Proponent will ensure that personnel are trained in the use of fire-fighting equipment.

The emissions from a fire would likely consist mainly of smoke (particulate matter) and CO₂ but could also include CO, NOₓ, SO₂, and other products of incomplete combustion. A large fire could create particulate matter levels greater than the ambient air quality standard over distances of several kilometres, but such situations would be of short duration, infrequent, and are not expected to occur because of the limited nature of the Project, planned mitigation, and prevention measures.

Therefore, the potential environmental effects of a Fire on Atmospheric Environment, Public Health and Safety, Terrestrial Environment, and Marine Environment during Construction, Operation, and Decommissioning and Abandonment of the Project are rated not significant.

5.5.3.2.4 Hazardous Material Spill

A Hazardous Material Spill may interact with Groundwater Resources, Marine Environment, and Terrestrial Environment. A Hazardous Material Spill will not interact with any other VEC and
thus its environmental effects on these other VECs for which the interactions were ranked as 0 in Table 5.17 are rated not significant, and are not discussed further.

A spill of fuel, oil, lubricants, or other hazardous materials may occur during Construction or Operation activities, through damage to vehicles, leaks from Project components. Any spill is usually highly localized and easily cleaned up by on-site crews using standard equipment. Large quantities of hazardous materials will not be used by or stored as part of the Project, therefore a large spill is not considered to be a possibility.

The construction contractor will be required to provide environmental training, as well as training in spill prevention and response to Construction personnel. Prior to the commencement of Construction activities, the Proponent will ensure that spill response equipment is readily available. All spills will immediately be contained, cleaned, and reported to applicable authorities as per the following guidelines:

- all contaminated material or potentially hazardous material will be contained;
- proper safety precautions (e.g., protective clothing and footwear) will be taken;
- the Proponent will ensure that PEIDEEF or the Canadian Coast Guard Maritimes Regional Office’s Environmental Emergencies 24-hour Report Line at 1-800-563-9089 is notified;
- contaminated wastes, such as used cleaning cloths, absorbents, and pads, will be stored in proper waste containers; and
- waste material will be disposed of at approved disposal facilities.

Construction equipment will be cleaned and maintained in good working condition, with visual inspections of equipment performed on a regular basis. Petroleum products such as gasoline, diesel fuel and oil will be properly labeled in accordance with. Refuelling, oiling, and maintenance of equipment, as well as storage of hazardous materials, will be conducted in a specifically designated and contained area on the construction site as far as possible from the adjacent surface waters. Construction equipment will be stored away from the water to ensure that in the event of an accident or vandalism, fuels or lubricants will not reach Charlottetown Harbour. Servicing of equipment (e.g., oil changes and hydraulic repairs) will be completed off site when possible; however, when required at the site, work will be completed over an impervious tarp or a tray. Vehicles will be equipped with spill containment and clean-up materials.

Personnel handling fuels and hazardous wastes will be trained in Workplace Hazardous Materials Information System (WHMIS) and qualified to handle these materials in accordance with the manufacturer’s instructions and applicable regulations. Hazardous waste and storage area(s) will be clearly marked and secured. Industrial waste will be reused or recycled on a priority basis. Where reuse or recycling opportunities are not available, industrial waste will be collected and disposed of at an approved facility. Garbage receptacles for solid non-hazardous wastes will be available. These wastes will be collected on a regular basis or as they are generated and will be disposed of at approved locations.
With these mitigation measures and emergency response procedures implemented, and because of the low likelihood of such events, the potential environmental effects of a Hazardous Material Spill on Groundwater Resources, Marine Environment, and Terrestrial Environment during Construction, Operation, and Decommissioning and Abandonment of the Project are rated not significant.

5.5.3.2.5 Vehicle Accident

A Vehicle Accident arising from Project-related activities may interact with Transportation and Public Health and Safety. A Vehicle Accident will not interact with any other VEC and thus its environmental effects on these other VECs for which the interactions were ranked as 0 in Table 5.17 are rated not significant, and are not discussed further.

The potential for a Vehicle Accident to occur exists during Construction and Operation of the Project. Decommissioning will be assessed upon completion of a decommissioning and abandonment plan at the end of the life of the Project.

Worker traffic and truck traffic to and from the site and the operation of heavy equipment on-site during Construction have the potential to result in a vehicle accident during Construction. The Project-related vehicles will observe all traffic rules and provincial and federal highway regulations. Trucking activity will take place on designated truck routes, and observe speed limits and weight restrictions.

Because the Project will comply with all applicable traffic rules and regulations, the nominal increase in traffic volumes as a result of the Project, and because safety measures will be implemented during Construction, the potential environmental effects of a Vehicle Accident on Transportation and Public Health and Safety during Construction, Operation, and Decommissioning and Abandonment of the Project are rated not significant.

5.5.3.3 Interactions Ranked as 2

There were no interactions ranked as 2 in Table 5.17. Accordingly, by definition, the potential environmental effects of all Accidents, Malfunctions, and Unplanned Events are rated not significant.

5.5.4 Determination of Significance

The Project is being designed, and will be constructed and operated with the utmost regard for health, safety, and environmental protection to minimize its potential environmental effects that could result during the normal course of Construction, Operation, and Decommissioning and Abandonment as well as those that could result from Accidents, Malfunctions, and Unplanned Events.

The careful planning of the Project and the implementation of proven and effective mitigation will minimize the potential for Accidents, Malfunctions, and Unplanned events to occur. There are
no potential environmental effects that could occur as a result of Accidents, Malfunctions, or Unplanned Events that would cause a significant adverse environmental effect to any VEC, during any phase of the Project. In the very unlikely and improbable event that an Accident, Malfunction, or Unplanned Event of any considerable magnitude were to occur, it would be of a short duration, low frequency, or limited geographic extent such that significant adverse environmental effects to any VEC would be very unlikely to occur.

