

Contrecoeur Maritime Terminal Expansion Project

Environmental Impact Assessment – Summary

Montreal Port Authority



Environment & Geoscience

December | 2017

Final Report > Rev. F02
Internal ref. 639223

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Montreal Port Authority
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Project No. : 639223
Document No. : Final Report, F02

December 2017



Preface

This document presents a summary of the Environmental Impact Assessment (EIA) prepared for the Contrecœur Maritime Terminal Expansion Project of the Montreal Port Authority (hereafter referred to as “MPA”).

This study was prepared by a team of multidisciplinary professionals who used recognized methods to identify, describe and assess the environmental and social impacts associated with the project and to propose mitigation or compensation measures to minimize such impacts.

Readers are referred to the Environmental Impact Assessment, its annexes and addendum for further details on the project and foreseen impacts, as well as for bibliographical references concerning the technical documents consulted.

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Acronyms and Abbreviations

3R-RD	Reduction, reuse, recycling, reclamation, disposal
AALC	Acute aquatic life criterion
BWQI	Bacteriological and physicochemical quality index
C ₁₀ -C ₅₀	Petroleum hydrocarbons
CALC	Chronic aquatic life criterion
CAR	<i>Clean Air Regulation</i>
CCME	Canadian Council of Ministers of the Environment
CD	Chart datum
CDFM	<i>Centre de développement de la formation et de la main d'œuvre huronne-wendat</i> (Huron-Wendat Labor Development and Training Center)
CDPNQ	<i>Centre de données sur le patrimoine naturel du Québec</i> (Quebec Natural Heritage Data Centre)
CEAA	Canadian Environmental Assessment Agency
CETA	Comprehensive Economic and Trade Agreement
CHSLD	<i>Centre hospitalier de soins de longue durée</i> (Residential and Long-term Care Centre)
CIRRELT	Interuniversity Research Center on Enterprise Networks, Logistics and Transportation
CLSC	<i>Centre local de service communautaire</i> (Local Community Service Center)
CN	Canadian National
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
ECRC	Eastern Canada Response Corporation
EIA	Environmental Impact Assessment
EL	Engineered landfill
ESMP	Environmental and Social Management Plan
EU	European Union
FIGWQGS	<i>Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites</i>
FSDS	<i>Federal Sustainable Development Strategy</i>
GCNWA	Grand Council of the Waban-Aki Nation
GDP	Gross domestic product
GHG	Greenhouse gas
HA	Highly annoyed
HAZMAT	Hazardous materials
HHW	Household hazardous waste
HWN	Huron-Wendat Nation
IAS	Invasive Alien Species

IBA	Important Bird and Biodiversity Area
IMO	International Maritime Organization
IP Zones	Industrial Port Zones
LNG	Liquefied natural gas
LSA	Local study area
MCK	Mohawk Council of Kahnawake
MDDELCC	<i>Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques</i> (Ministry of Sustainable Development, Environment and the Fight Against Climate Change)
MDDEP	<i>Ministère du Développement durable, de l'Environnement et des Parcs</i> (Ministry of Sustainable Development, Environment and Parks, now MDDELCC)
MGTP	Montreal Gateway Terminals Partnership
MIARC	Major Industrial Accidents Reduction Council
MMC	Montreal Metropolitan Community
MP	Management plan
MPA	Montreal Port Authority
n.a.	not available
OEC	Occasional Effects Concentration
PAH	Polycyclic aromatic hydrocarbon
pH	Potential hydrogen
PM ₁	Particulate Matter, diameter ≤ 1 micron
PM _{2.5}	Particulate Matter, diameter ≤ 2.5 microns
PM ₁₀	Particulate Matter, diameter ≤ 10 microns
PM _T	Total Suspended Particle
RCM	Regional County Municipality
RBCS	Regulation Respecting the Burial of Contaminated Soils
RG	Geodetic datum
RHM	Regulation Respecting Hazardous Materials
RIPRSL	<i>Régie intermunicipale de police Richelieu-Saint-Laurent</i>
SME	Small and Medium Enterprises
SQACQ	Sediment Quality Assessment Criteria in Quebec
SWR	Surface Water Resurgence
TSS	Total suspended solids
USA	United States of America
VOC	Volatile organic compound
WFGA	Waterfowl Gathering Area
ZIP	Priority Intervention Zone

Units and Symbols

°	degree
'	minute
”	second
+	plus
+/-	positive or negative
\$	dollar
%	percentage or percent
CO ₂ eq	CO ₂ equivalent
dBA	A-weighted decibels
ft	feet
h	hour
ha	hectare
km	kilometer
km ²	square kilometer
L _{Aeq}	A-weighted equivalent continuous sound pressure level over period T
L _{Ar}	Acoustic evaluation level
m	meter
m ²	square meter
m ³	cubic meter
mg/kg	milligram per kilogram
mg/L	milligram per liter
min	minute
m/s	meter per second
m ³ /s	cubic meter per second
N	north
ppb	part per billion
TEU	twenty-foot equivalent
µg/m ³	microgram per cubic meter
W	west

Chemical Symbols

CO	Carbon monoxide
H ₂ S	Hydrogen sulfide
NO ₂	Nitrogen dioxide or nitrites
O ₂	Oxygen
O ₃	Ozone
SO ₂	Sulphur dioxide

1 Introduction

1.1 Guidelines and Regulatory Context

This study was prepared in accordance with the *Guidelines for the Preparation of an Environmental Impact Statement* issued by the Canadian Environmental Assessment Agency (CEAA) in March 2016. These guidelines were developed following the filing of the Project Description in November 2015 that was used to determine whether the Contrecoeur Maritime Terminal Expansion Project was subject to the federal environmental assessment process laid out in the *Regulations Designating Physical Activities* (SOR/2012-147) and the *Canadian Environmental Assessment Act* (SC, 2012, c.19, s.52). This impact assessment summary provides an overview of the environmental and social changes produced by the project's construction and operation phases.

In response to the filing of this Environmental Impact Assessment (EIA) and to the information to be collected during the environmental assessment process, the CEAA will issue an environmental assessment report, which will subsequently be submitted to Environment and Climate Change Canada (ECCC) for the issuance of the environmental assessment decision statement.

Before undertaking the expansion of its Contrecoeur maritime terminal, the MPA will be required to obtain environmental authorizations delivered by Fisheries and Oceans Canada (DFO) under Section 35(2) of the *Fisheries Act* (RSC, 1985, c. F-14) and under the *Species at Risk Act* (S.C. 2002, c. 29).

In addition, the project will be subject to several federal laws and regulations, including the following:

- › The *Canadian Environmental Protection Act* (SC 1999, c.33);
- › The *Migratory Birds Convention Act* (SC 1994, c.22);
- › The *Transportation of Dangerous Goods Act* (RSNB 2011, c. 232);
- › The *Canada Transportation Act* (SC 1996, c.10);
- › The *Hazardous Products Act* (RSC, 1985, c. H-3);
- › The *Environmental Emergency Regulations* (SOR/2003-307);
- › The *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* (SOR/2008-197);
- › The *Ozone-depleting Substances and Alternative Halocarbon Regulations* (SOR/2016-137);
- › The *Canada Marine Act* (SC 1998, c.10);
- › The *Port Authorities Operations Regulations* (SOR/2000-55);
- › The MPA's Letters Patent.

1.2 Project Context and Rationale

1.2.1 Competitive Environment

1.2.1.1 Ports: At the Heart of Global Supply Chains

As a result of their central role in global logistics chains, ports are instruments of trade for countries. With over 65% of its gross domestic product (GDP) associated with foreign trade, Canada is a country whose economy is heavily reliant on international trade. This trade is supported by a complex national logistics network where ports play a unique role as gateways.

The degree to which the various transportation modes used in the logistics chain are integrated is contingent on the “common denominator law”. This means that a logistics chain is as strong as its weakest link. Thus a capacity, productivity or efficiency issue that is inherent in one mode will negatively affect the performance and competitiveness of the entire chain and may directly affect the economic health of the industry in general, as well as the economy of Quebec and of Canada.

1.2.1.2 Competing Ports

Ports on the North American East Coast not only serve a local container shipment market, but also and most important, compete for the continental markets. A port’s diversified land base is a major success factor. By virtue of its location and connection to road and rail networks, the Port of Montreal is primarily the port of the province of Quebec, but also the province of Ontario and the American Midwest’s port.

In fact, the United States’ Midwest is a market that is highly sought after by all East Coast ports. In recent years, the majority of port and railway investments by East Coast ports specifically targeted the improvement of their services to the Midwest. An estimated amount of more than \$9 billion has been invested in ongoing projects to support East Coast container port facilities.

These ongoing investments will result in increased port capacity and in productivity gains. Consequently, they will have an impact on the overall port capacity of the East Coast.

The Port of Montreal along with the entire Montreal supply chain recognize this long-term competitive pressure and cannot afford to be passive at the risk of being marginalized. In addition, the cost of congestion caused by a lack of capacity would penalize Canadian importers and exporters which could ultimately compromise the competitiveness of the manufacturing industry in Quebec and Canada.

1.2.1.3 Dynamics of the Maritime Industry

Ocean carriers are generally the ones that select which ports will be called throughout the itinerary of shipped goods. These decisions are based on a multiple factor analysis, including the architecture of existing maritime networks, transshipment strategies, strategic alliances between ocean carriers, the geography of maritime terminals, established railway connections, etc. Naturally, whatever its size, a logistics chain has to offer a clear profitability perspective for its operators. Therefore, it is essential for a port to constantly demonstrate its performance and competitiveness, at the risk of losing cargo to competing ports. The consequences of a decline in productivity or of a lack of capacity that can lead to congestion in a port can be very detrimental.

Over the past decade, ocean carriers have accelerated their acquisition of larger ships in an effort to control costs. The introduction of larger ships and the emergence of transshipment ports have directly impacted the entire logistics supply chain, particularly for ports that serve as sea-land interface. Ports must not only adapt wharf equipment to the increasing size of new ships but also the ground capacity to accommodate a larger number of containers per port of call. This adaptation requires significant investments by ports or they risk being marginalized within the maritime transport networks.

In the case of the Port of Montreal, the necessity for investment to adapt its infrastructure is mitigated by two main reasons. The first is that the Port of Montreal is a river port. This means the province of Quebec will most likely never see the mega ships (12,000 TEUs to 21,000 TEUs) currently sailing the Asian and European major maritime routes because the trade volume between Montréal's domestic markets and the World is small when compared to routes adapted to large ships. However, this does not imply that Montreal has not had to adapt to increased container ship sizes. Over the past forty years, the ship capacity has increased from 750 TEUs to 6,000 TEUs. Since 2013, Montreal has been able to accommodate container ships with a capacity of 6,000 TEUs, whereas the largest ships currently using the port have a capacity of about 5,050 TEUs. Therefore, there is window of opportunity for a real increase in the size of ships using the port. The second reason is that, unlike its east coast competitors, Montreal is a destination port. This means that every ships calling at the Port of Montreal is completely unloaded and reloaded, which is not the case at other ports along the East Coast, where ships can stop over to unload a portion of their cargo before moving on to the next port. Typically, ocean carriers' services on the East Coast will make 3 to 5 ship calls per trip to different ports, thus unloading only a fraction of their cargo at each port. By contrast, Montreal being the only container port on the St. Lawrence River, ships will unload their entire cargo at the Port of Montreal before reloading at full capacity. The strategic location of the Port of Montreal is unique, and as such, the MPA sees little interest in engaging in a race for gigantism. Instead, it operates on the basis of stable economic foundations and sustainable growth of its traffic. It is a unique model according to the Interuniversity Research Center on Enterprise Networks, Logistics and Transportation (CIRRELT).

1.2.2 Growth Prospects

1.2.2.1 Economic Context

The Port of Montreal is a strategic asset contributing to the entire Canadian economy. It is also the leader on the North American East Coast for container services between Northern Europe and the Midwest states. As a result, the Port of Montreal is a natural gateway for trade between Europe and North America's industrial heartland, with the shortest transit time, taking only eight days to access the world's largest economic block.