Overall, given the nature of the Project and credible Accidents, Malfunctions, and Unplanned Events considered, and in light of the nature of the Project and proposed mitigation, the potential environmental effects of all Project-related Accidents, Malfunctions, and Unplanned Events on all VECs during all phases of the Project, are rated not significant.
CONCLUSION

In this EA, Stantec conducted an assessment of the proposed Prince Edward Island Convention Centre/Queens Wharf Redevelopment ("the Project") proposed by CADC ("the Proponent"). The Project involves the Construction and Operation of a convention centre in Charlottetown, Queens County, PEI.

Scope of the Environmental Assessment

An EA of the Project is required under Section 9(1) of the PEI EPA and section 5 of CEAA. This EA follows Stantec EA Methodology that has been developed to meet the requirements of the PEI EPA and CEAA.

The EA evaluated the potential environmental effects of the Project. The scope of the assessment included all activities necessary for the Construction and Operation of the Project. Environmental effects were assessed for each phase of the Project (i.e., Construction, Operation, Decommissioning and Abandonment), where relevant, as well as for credible accidents, malfunctions, and unplanned events. The assessment was conducted within defined boundaries (spatial, temporal, administrative, and technical) for the assessment and in consideration of defined residual environmental effects rating criteria aimed at determining the significance of the environmental effects. The EA considered measures that are technically and economically feasible that would mitigate any significant adverse environmental effects of the Project.

Environmental Effects Assessment

Of the VECs identified for further evaluation, a considerably more substantive environmental effects assessment was conducted for Atmospheric Environment, Marine Environment, Accident, Malfunctions, and Unplanned Events, and Effects of the Environment on the Project, which were identified by the Study Team (based on experience and professional judgment) as being the key VECs for which substantive interactions with the Project were anticipated or could occur. Table 6.1 summarizes the results of environmental effects analysis for the proposed convention centre.
### Table 6.1 Potential Environmental Effects Analysis Summary

<table>
<thead>
<tr>
<th>Environmental Components</th>
<th>Project Phase/ or Component</th>
<th>Description of Potential Environmental Effects</th>
<th>Significance of the Effect</th>
<th>Recommended Mitigation Measures / or Best Management Practices (BMPs)</th>
<th>Residual Effect</th>
<th>Significance of Residual Effect*</th>
<th>Monitoring</th>
<th>Follow-up</th>
</tr>
</thead>
</table>
| **Atmospheric Environment** | Construction               | There is potential for Project activities to release contaminants in to the air, including GHGs, and also to produce sound emissions in the form of unwanted noise. | S                         | The following mitigation measures will be implemented wherever technically and economically feasible to minimize potential adverse environmental effects of the Construction of the Project on the Atmospheric Environment:  
- Contaminated fill from the Project site will be contained and encapsulated;  
- Apply dust suppressants as required;  
- Follow equipment maintenance schedules;  
- Environmental awareness training with Key Contract Personnel will include vehicle idling;  
- Minimize activities that generate large quantities of dust during high winds;  
- Work will be limited to the hours between 7 am and 7 pm;  
- Use well maintained equipment with quality mufflers;  
- Notify residents at NSAs of major Construction activities and update on progress;  
- Complaint follow-up and response procedure; and  
- Use of high frequency vibro-hammer with controlled variable eccentricity for majority of pile driving time. | Overall, given the nature of the Project and the proposed mitigation, the potential environmental effects of the Project-related activities on Atmospheric Environment during all phases of the Project are rated not significant, with a high level of confidence. | NS | NA | NA |
### Table 6.1 Potential Environmental Effects Analysis Summary

<table>
<thead>
<tr>
<th>Environmental Components</th>
<th>Project Phase/ or Component</th>
<th>Description of Potential Environmental Effects</th>
<th>Significance of the Effect</th>
<th>Recommended Mitigation Measures / or Best Management Practices (BMPs)</th>
<th>Residual Effect (If yes, provide a description)</th>
<th>Significance of Residual Effect*</th>
<th>Monitoring</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operation/ Decommissioning and Abandonment</td>
<td>During Operation of the Project, a fuel oil boiler is planned to meet the heating needs of the facility. The operation of the fuel oil boiler will result in the release of air contaminants and GHGs to the atmosphere.</td>
<td>S</td>
<td>• Follow boiler maintenance schedules; • Contaminated fill from the Project site will be contained and encapsulated;</td>
<td>Overall, given the nature of the Project and the proposed mitigation, the potential environmental effects of Project Operation on the Atmospheric Environment are rated not significant, with a high level of confidence.</td>
<td>NS</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Freshwater Environment</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Terrestrial Environment</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS/ ME</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Wetland Environment</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Environmental Components</td>
<td>Project Phase/ or Component</td>
<td>Description of Potential Environmental Effects</td>
<td>Significance of the Effect</td>
<td>Recommended Mitigation Measures / or Best Management Practices (BMPs)</td>
<td>Residual Effect</td>
<td>Significance of Residual Effect</td>
<td>Monitoring</td>
<td>Follow-up</td>
</tr>
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<td>--------------------------</td>
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<td>-----------------------------------------------------------------</td>
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</tr>
<tr>
<td>Marine Environment</td>
<td>Construction</td>
<td>Infilling in the marine environment will cause the destruction of habitat in the area. The Project will result in HADD of fish habitat, requiring an Authorization under Section 35(2) of the Fisheries Act. Pile driving during the installation of the steel sheet pile wall may cause behavioural effects to fish in the vicinity of the site, even with the use of a vibratory hammer.</td>
<td>S</td>
<td>• The Project will result in the harmful alteration, disruption, or destruction (HADD) of fish habitat, requiring an Authorization under Section 35(2) of the Fisheries Act. As such, a habitat compensation plan will be developed and implemented by the proponent pending DFO-Habitat approval. • Prior to and during work in the marine environment, an EEM program will be implemented to monitor the TSS levels in the vicinity of the Project to ensure they do not exceed applicable guidelines. • Sheet pile seawall will be lined with geotextile filter fabric prior to infilling. • A silt curtain will be installed around the perimeter of the infill area prior to pile driving and marine infilling. The construction manager will monitor the stability of the structure on a daily basis to ensure the silt curtain is functioning properly; • Fish rescue will be conducted from the area enclosed by the silt curtain; • Fish rescue will comply with all regulations and mitigations set out in the Licence to Fish for Experimental, Scientific, Educational Purpose, and/or Public Display Permit; • Clean fill material (i.e., from a provincially approved source) will be used for the initial metre along the base of the infill.</td>
<td>Overall, given the nature of the Project and the proposed mitigation, the potential environmental effects of the Project-related activities on Marine Environment during all phases of the Project are rated not significant, with a high level of confidence.</td>
<td>NS</td>
<td>M</td>
<td>NA</td>
</tr>
</tbody>
</table>
### Table 6.1 Potential Environmental Effects Analysis Summary

<table>
<thead>
<tr>
<th>Environmental Components</th>
<th>Project Phase/ or Component</th>
<th>Description of Potential Environmental Effects</th>
<th>Significance of the Effect*</th>
<th>Recommended Mitigation Measures / or Best Management Practices (BMPs)</th>
<th>Residual Effect (If yes, provide a description)</th>
<th>Significance of Residual Effect*</th>
<th>Monitoring</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater Resources</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS/ ME</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Groundwater Resources</td>
<td>Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS/ ME</td>
<td>NA</td>
<td>NA</td>
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<td>NA</td>
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<th>Monitoring</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour and Economy</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS/ ME</td>
<td>NA</td>
<td>NA</td>
<td>NS</td>
<td>NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Land Use</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS</td>
<td>NA</td>
<td>NA</td>
<td>NS</td>
<td>NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Archaeology and Heritage Resources</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS</td>
<td>NA</td>
<td>NA</td>
<td>NS</td>
<td>NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS</td>
<td>NA</td>
<td>NA</td>
<td>NS</td>
<td>NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS/ ME</td>
<td>NA</td>
<td>NA</td>
<td>NS</td>
<td>NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Public Health and Safety</td>
<td>Construction/ Operation/ Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS/ ME</td>
<td>NA</td>
<td>NA</td>
<td>NS</td>
<td>NA NA NA</td>
<td></td>
</tr>
<tr>
<td>Effects of Environment on the Project</td>
<td>Decommissioning and Abandonment</td>
<td>No anticipated environmental effects.</td>
<td>NS/ ME</td>
<td>NA</td>
<td>NA</td>
<td>NS</td>
<td>NA NA NA</td>
<td></td>
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</tr>
</thead>
<tbody>
<tr>
<td>Construction/ Operation</td>
<td>Severe weather events and climate change have the potential to delay construction and/or operation and damage infrastructure.</td>
<td>S</td>
<td>The Project will be designed in compliance with applicable codes and standards that address specific issues related to environmental forces and activities that could affect the Project. The Project will be designed and constructed to withstand severe weather conditions including wind, ice storms, and other severe weather.</td>
<td>Overall, given the nature of the Project and the proposed mitigation, the potential environmental effects of the Project-related activities on the Effects of the Environment on the Project during all phases of the Project are rated not significant, with a high level of confidence.</td>
<td>NS</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

* Different methods/criteria can be used to define the Significance of the effect (or the significance of residual effect).

- **S**: Significant adverse environmental effect
- **M**: Monitoring required
- **ME**: Minor Adverse Effect/ Mitigable Effect (Not Significant)
- **F**: Follow-up required
- **NS**: Not significant adverse environmental effect
- **NA**: Not required or not applicable
The EA concluded that the potential environmental effects of the Project for all VECs would be not significant during all phases of the Project and for all activities to be conducted as part of the Project. These conclusions were reached in consideration of the nature of the Project itself, the nature and extent of its environmental effects, and the planned implementation of proven and effective mitigation as part of the Project throughout its design, construction, commissioning, operation, maintenance, and eventual decommissioning and abandonment. The environmental effects of accidents, malfunctions, and unplanned events were also rated not significant. Effects of the Environment on the Project were rated not significant due to design consideration and compliance with codes and standards that will mitigate against a significant adverse effect on the Project. The environmental effects and significance predictions were made with a high level of confidence by the Study Team.

Follow-Up and Monitoring

Where appropriate and/or required, follow-up and monitoring measures aimed at verifying the environmental effects predictions or the effectiveness of mitigation were identified. Other than for routine compliance monitoring during Construction, no specific follow-up and monitoring measures were required as a result of this EA.

Overall Conclusion

Based on the results of this EA, it is concluded that, with planned mitigation, the residual environmental effects of the Project during all phases are rated not significant and the Project should proceed as is described within this EA.
ENVIRONMENTAL ASSESSMENT (EA):
Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI

7 CLOSING

This report has been prepared by Stantec Consulting Ltd. (Stantec) for the sole benefit of Charlottetown Area Development Corporation (CADC). The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and CADC.

This report was undertaken exclusively for the purpose outlined herein and was limited to the scope and purpose specifically expressed in this report. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Stantec makes no representation or warranty with respect to this report, other than the work was undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Any information or facts provided by others and referred to or used in the preparation of this report were assumed by Stantec to be accurate. Conclusions presented in this report should not be construed as legal advice.

The information provided in this report was compiled from existing documents and data provided by CADC and by applying currently accepted industry standard mitigation and prevention principles. This report represents the best professional judgment of Stantec personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect the any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

STANTEC CONSULTING LTD.

(digital not signed) (digital not signed)

Associate, Project Manager Senior Reviewer
Environmental Management Environmental Management

March 2, 2011
8 REFERENCES


March 2, 2011


DFO. 1996. Southern Gulf Northern Quahog. DFO Atlantic Fisheries Stock Status Report 96/102E.


ENVIRONMENTAL ASSESSMENT (EA):
Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown, Queens County, PEI


Ontario Ministry of Environment 2008. Ontario’s Ambient Air Quality Criteria (Sorted By Name), PIBS# 6570e, Standards Development Branch, February 2008.


PEIDEEF. 2009. Ambient Air Quality Data Spreadsheet. Received October 20, 2009.