The Comprehensive Economic and Trade Agreement (CETA) between Canada and the European Union (EU) represents an historic opportunity for Canadian importers and exporters. Trade between Canada and the European Union generates \$85 billion annually for the Canadian economy. CETA is highly favorable to the Port of Montreal as it currently handles one-third of trade operations between Canada and the EU (in tons) including more than 80% of containers originating from or destined for Europe. The gradual suppression of tariffs on 98% of traded products should facilitate the growth of the Port's containerized cargo traffic.

In addition to this favorable macroeconomic context, a unique political environment is developing in Quebec with the new provincial Maritime Strategy, making Quebec the only Canadian province with a formal maritime policy. The strategy proposes investments of \$1.5 billion to support the maritime industry until 2020, and includes several targeted initiatives in the Montreal metropolitan area and in the vicinity of the Port of Montreal. More specifically, \$400 million has been earmarked for the establishment of logistics hubs in western Montérégie and in Contrecœur. The future and success of a logistics hub in Contrecœur naturally lies on the development of a new container terminal in Contrecœur. The principle of cluster between a port and logistics and transport service providers is at the heart of the concept of a logistics hub. This cluster limits truck movements, eases congestion on road networks and reduces the carbon footprint of freight transportation.

1.2.2.2 Port of Montreal Container Volume Forecasts: Horizon 2030

Container volumes forecasts for the Port of Montreal indicate that the anticipated growth rate for container volume at the Port of Montreal should nearly double between 2016 and 2030, increasing from 1.45 million to 2.47 million TEUs. This growth will have a major impact port infrastructure need and on additional intermodal access, especially considering the increase in urban traffic congestion. Similar pressure is expected on the port's urban railway accesses.

Therefore, the selection of a peri-urban site to build new installations emerges as a sustainable solution with respect to the Port of Montreal's anticipated growth. A site with the capacity to facilitate clusters of logistics companies is a solution that is advantageous from an intermodal, environmental, social and economic point of view.

1.2.3 Capacity Management: Keeping Pace with Demand

1.2.3.1 Optimization of Existing Facilities

It is important for the Port of Montreal to meet the growing demand by developing the required facilities to serve its current and future customers and to avoid losing volume to intense US competition. Therefore, it must position itself now in order to build tomorrow's infrastructure and seize opportunities. The major strategic issues associated with the fluidity of goods, increasing ship size and future infrastructure capacity require that the Port of Montreal adopts a proactive vision of the future, without which the port could lose its status as a continental hub to American ports on the East Coast.

For many years now and in line with its development plan, the Port of Montreal has had a three-phase strategy: the first phase being the optimization of its current facilities in Montreal, the second phase is the development of new facilities in Montreal and the third phase consists of developing new facilities in Contrecœur.

Prior to the recent construction of the Viau terminal, the last container terminal to be inaugurated in Montreal was the Maisonneuve terminal in 1987. Since then, the maritime industry has changed considerably and port facilities have had to adapt and modernize. Numerous investments have been made by the MPA and its partners over the past few years in order to optimize container facilities. These investments provided the Port of Montreal with one of the most optimal footprints when compared to other North American ports, representing an average throughput of 15 000 TEUs per hectare. In addition, over the past five years, more than \$250 million have been injected in the development of container terminals by the MPA and its operators.

With the commissioning of the Viau terminal (Phase 1) in November 2016, the capacity of the Port of Montreal increased from 1.9 million TEUs to 2.1 million TEUs under optimum operating conditions. The international container terminals of Cast, Maisonneuve, Racine and Viau total a combined annual capacity of 2.0 million TEUs (excluding the Bickerdike domestic terminal).

Phase 2 of the Viau project (250,000 TEUs) and the terminals of the Montreal Gateway Terminals Partnership (MGTP) (Cast and Racine, 250,000 TEUs), will benefit from a series of optimization measures increasing the capacity by 500,000 TEUs. Ultimately, these anticipated capacity increases will make it possible to achieve the total capacity of the facilities on the Island of Montreal to nearly 2.5 million TEUs, by 2022.

1.2.3.2 Port Capacity Requirements

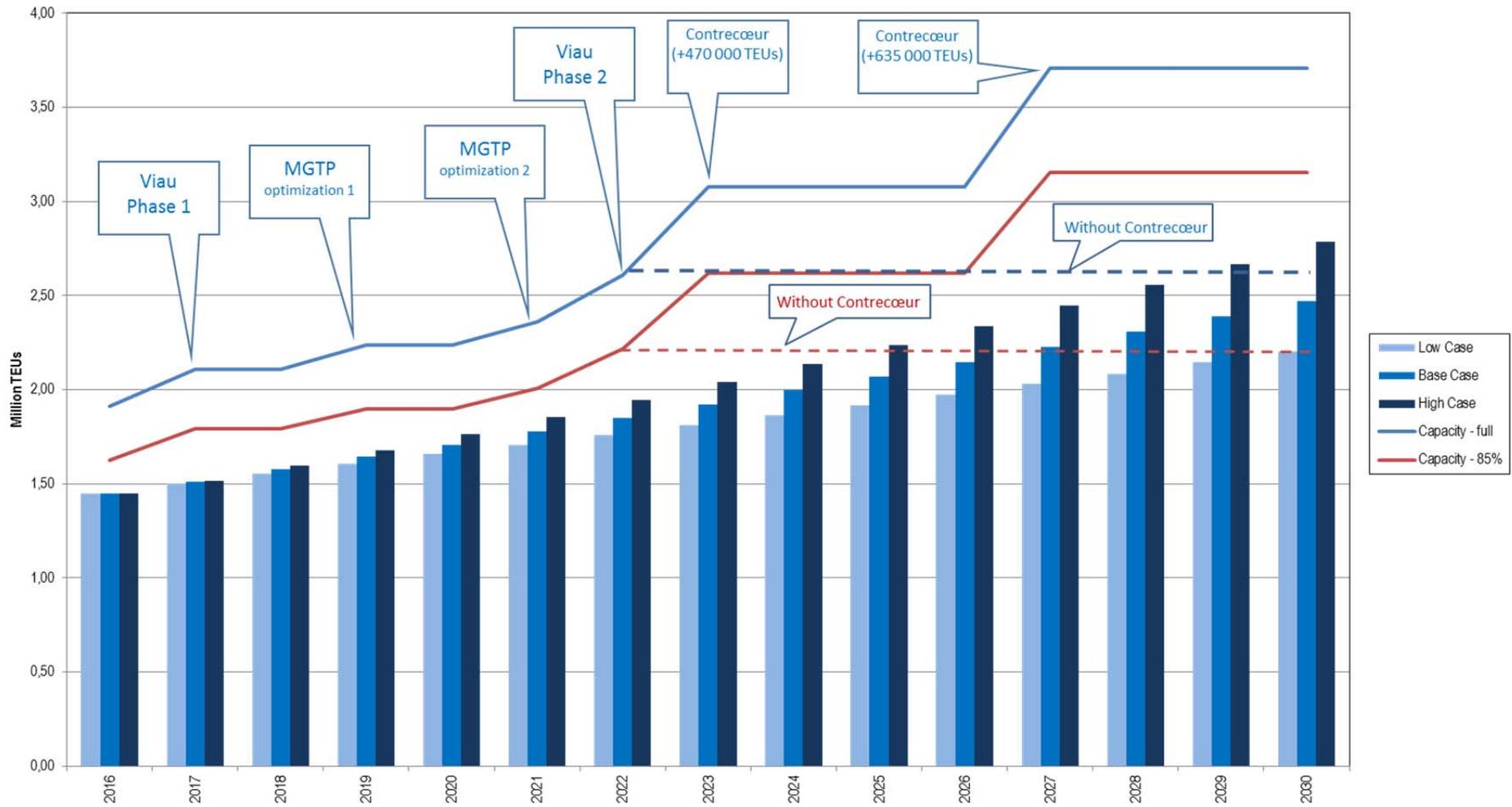
In 2016, prior to the commissioning of the Viau terminal, the overall utilization rate of the port's container terminals was 76%. However, when only international terminals are taken into account, with their individual capacity and the effects of volume seasonality, this percentage increase to 83%, thus allowing very little flexibility in terms of absorbing growth. The generally acceptable utilization rate in the industry is 85%, providing a buffer capacity without compromising operations.

The commissioning of the Viau terminal has certainly made it possible to address an immediate capacity requirement, and therefore reduce the overall terminal utilization rate to approximately 70%. However, without adding incremental capacity, the 85% utilization threshold would be reached within 5 years' time. Figure 1.1 graphically illustrates the balance between port capacity deployment and the demand for container traffic. It is important, however, to emphasize that no quantitative curve can do justice to qualitative factors such as growth modeling, seasonal effects and intra-port variations.

Consequently, these qualitative factors require caution in the interpretation of Figure 1.1, as they tend to make the capacity curve look conservative, i.e. the capacity requirements are often greater than shown in the graph.

MPA volume forecasts predict that container volume will reach and surpass the 85% operational threshold despite several optimization projects planned over the next year (Figure 1.1). Impeding on this limited margin would not allow the port to accommodate new maritime services, for instance, if a new carrier or an alliance of carriers wished to include Montreal in its services. Without the Contrecoeur terminal expansion, the 2020-2023 period would result in a reduction of the port's buffer capacity, which could thus be a vulnerability in the port's ability to host new maritime services and would hinder economic growth with associated consequences for the industries and consumers. It is only in 2023, after the Contrecoeur terminal has been commissioned, that a comfortable operational balance would be restored through the addition of a first phase of the terminal.

Figure 1.1 Port Capacity Requirements and Volume Forecasts up to 2030



1.2.4 Project's Economic Objectives and Benefits

The Contrecœur Maritime Terminal Expansion Project aims to increase the capacity of the MPA's port facilities to meet increasing freight demand while enhancing its competitiveness and resilience in the container sector. Traffic forecasts, even conservative ones, excluding the CETA effect and Quebec's Maritime Strategy, demonstrate that the anticipated growth will sustain both, existing facilities and an expansion in Contrecœur. The proposed expansion of the Contrecœur Maritime Terminal is not intended to compete with the Montreal facilities. Instead, it aims to meet a growing demand once one or more facilities on the Island of Montreal will nearly reach their full capacity.

The strategic location of the Contrecœur site is ideal for the construction of a container handling terminal. It is located near the shipping channel, a railway network and a major highway connection, i.e. Highway 30. Numerous sites located along this highway will also facilitate the development of the logistics and distribution industry. These activities go hand-in-hand with port activities and catalyze each other. The Contrecœur site is also adequately geometrically sized and laid out for the operation of a modern terminal, and offers the flexibility to accommodate long-term additional expansion requirements.

The Contrecœur Maritime Terminal Expansion Project will be a three-phase process. Once fully developed, the Contrecœur site will handle a maximum annual capacity of 3.5 million TEUs. This study focuses only on Phase 1 of the proposed development of the new Contrecœur maritime terminal, with at an annual capacity of 1.15 million TEUs.

The project is in line with the long-term vision for the development of the services offered at the Port of Montreal in Contrecœur. Accordingly, the described container shipping and handling facilities could be expanded when appropriate, depending on market growth.

Several factors could influence the successful planning of this expansion project:

- › Continued growth of the container market;
- › Tangible benefits of the Canada/Europe free trade agreements;
- › A business partner to operate the future terminal;
- › A proper financial package;
- › Securing permits and authorizations, including from the CEAA and DFO;
- › Creation of a regional logistics hub and of an Industrial Port Zone in Contrecœur.