8.1 Personal Communications


APPENDIX A

Figures
REFERENCE DRAWING: CENTRE FOR TOPOGRAPHIC INFORMATION, NATURAL RESOURCES CANADA. CHARLOTTETOWN 11L06 (1987)
CROSS SECTION A - PROPOSED DEVELOPMENT
ENVIRONMENTAL ASSESSMENT
PROPOSED PRINCE EDWARD ISLAND CONVENTION CENTRE
CHARLOTTETOWN, QUEENS COUNTY, PEI

SCALE: HOR = 1:500 VERT = 1:250

CLAYEY SILT
FINE SANDS
SANDSTONE
FILL

PROPOSED PARKING AREA
PROPOSED CONVENTION CENTRE
SSP WALL
HIGH TIDE
MEAN TIDE
LOW TIDE

7.6m (Approx.)
2.25m
2.5m
3m

Reference:
Handstad Associates
Cross Sections Sheet S2
File no. 132-10
July 9, 2010

Client:
CHARLOTTETOWN AREA DEVELOPMENT AREA
APPENDIX B

Aboriginal Groups Responses
Chief Darlene Bernard  
Council of Lennox Island Band  
P O Box 134  
Lennox Island PE C0B 1P0  

December 10, 2010  

Chief Darlene Bernard:  

RE: Prince Edward Island Convention Centre/Queens Wharf  

We are writing to provide the information that Public Works and Government Services Canada is proposing to transfer the Charlottetown Coast Guard Base to the Province of Prince Edward Island (PEI)/Charlottetown Area Development Corporation (CADC). PEI and CADC will then immediately commence the decommissioning of the Canadian Coast Guard Building, the construction of the PEI Convention Centre/Queens Wharf, and the operation of the PEI Convention Centre/Queens Wharf. As well, we are aware that the Province of PEI signed a Memorandum of Understanding with the Mi’kmaq Confederacy of Prince Edward Island (MCPEI) to partner with the Mi’kmaq governments in Lennox Island and Abegweit for the re-development of this property once the Province acquires it from the federal government. PWGSC has also conducted consultation with the Mi’kmaq governments in Lennox Island and Abegweit as part of the proposed land transfer and in context of the above mentioned Memorandum of Understanding.  

Project Description  
The proposed project is to be carried out in Charlottetown, Queens County, Prince Edward Island. Refer to Figure 1 for a map of the Charlottetown area in reference to the existing coastline and adjacent communities. The approximate coordinates of the proposed project area are 46.230871N and -63.123070W. Refer to Figure 2 for an aerial photograph of the project site.  

This development would be on land which is presently owned by PWGSC that currently house the Department of Fisheries and Oceans Canada and the Canadian Coast Guard. This land ownership will be transferred from PWGSC to the Province of PEI/CADC. With this land transfer, the Canadian Coast Guard Building will be decommissioned and the PEI Convention Centre/Queens Wharf will be constructed by CADC in its place. The proposed addition will consist of approximately 3,350 square metres (m2) of meeting and convention space on the main level and the expansion of the existing parking facility by approximately 3,200 m2, creating an additional 80 parking spaces. To facilitate the construction of the proposed convention centre the existing property will be redeveloped which will include, but not be limited to, demolition of the existing buildings, earthworks, piling driving, installation of a steel sheet pile wall and infilling a small portion of the marine environment behind the wall. The total area of the marine habitat to be affected by the marine infill is 1,552 m2. Refer to Figure 3, 4, 5, and 6 for two conceptual drawings and two site plans of the proposed project, respectively.  

The proposed project is subject to an environmental assessment under the Canadian Environmental Assessment Act (CEAA). The assessment will identify appropriate mitigation measures throughout all components of the project in order to minimize any potential adverse effects.
Provincial Regulatory Decisions

The development proposal is subject to a provincial environmental assessment in accordance with the PEI Environmental Protection Act. The federal environmental assessment will be coordinated, with the provincial environmental assessment. However, the federal and provincial governments will each make decisions on matters within their own legislative authorities.

Federal Regulatory Decisions

Under section 5 of CEAA, PWGSC, DFO and Infrastructure Canada may be Responsible Authorities (RA's) on this project.

PWGSC is transferring the land to the Province and this trigger for the CEAA assessment. PWGSC takes the lead Responsible Authority role in the CEAA assessment.

DFO's regulatory role is from the CADC's requirement to obtain a HADD authorization under the Fisheries Act prior to infilling the portion of the water lot that will be enclosed by the new seawall (The steel sheet pile (SSP) wall will be extended, which will result in the infilling of 1,552^2 of waterlog. The structure will be built on a steel sheet pile (SSP) wall. This HADD authorization makes DFO a co-Responsible Authority in the CEAA screening for this project.

CADC is seeking funding from the Government of Canada for this project. Infrastructure Canada is considering committing funding in support of the convention centre development through the Building Canada Funds-Major Infrastructure Component. As such, Infrastructure Canada is likely to be a co-Responsible Authority in the CEAA screening for this project.

Transport Canada may be issuing an approval under the Navigable Waters Protection Act for the new facility.

As part of the environmental assessment, we are seeking your input on what, if any, changes the project may cause to the environment that could affect the current use of lands and/or resources for traditional purposes and/or cultural use. We are respectfully requesting any feedback that you may have with respect to this proposed project by January 10, 2011.

If you have any questions and/or would like to discuss this further, please contact me via e-mail at don.maynard@pwgsc-tpsgc.gc.ca or by telephone at (902-566-7533).

Sincerely,

Donald Maynard  
Environmental Services  
PWGSC – Charlottetown, PEI

Sincerely,

Greg Wilson  
Env. Permitting and Legislation Environment Division  
PEI Department of Environment, Energy and Forestry

Attachments

Cc: Mr. Don MacKenzie, Mi’kmaq Confederacy of Prince Edward Island
Chief Brian Francis
Abegweit First Nations
P.O. Box 36
Mt. Stewart PE C0A 1T0

December 10, 2010

Chief Brian Francis:

RE: Prince Edward Island Convention Centre/Queens Wharf

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Sincerely,

Donald Maynard
Environmental Services
PWGSC – Charlottetown, PEI

Sincerely,

Greg Wilson
Env. Permitting and Legislation Environment Division
PEI Department of Environment, Energy and Forestry

Attachments

Cc: Mr. Don MacKenzie, Mi’kmaq Confederacy of Prince Edward Island
President and Chief Jamie Gallant  
Native Council of PEI,  
6FJ McAuley Court,  
Charlottetown PEI C1A 9M7

December 10, 2010

Dear Chief Jamie Gallant:

RE: Prince Edward Island Convention Centre/Queens Wharf

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Transport Canada may be issuing an approval under the Navigable Waters Protection Act for the new facility.