Finally, it is important to emphasize the impact of the port on regional and national economies. The Port of Montreal represents:

- › \$41 billion in merchandise value annually;
- › \$2.1 billion in annual economic spin-offs for Canada, including \$1.6 billion for Quebec;
- › 16,000 stable jobs across Canada, including 7,000 directly related to maritime and port activities in Quebec;
- › Nearly \$900 million in annual expenditures for ongoing activities related to the Montreal maritime and port system;
- › More than \$250 million in revenues for the provincial and federal governments annually, including \$150 million for the Government of Quebec (each tonne handled generates approximately \$5.30 in provincial tax revenue);

- › Each container handled contributes approximately \$600 to Quebec's GDP and \$960 to Canada's GDP (including Quebec);
- › One job is generated for every 130 containers handled at the port.

The proposed Contrecœur Maritime Terminal Expansion Project will also generate considerable positive economic benefits during both its construction and operation. These impacts are described in Tables 6.4 and 6.5.

1.3 Sustainable Development

The project is designed to take into consideration all the principles set out in the MPA's policies, including its Sustainable Development Policy, Environmental Policy and Community Investment Policy. The project also takes into account the sustainable development principles of Quebec's *Sustainable Development Act* (RSQ, chapter D-8.1.1), certain cross-cutting principles of the *Federal Sustainable Development Strategy* (FSDS), and recommendations made by stakeholders and Aboriginal peoples during consultations that led the MPA to modify some elements of the project and make environmental and social commitments that will contribute to the port's continuous improvement. Combined together, the conceptual elements of the project and the MPA's environmental and sustainable development guidelines meet the 16 sustainable development principles included in Quebec's *Sustainable Development Act* (RSQ, chapter D- 8.1.1).

The MPA's Sustainable Development Policy, which was revised in 2016, aims at integrating economic, environmental and social considerations into its business processes. The policy is supported by a communication process and a description of each stakeholder's responsibilities with respect to its implementation. The policy applies to all the facilities and activities of the MPA, and therefore to the proposed project. It is structured around six guiding principles:

- › Ensuring responsible management of the organization;
- › Contributing to the prosperity of society;
- › Providing a stimulating work environment;
- › Reducing environmental footprints;
- › Maintaining safety and security as operating core values;
- › Ensuring the economic mission of the Port of Montreal.

This policy is accompanied by a three-year action plan for the 2016-2018 period. In 2016 and 2017, the MPA has put in place several initiatives that respond to this plan's objectives, most of which will be pursued in the context of the proposed project.

2 Project Overview

2.1 Project Components

The project is located on the territory of the municipality of Contrecoeur, in the Regional County Municipality (RCM) of Marguerite-d'Youville, on the south bank of the St. Lawrence River (Map 1). The site is located approximately 40 km downstream of the MPA facilities in Montreal, near the CN railway, Route 132 and Highway 30. The central geographic coordinates of the proposed facilities are 45° 49' 39.021" N and 73° 16' 45.277" W.

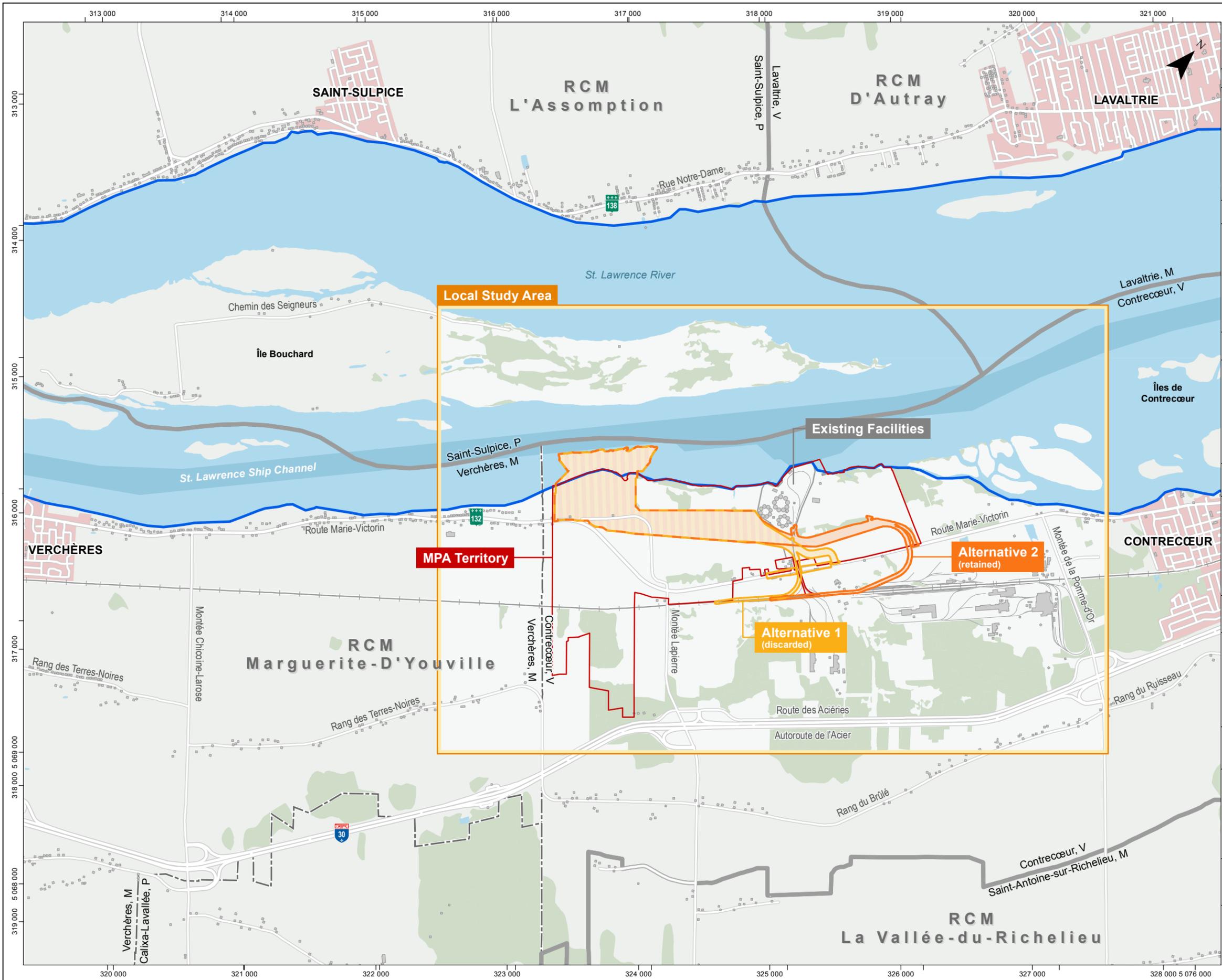
The majority of the planned structures are located between Route 132 and the St. Lawrence River. The surrounding properties are predominantly industrial and agricultural, with the exception of residences located directly west of the site and of the residence located at the intersection of Montée Lapierre and Route 132 which is currently unoccupied.