As part of the environmental assessment, we are seeking your input on what, if any, changes the project may cause to the environment that could affect the current use of lands and/or resources for traditional purposes and/or cultural use by your members. We are respectfully requesting any feedback that you may have with respect to this proposed project by January 10, 2011.

If you have any questions and/or would like to discuss this further, please contact me via e-mail at don.maynard@pwgsc-psgc.gc.ca or by telephone at (902-566-7533).

Sincerely,

[Signature]

Donald Maynard
Environmental Services
PWGSC – Charlottetown, PEI

Attachments
Mr. Donald Maynard

Environmental Services
PWGSC-Charlottetown, PEI
Cambridge Building
3 Queen Street
Charlottetown, PE
C1A 4A2

January 18th 2011

Dear Mr. Maynard:

Thank you for your previous letter, bringing to my attention the modifications being proposed in the construction of the PEI Convention Center and Queens Wharf.

I thank you for being considerate and informing my large community of Mi’kmaq Aboriginal Peoples who continue to reside on Traditional Ancestral Homelands throughout Prince Edward Island as represented by the Native Council of Prince Edward Island about this project, and seeking our views, issues or interests about these proposed modifications. I see no issue or concern at this time based on your description of this proposed project.

I do not see a need at this time to have further discussion on this project nor do I believe that it is necessary from our perspective to hold any further consultation on this specific issue.

Thank you for considering us and informing us about this project.

Protecting, Promoting and Harvesting
Epekwitk-PEI Natural-Life Resources

[Signature]
Jordan Crane
Kelewall Commissioner

CC. Jamie Gallant, Chief and President
NCPEI Board of Directors
Don Maynard

From: Don MacKenzie [dmackenzie@mcpei.ca]
Sent: Monday, February 14, 2011 10:05 AM
To: Don Maynard
Cc: 'Randy Angus'
Subject: RE: Copies of CCG Base Transfer CEAA letters sent out in Dec./follow-up on Feb 11

Good morning Don,

Thank you for your email and the information you provided during our telephone call this morning. As I understand it, you are seeking the input of MCPEI with respect to the proposed construction and infill relating to the Convention Centre side (east side of Queen Street, as shown in figure 6 provided by you) of the Queen’s wharf. I have reviewed this matter with Randy Angus, MCPEI’s director of Integrated Resource Management. Based on the information you have provided to us, MCPEI does not raise any objections to the proposed project. However, MCPEI has an interest in participating in any habitat rehabilitation activities associated with this project, and we specifically request to be so included.

Should the scope or location of the proposed project be altered in any way, the PEI First Nations, through MCPEI, expect to be consulted immediately.

I trust this to be satisfactory, but please do not hesitate to contact me if you have any questions.

DKM

Donald K. MacKenzie
Legal / Band Government Advisor and
Director of Intergovernmental Affairs
Mi’kmaw Confederacy of PEI
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APPENDIX C

Underwater Marine Benthic Habitat Survey – Proposed Prince Edward Island Convention Centre/Queens Wharf Re-development, Charlottetown, Queens County, Prince Edward Island
August 26, 2010

Job No. 121810269 – File No. 91819

Charlottetown Area Development Corporation
4 Pownal Street
Charlottetown PE C1A 7L9

Attention: Mr. Ernie Morello

Dear Mr. Morello:

Reference: Underwater Benthic Habitat Survey – Proposed Prince Edward Island Convention Centre/Queens Wharf Re-development, Charlottetown, Queens County, Prince Edward Island

Introduction

In August of 2010, Stantec Consulting Ltd. (Stantec) was retained by Charlottetown Area Development Corporation (CADC) to conduct an underwater marine benthic habitat survey (UMBHS) in the footprint of the proposed Prince Edward Island Convention Centre/Queens Wharf Re-development in Charlottetown Harbour, Queens County, Prince Edward Island (PEI). Currently, CADC is in the process of acquiring the existing Fisheries and Oceans Canada (DFO) and Canadian Coast Guard (CCG) property from the Government of Canada. Once the property is acquired, CADC proposes to construct the Prince Edward Island Convention Centre. The proposed development project requires infilling 2,081 square metres (m²) of marine habitat below high water.

This UMBHS survey, which includes two (2) transects and three (3) tie lines, was conducted to assist DFO with their assessment of the marine habitat in the proposed infill area. The survey layout is shown on Drawing 1, attached.

Materials and Methods

On August 12, 2010, two (2) transects and three (3) tie lines were surveyed in the footprint of the proposed Prince Edward Island Convention Centre/Queens Wharf Re-development in Charlottetown Harbour. The survey was conducted by Canadian Standards Association and Diver Certification Board of Canada certified divers from Diversified Divers Inc. using self contained underwater diving apparatus (SCUBA). Stantec professional staff was on site during the UMBHS.

Lead lines, marked in 5 metre (m) increments, were used to measure transect distances. On site, the locations of the lead line endpoints were recorded using a handheld Global Positioning System (GPS). Transect start and end point coordinates in latitude and longitude in degrees (NAD 83) and in Universal Transverse Mercator (UTM) (NAD 83) are provided in Tables 1a and 1b, respectively.
Reference: Underwater Benthic Habitat Survey – Proposed Prince Edward Island Convention Centre/Queens Wharf Re-development, Charlottetown, Queens County, PEI

Table 1a. Transects (Latitude and Longitude Coordinates NAD 83)