The expansion project is located almost entirely on the MPA's land property. The section of the wharf in the riverbed is located on lands belonging to the Water Domain of the Government of Quebec. The transfer of rights over these lands (riverbed and deep water) required for the MPA is currently under negotiation between the Government of Quebec and the Government of Canada. Once the Government of Quebec has transferred these lands to the Government of Canada, their management will be entrusted to the MPA, in compliance with *Canada's Marine Act*. Furthermore, a portion of the railway access is located on adjacent private industrial lands. Other private properties located west of the MPA territory are in the process of being acquired. The terminal will cover approximately 120 ha and will include the main components presented in Table 2.1 and Map 2.

Two potential dredged materials storage areas are considered, i.e. Zones 2 and 4 (Map 2).

Table 2.1 Project Components and their Surface Areas

Project Components	Surface Area (ha)
Approach and berthing area	19.1
Wharf (2 berths)	2.3
Container yard	26.0
› Temporary storage and handling area	14.0
› Maritime transfer area	7.3
› Landside transfer area	4.7
Intermodal yard and marshalling yard	24.0
Truck control area	1.2
Road and rail infrastructure	21.5
› Roads	15.7
› Railway	5.8
Support buildings	2.9
TOTAL (with Storage Area 2)	125.7
TOTAL (with Storage Area 4)	120.3



Study Areas

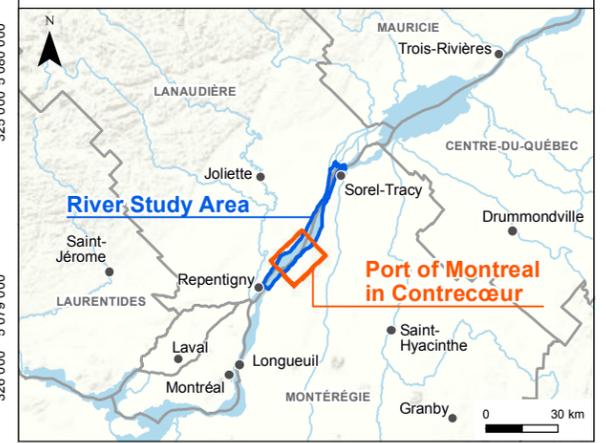
- Local Study Area
- River Study Area
- MPA Territory
- Project Area - Alternative 1 (discarded)
- Project Area - Alternative 2 (retained)

Existing Infrastructure

- Existing Facilities
- CN Railway
- Other Railway
- Road Network
- St. Lawrence Ship Channel

Administrative Boundaries

- Municipal Boundary
- RCM Boundary

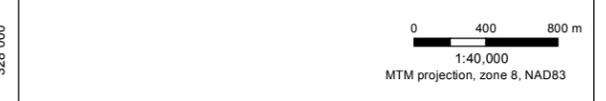


MONTREAL PORT AUTHORITY
Contrecoeur Port Terminal Expansion Project

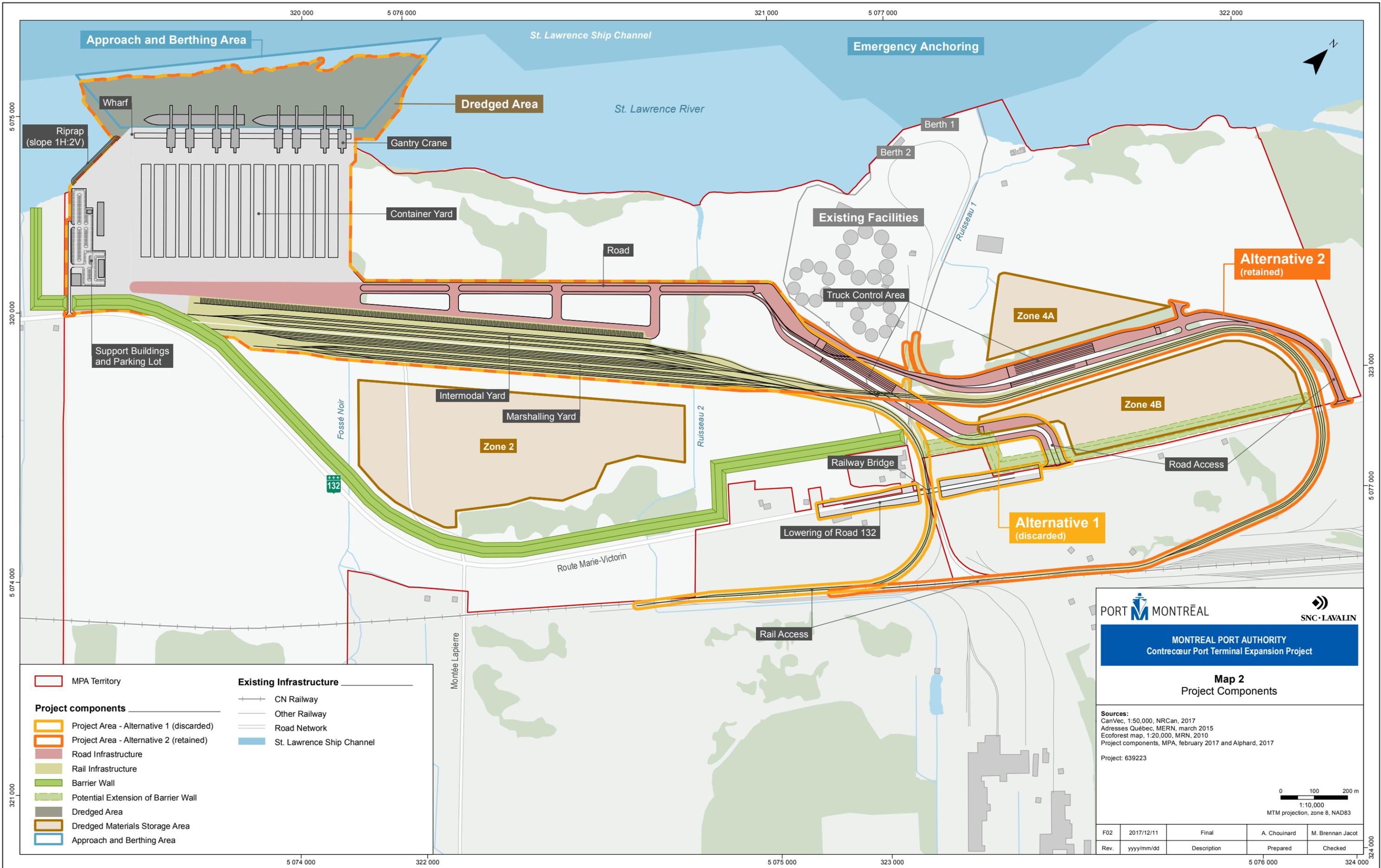
Map 1
Location of Project and Main Study Areas