<table>
<thead>
<tr>
<th>Survey Line ID</th>
<th>Start Point</th>
<th>End Point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Latitude</td>
<td>Longitude</td>
</tr>
<tr>
<td>Transect 1</td>
<td>46° 13' 51.3''</td>
<td>63° 07' 20.2''</td>
</tr>
<tr>
<td>Transect 2</td>
<td>46° 13' 50.0''</td>
<td>63° 07' 18.9''</td>
</tr>
<tr>
<td>Tie Line 1</td>
<td>46° 13' 50.7''</td>
<td>63° 07' 20.9''</td>
</tr>
<tr>
<td>Tie Line 2</td>
<td>46° 13' 50.2''</td>
<td>63° 07' 20.2''</td>
</tr>
<tr>
<td>Tie Line 3</td>
<td>46° 13' 50.3''</td>
<td>63° 07' 19.2''</td>
</tr>
</tbody>
</table>

Table 1b. Transects (UTM Zone 20 Easting and Northing NAD 83)

<table>
<thead>
<tr>
<th>Survey Line ID</th>
<th>Start Point</th>
<th>End Point</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Easting</td>
<td>Northing</td>
</tr>
<tr>
<td>Transect 1</td>
<td>490571</td>
<td>5119712</td>
</tr>
<tr>
<td>Transect 2</td>
<td>490596</td>
<td>5119672</td>
</tr>
<tr>
<td>Tie Line 1</td>
<td>490556</td>
<td>5119694</td>
</tr>
<tr>
<td>Tie Line 2</td>
<td>490572</td>
<td>5119677</td>
</tr>
<tr>
<td>Tie Line 3</td>
<td>490593</td>
<td>5119681</td>
</tr>
</tbody>
</table>

Video footage and notes on the habitat were recorded along each transect in an approximate 1 m swath (Table 2).

Results

Approximately 245 m of marine habitat was surveyed along two (2) transects and three (3) tie lines in the footprint of the proposed Prince Edward Island Convention Centre/Queens Wharf Development in the Charlottetown Harbour, Queens County, PEI. The substrate type, fauna, and flora recorded during the benthic habitat survey are presented in Table 2, and are summarized below by transect. Identification of substrate, flora, and fauna along the transects and tie lines is based primarily on video imagery. Overall, the area surveyed had a high abundance of both silversides (Menidia menidia) and threespine stickleback (Gasterosteus aculeatus) and appeared to be a nursery area for juvenile fishes.

Transect 1 (85 m)

The substrate along transect 1 was predominantly silt/sand with the exception of the final 5 to 10 m which were boulder (breakwater). Flora encountered consisted of eelgrass (Zostera marina, 0 to 70% coverage), unidentified brown algae (0 to <1% coverage), sea beard (Pyraliella littoralis, 0 to 20% coverage), oarweed kelp (Saccharina latissima, 0 to <1% coverage), rockweed (Fucus sp., 0 to <1% coverage), and bladder wrack (Fucus vesiculosus, 0 to 5% coverage). The majority of the transect had algae covering the substrate. Fauna observed along this transect consisted of frilled anemone (Metridium senile), unidentified crabs, sea stars (not identified to species), sand shrimp (Cragon septemspinosa), rock crabs (Cancer irroratus), a hermit crab (not identified to species), silversides, an unidentified tunicate, barnacles (not identified to species), cunners (Tautogolabrus adspersus), and periwinkles (not identified to species). Green crab (Carcinus maenas), an invasive species, was also observed along transect 1.
Transect 2 (75 m)

The substrate along transect 2 was initially boulder (breakwater) in the first 5 m, but transitioned to silt/sand. The final 10 m were entirely boulder (wharf protection). Flora encountered along this transect include eelgrass (0 to <5% coverage), rockweed (0 to <5% coverage), sea lettuce (Ulva lactuca, 0 to <5% coverage), unidentified vegetation (0 to <5% coverage), and sea beard (0 to 10% coverage). The majority of the transect had an algal mat covering the substrate. Fauna observed consisted of periwinkles (not identified to species), blue mussels (Mytilus edulis), barnacles (not identified to species), unidentified crabs, unidentified fish, sea stars (not identified to species), silversides, sand shrimp, hermit crabs, and unidentified fauna. Green crab was also identified along transect 2.

Tie Line 1 (20 m)

The substrate along tie line 1 was entirely silt/sand. Flora encountered along this transect include eelgrass (0 to <1% coverage) and sea beard (0 to <1% coverage). An algal mat covered the substrate along the entire transect. Fauna observed consisted of frilled anemone, silversides, and unidentified fauna. Green crab was also identified along tie line 1.

Tie Line 2 (25 m)

The substrate along tie line 2 was initially a mixture of rock (boulder and pebble) and silt/sand but transitioned to entirely silt/sand. Flora encountered along this transect include eelgrass (0 to <5% coverage) and sea lettuce (0 to <1% coverage). An algal mat covered the substrate along the entire transect. Fauna observed consisted of barnacles (not identified to species), periwinkles (not identified to species), unidentified fish, and frilled anemone. Green crab was also identified along tie line 2.

Tie Line 3 (25 m)

The first 15 m of tie line 3 was too shallow in depth to obtain underwater video. The substrate along tie line 3 was initially a mixture of rock (pebble and gravel) and silt but transitioned to predominantly silt/sand. Flora encountered along this transect include hollow green weed (Enteromorpha intestinalis, 0 to <1% coverage), eelgrass (0 to <5% coverage), sea lettuce (0 to <5% coverage), and rockweed (0 to <1% coverage). An algal mat covered the substrate along the final 10 m of the transect. Fauna observed consisted of a sea star (not identified to species), blue mussels, and frilled anemone. Green crab was identified along tie line 3.
### Table 2. Benthic Habitat Characterization – Proposed Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown Harbour, Queens County, PEI