Sources:
 CanVec, 1:50,000, NRCan, 2017
 Adresses Québec, MERN, march 2015
 Ecoforest map, 1:20,000, MRN, 2010
 SDA, 1:20,000, MRN, september 2013
 RCM Marguerite-D'Youville
 Project components, MPA, february 2017

Project: 639223



F02	2017/12/11	Final	A. Chouinard	M. Brennan Jacot
Rev.	yyyy/mm/dd	Description	Prepared	Checked



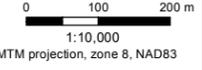



MONTREAL PORT AUTHORITY
 Contrecoeur Port Terminal Expansion Project

Map 2
 Project Components

Sources:
 CanVec, 1:50,000, NRCan, 2017
 Adresses Québec, MERN, march 2015
 Ecoforest map, 1:20,000, MRN, 2010
 Project components, MPA, february 2017 and Alphard, 2017

Project: 639223



F02	2017/12/11	Final	A. Chouinard	M. Brennan Jacot
Rev.	yyyy/mm/dd	Description	Prepared	Checked

Format 11x17

2.1.1 Maritime Access Areas

An approach and berthing area will be dredged to provide safe conditions for ships accessing the wharf from the St. Lawrence shipping channel. The approach area will be dredged to maintain a depth of 11 m from chart datum (CD) level, which is slightly lower than that of the shipping channel, maintained at 11.3 m.

2.1.2 Two-Berth Wharf

The Contrecoeur Maritime Terminal Expansion Project will include a 675 m long wharf which will serve as a berthing area for ships arriving from downstream. This wharf will allow the simultaneous berthing of two ships with a length of up to 300 m each and a capacity that could reach 4,200 TEUs each, thus similar to ships currently transiting at the Port of Montreal.

The three vertical surfaces of the wharf will consist of steel sheet piles attached to the shoreline with tie rods. The sheet pile wall will consist of a combined-wall arrangement composed of “H” profiled metallic elements as load-bearing parts and of sheet piles as intermediate elements.

Eight rail-mounted gantry cranes will be used to load and unload ships, i.e. four per berth. The cranes will have a rail width of 30.48 m (100 ft) and will reach a height of 95 m when their boom is raised.

2.1.3 Container Yard

The Container yard is an area of approximately 26 ha that will serve as a handling area for both ship and land transportation. The central part of the yard will be occupied by a temporary storage and container handling area. A maritime transfer area will be used for transshipment operations at berth and in the container yard. The temporary storage area of the container yard will be perpendicular to the wharf and will be divided into 16 blocks. Each block will be able to receive 36 containers in length and 10 containers in width. The overall storage capacity could reach up to 28,800 TEU containers. On the other hand, a land-based transfer area will be used for the handling of containers from the container yard to the intermodal yard (or vice versa) or for loading and unloading containers to be transported by truck.

2.1.4 Intermodal Yard and Marshalling Yard

A portion of approximately 24 ha of the terminal will be dedicated to the intermodal yard and the marshalling yard. Most of this area will be crossed by railway tracks to allow train services and switching activities. Five electrical rail-mounted overhead traveling bridge cranes will be installed to transfer containers, from transfer vehicles (yard trucks) to rail cars.

2.1.5 Truck Control Area

The truck control area covers approximately 1.2 ha. It is an area where road haulers entering or exiting the terminal will be required to stop in order to be identified and have the accuracy of their transactions verified in accordance with Transport Canada’s port security regulations on terminal access.

2.1.6 Land Transport Infrastructure

The terminal will be accessed via Highway 30, Route 132 and the CN railway. Road and rail accesses will be located near the eastern boundary of the MPA territory at Contrecœur. A railway crossing is planned where the rail access crosses Route 132.

2.1.7 Support Buildings

To ensure operations at the new container terminal, various support buildings will be required:

- › Administrative offices, including Customs offices;
- › Mechanical and maintenance workshops;
- › Employee room;
- › Employee and visitors' parking;
- › Electrical substation and compressors;
- › Firefighting infrastructure;
- › Sanitary network and sealed underground sanitary tank (if necessary, unless connected to the municipal sanitary network);
- › De-icing salt storage area.

A terminal road access connected to Route 132 will be built for workers and other authorized vehicles. Workers will be able to use a parking lot located southwest of the site. In order to control the access to the terminal, the area of the support buildings will be fenced.

2.1.8 Utilities

On-site water supply (service water, fire water) will be pumped from the St. Lawrence River. A water intake will be installed on the wharf's facade at approximately 2 m below the low-water level.

Potable water will come from the municipal water system. A connection to this system, which runs along Route 132 at the southern limit of the site, will be required.

The maritime terminal power supply will be provided through a connection to the Hydro-Québec network.