<table>
<thead>
<tr>
<th>Survey Line ID</th>
<th>Position (m)</th>
<th>Substrate</th>
<th>Flora</th>
<th>Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transect 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 5</td>
<td>Poor visibility</td>
<td>90% Silt</td>
<td>&lt;5% Eelgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, uncommon)</td>
</tr>
<tr>
<td>5 to 10</td>
<td>90% Silt 10% Pebble</td>
<td>&lt;1% Unidentified brown algae</td>
<td>Unidentified crab (1)</td>
<td></td>
</tr>
<tr>
<td>10 to 15</td>
<td>95% Silt 5% Boulder</td>
<td>&lt;5% Sea beard (Pylaiella littoralis)</td>
<td>Green crab (Carcinus maenas, 1)</td>
<td></td>
</tr>
<tr>
<td>15 to 20</td>
<td>60% Silt 40% Boulder</td>
<td>&lt;1% Elgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, common)</td>
<td></td>
</tr>
<tr>
<td>20 to 25</td>
<td>100% Silt</td>
<td>&lt;1% Oarweed kelp (Saccharina latissima)</td>
<td>Sea star (not identified to species, 1)</td>
<td></td>
</tr>
<tr>
<td>25 to 30</td>
<td>100% Silt</td>
<td>&lt;1% Elgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, common)</td>
<td></td>
</tr>
<tr>
<td>30 to 35</td>
<td>Poor visibility, appeared to be 100% Silt</td>
<td>Poor visibility</td>
<td>Poor visibility</td>
<td></td>
</tr>
<tr>
<td>35 to 40</td>
<td>95% Silt 5% Boulder</td>
<td>&lt;1% Elgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, uncommon)</td>
<td></td>
</tr>
<tr>
<td>40 to 45</td>
<td>100% Silt</td>
<td>None observed</td>
<td>Sand shrimp (Crangon septemspinosa, common)</td>
<td></td>
</tr>
<tr>
<td>45 to 50</td>
<td>Poor visibility, appeared to be 99% Silt &lt;1% Boulder</td>
<td>Poor visibility</td>
<td>Poor visibility</td>
<td></td>
</tr>
<tr>
<td>50 to 55</td>
<td>100% Silt</td>
<td>&lt;1% Elgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, uncommon)</td>
<td></td>
</tr>
<tr>
<td>55 to 60</td>
<td>99% Silt &lt;1% Boulder</td>
<td>&lt;5% Sea lettuce (Ulva lactuca)</td>
<td>Rock crab (Cancer irroratus, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hermit crab (not identified to species, 1)</td>
</tr>
</tbody>
</table>
Table 2. Benthic Habitat Characterization – Proposed Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown Harbour, Queens County, PEI

<table>
<thead>
<tr>
<th>Survey Line ID</th>
<th>Position (m)</th>
<th>Substrate</th>
<th>Flora</th>
<th>Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transect 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 to 65</td>
<td>100% Silt</td>
<td>5% Eelgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, common)</td>
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</tr>
<tr>
<td>65 to 70</td>
<td>100% Silt</td>
<td>15% Eelgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, uncommon)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Green crab (Carcinus maenas, 1)</td>
</tr>
<tr>
<td>70 to 75</td>
<td>100% Silt</td>
<td>70% Eelgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, common)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;1% Rockweed (Fucus sp.)</td>
<td>Green crab (Carcinus maenas, 1)</td>
<td></td>
</tr>
<tr>
<td>75 to 80</td>
<td>70% Silt, 30% Boulder</td>
<td>50% Eelgrass (Zostera marina)</td>
<td>Frilled anemone (Metridium senile, common)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silverside (Menidia menidia, common (school))</td>
</tr>
<tr>
<td>80 to 85</td>
<td>95% Boulder, 5% Silt</td>
<td>20% Sea beard (Pyliella littoralis)</td>
<td>Rock crab (Cancer irroratus, 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5% Eelgrass (Zostera marina)</td>
<td>Sea star (not identified to species (4))</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5% Bladder wrack (Fucus vesiculosus)</td>
<td>Unidentified tunicate (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Barnacles (not identified to species, uncommon)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silverside (Menidia menidia, very common (school))</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Periwinkle (not identified to species, uncommon)</td>
</tr>
<tr>
<td>Transect 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 5</td>
<td>95% Boulder, 5% Silt</td>
<td>&lt;5% Eelgrass (Zostera marina)</td>
<td>Periwinkles (not identified to species, very common)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Blue mussels (Mytilus edulis, common)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Barnacles (not identified to species, uncommon)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fish (unidentified, small school)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Crab (unidentified, 2)</td>
</tr>
<tr>
<td>5 to 10</td>
<td>Poor visibility, appeared to be predominantly silt</td>
<td>Poor visibility</td>
<td>Green crab (Carcinus maenas, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5% Eelgrass (Zostera marina)</td>
<td>5% Rockweed (Fucus sp.)</td>
<td>Sea star (not identified to species, 1)</td>
<td></td>
</tr>
<tr>
<td>10 to 15</td>
<td>Poor visibility, appeared to be predominantly silt</td>
<td>&lt;1% Sea lettuce (Ulva lactuca)</td>
<td>Crab (unidentified, 2)</td>
<td></td>
</tr>
<tr>
<td>15 to 20</td>
<td>100% Silt</td>
<td>&lt;5% Sea lettuce (Ulva lactuca)</td>
<td>Crab (unidentified, 2)</td>
<td></td>
</tr>
<tr>
<td>20 to 25</td>
<td>100% Silt</td>
<td>&lt;5% Eelgrass (Zostera marina)</td>
<td>Green crab (Carcinus maenas, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;5% Unidentified vegetation</td>
<td>Crab (unidentified, 1)</td>
<td></td>
</tr>
<tr>
<td>25 to 35</td>
<td>100% Silt</td>
<td>5% Sea lettuce (Ulva lactuca)</td>
<td>Silverside (Menidia menidia, very common (school))</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;5% Eelgrass (Zostera marina)</td>
<td>Green crab (Carcinus maenas, 5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sand shrimp (Cragon septemspinosa, uncommon)</td>
</tr>
<tr>
<td>35 to 40</td>
<td>100% Silt</td>
<td>&lt;5% Sea lettuce (Ulva lactuca)</td>
<td>Green crab (Carcinus maenas, 6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;5% Eelgrass (Zostera marina)</td>
<td>Hermit crab (not identified to species, 1)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Benthic Habitat Characterization – Proposed Prince Edward Island Convention Centre/Queens Wharf Development, Charlottetown Harbour, Queens County, PEI

<table>
<thead>
<tr>
<th>Survey Line ID</th>
<th>Position (m)</th>
<th>Substrate</th>
<th>Flora</th>
<th>Fauna</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transect 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 to 45</td>
<td>100% Silt</td>
<td>&lt;5% Sea lettuce (<em>Ulva lactuca</em>)</td>
<td>Green crab (<em>Carcinus maenas</em>, 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;5% Eelgrass (<em>Zostera marina</em>)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 to 50</td>
<td>100% Silt</td>
<td>&lt;5% Sea lettuce (<em>Ulva lactuca</em>)</td>
<td>None observed</td>
<td></td>
</tr>
<tr>
<td>50 to 55</td>
<td>100% Silt</td>
<td>&lt;1% Sea lettuce (<em>Ulva lactuca</em>)</td>
<td>Green crab (<em>Carcinus maenas</em>, 2)</td>
<td></td>
</tr>
<tr>
<td>55 to 60</td>
<td>100% Silt</td>
<td>None observed</td>
<td>Hermit crab (not identified to species, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Green crab (<em>Carcinus maenas</em>, 1)</td>
<td></td>
</tr>
<tr>
<td>60 to 65</td>
<td>100% Silt</td>
<td>&lt;1% Sea lettuce (<em>Ulva lactuca</em>)</td>
<td>Unidentified fauna (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sea star (not identified to species, 1)</td>
<td></td>
</tr>
<tr>
<td>65 to 70</td>
<td>95% Boulder</td>
<td>10% Sea beard (<em>Pylaiella littoralis</em>)</td>
<td>Fish (unidentified, small school)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5% Silt</td>
<td>&lt;1% Rockweed (<em>Fucus sp.</em>)</td>
<td>Barnacles (not identified to species, very common)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sea star (not identified to species, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Green crab (<em>Carcinus maenas</em>, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Periwinkles (not identified to species, common)</td>
<td></td>
</tr>
<tr>
<td>70 to 75</td>
<td>100% Boulder</td>
<td>&lt;1% Rockweed (<em>Fucus sp.</em>)</td>
<td>Barnacles (not identified to species, very common)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Periwinkles (not identified to species, common)</td>
<td></td>
</tr>
<tr>
<td><strong>Tie Line 1</strong></td>
<td></td>
<td></td>
<td>Unidentified fauna (1)</td>
<td></td>
</tr>
<tr>
<td>0 to 5</td>
<td>100% Silt</td>
<td>&lt;1% Eelgrass (<em>Zostera marina</em>)</td>
<td>Green crab (<em>Carcinus maenas</em>, 1)</td>
<td></td>
</tr>
<tr>
<td>5 to 10</td>
<td>100% Silt</td>
<td>None observed</td>
<td>Silverside (<em>Menidia menidia</em>, common (school))</td>
<td></td>
</tr>
<tr>
<td>10 to 15</td>
<td>100% Silt</td>
<td>&lt;1% Sea beard (<em>Pylaiella littoralis</em>)</td>
<td>None observed</td>
<td></td>
</tr>
<tr>
<td>15 to 20</td>
<td>100% Silt</td>
<td>None observed</td>
<td>Frilled anemone (<em>Metridium senile</em>, uncommon)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Green crab (<em>Carcinus maenas</em>, 2)</td>
<td></td>
</tr>
<tr>
<td><strong>Tie Line 2</strong></td>
<td></td>
<td></td>
<td>Barnacles (not identified to species, very common)</td>
<td></td>
</tr>
<tr>
<td>0 to 5</td>
<td>90% Pebble</td>
<td>10% Boulder</td>
<td>Periwinkles (not identified to species, common)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20% Silt</td>
<td>None observed</td>
<td>Fish (unidentified, 1)</td>
<td></td>
</tr>
<tr>
<td>5 to 10</td>
<td>80% Pebble</td>
<td>&lt;5% Eelgrass (<em>Zostera marina</em>)</td>
<td>Green crab (<em>Carcinus maenas</em>, 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20% Silt</td>
<td></td>
<td>Green crab (<em>Carcinus maenas</em>, 2)</td>
<td></td>
</tr>
<tr>
<td>10 to 15</td>
<td>100% Silt</td>
<td>&lt;1% Sea lettuce (<em>Ulva lactuca</em>)</td>
<td>Frilled anemone (<em>Metridium senile</em>, common)</td>
<td></td>
</tr>
<tr>
<td>15 to 20</td>
<td>100% Silt</td>
<td>&lt;1% Eelgrass (<em>Zostera marina</em>)</td>
<td>Green crab (<em>Carcinus maenas</em>, 2)</td>
<td></td>
</tr>
<tr>
<td>20 to 25</td>
<td>100% Silt</td>
<td>&lt;1% Eelgrass (<em>Zostera marina</em>)</td>
<td>Frilled anemone (<em>Metridium senile</em>, common)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Green crab (<em>Carcinus maenas</em>, 1)</td>
<td></td>
</tr>
</tbody>
</table>
This report presents the results of the underwater marine benthic habitat survey conducted in the Charlottetown Harbour, Queens County, PEI. Underwater video and observations were recorded of the benthic habitat within the footprint of the proposed Prince Edward Island Convention Centre/Queens Wharf Re-development. The substrate was predominantly silt/sand with patches of rock (boulder, pebble, and gravel). Flora consisted of eelgrass, oarweed kelp, sea beard, sea lettuce, unidentified brown algae, unidentified vegetation, rockweed, bladder wrack, hollow green weed, and an algal mat covering much of the substrate. Fauna observed during the benthic habitat survey include periwinkles, unidentified crabs, sand shrimp, barnacles, frilled anemone, sea stars, cunners, silversides, rock crabs, hermit crabs, unidentified fish, blue mussels, and unidentified fauna. An invasive species, the green crab, was also observed.

This report has been prepared on behalf, and for the exclusive use, of Charlottetown Area Development Corporation. The data represent the conditions in the subject area at the time of the survey. Results can only be extrapolated to an undefined limited area surrounding the survey location. Stantec Consulting Ltd. certifies that, to the best of our knowledge, the information presented is accurate.

We trust this letter contains all of the information required at this time and are available at your convenience should you have any questions.

Sincerely,

Dale Conroy, MSc.
Project Manager, Associate

cc: Guy Robichaud – DFO
Monic Myles - DFO
Don Maynard - PWGSC