2.2 Construction Activities

The construction works will require approximately 4 years from the mobilization of the contractor planned in 2020. Activities planned during the construction phase include the following:

- › Mobilization and Site Preparation:
 - Access road to the site;
 - Deforestation and removal of vegetation cover;
 - Stripping and storage of topsoil;
 - Excavation, earthmoving and leveling;
 - Construction of storage areas for dredged materials;
 - Construction of the drainage network.
- › Construction of Temporary Facilities:
 - Access to the site;
 - Trailer-type temporary buildings;
 - Temporary materials storage areas;
 - Machinery parking and refueling areas;
 - Equipment washing areas;
 - Water supply;
 - Temporary sanitary facilities;
 - Temporary connections to the electrical distribution network.
- › Mechanical Dredging of Sediments:
 - Dredging operations are carried out to provide safe approach and berthing conditions for ships. The approach area to be dredged extends along the full length of the wharf (675 m) and over approximately 30 m either side, up to the St. Lawrence shipping channel (Map 2).
 - Dredging will be conducted to a depth of -11.0 m below CD, which is the depth for operations.
 - The total size of the dredged area is 16.3 ha and the total volume to be dredged is estimated at 839,000 m³ of sediment, which represents a total volume of 1,100,000 m³ of material when considering stacking factor.
 - Dredging works will be carried out over three years, i.e. from September 15th to December, in order to comply with the restriction periods applicable for fish protection purposes.
 - Sediments will be dredged mechanically by means of two barge-mounted clamshell dredgers.
 - Dredged materials will be deposited in barges pulled by two tugboats up to the wharf for transshipment.
 - Three to four transshipment areas are to be built on the final wharf.

› Management of Dredged Materials:

- The preferred approach for the disposal of dredged material involves either one or a combination of the following two options:
 - Storage on the MPA's territory in Contrecœur as backfill material in Storage Areas 2 or 4 and construction of a barrier wall (Map 2);
 - Disposal of excavated material by truck on authorized sites where they will be valorized.
- Sediment stored on the MPA site will be handled by trucks and bulldozers.

› Wharf Construction:

- Construction of the wharf by driving sheet piles and anchor piles and by backfilling the inside of the wharf compound;
- Paving, installation of utilities, mooring and container handling equipment.

› Development of Land-Based Facilities:

- Installation of utilities, such as electricity and water supply system;
- Surface leveling of the container and intermodal yards, and of the truck control area;
- Construction of railways and roads;
- Mobile equipment installation (gantry cranes, overhead traveling bridge cranes, etc.);
- Construction of support buildings.

› Residual Materials Management:

- The main residual materials are waste oils, construction debris and domestic waste;
- Management procedures will be established to control their screening, storage and disposal;
- The reduction, reuse, recycling, reclamation, disposal (3R-RD) principle will be applied in the management of these residual materials during the construction phase.

It is estimated that approximately 150 trucks/day could transit to the construction site. If the dredged material is entirely managed off-site, it is estimated that approximately 350 trucks/day may be required for its transport during dredging works (from mid-September to December, for 3 years). Thus, during the most intensive work periods, a maximum of 500 trucks/day could transit from or towards the construction site.

The receipt of construction materials will be done through the old Route 132, at the intersection of the Montée Lapierre, and the permanent access that will be built on the eastern side of the MPA's territory. Trucks will thus use the Montée Lapierre or the Montée de la Pomme-d'Or to access the construction site. According to a traffic study, traffic conditions during the construction period will be satisfactory at all road crossings.

No sanitary wastewater discharge will be generated during the construction period. Chemical toilets will be used by the contractors, which will be emptied by a specialized firm. Runoff waters will be managed by the gradual construction of the drainage system. These waters will be treated via various vegetated ditches, retention basins and hydrodynamic separators before being discharged into the environment.

2.3 Operation Activities

The terminal will operate continuously, 24 hours a day, 365 days a year. The activities planned during the operation phase are as follows:

› Ship Navigation and Maneuvering:

- In total, 1 to 3 ships per week (156 ships/year) are expected to sail into the Contrecoeur terminal, 3 being the maximum when the terminal operates at full capacity, i.e. 1.15 million TEUs. This additional traffic will only slightly increase ship traffic on the St. Lawrence River (at the rate of 6%), which currently amounts to about 4,000 merchant ship transits annually;
- Docking and berthing maneuvers at the new terminal are based on full-bridge simulations performed by river pilots;
- Ships will be similar in size to those currently using Montreal's installations, with a capacity that could reach 4,200 TEUs;
- Ships will be arriving from overseas, will stop at Contrecoeur, will unload and reload before returning downstream. Consequently, there will be no increase in the number of ships using the St. Lawrence Seaway.

› Wharf Operations:

- Loading and unloading of containers using gantry cranes;
- Supplying ships with consumable goods;
- There will be no land-based bunkering infrastructure (fuel supply). Refuelling, if necessary, will be done by tanker trucks or refuelling ships, as it is currently the case at Montreal and Contrecoeur facilities;
- Ship wastewater management;
- Shore power supply, for ships that have a connection system;
- Limited ballasting operations should be carried out, the terminal being a loading and unloading port.

› Container Storage and Handling Operations:

- Handling of containers by means of electric rail-mounted gantry cranes;
- Stacking of containers in blocks based on their origin and/or destination, and also based on their characteristics.

› Train Loading Activities and Rail Traffic:

- 45% of the containers will be transported by rail;
- One train per day of approximately 3,050 m (10,000 ft) will be unloaded and loaded if volume dictates it;
- The train will cross Route 132 through a new grade crossing and will stop traffic on Route 132 and on the Montée Lapierre for a period of approximately 7.5 minutes at each train crossing.

› Truck Loading Activities and Road Traffic:

- 55% of the containers will be transported by truck;
- Approximately 1,200 trucks/day (terminal operation at full capacity) will transit to and from the terminal;
- Trucking activities will take place from 6 am to 6 pm, but mainly before 3 pm, on weekdays only;

- Trucks coming and going to the new terminal will use Highway 30 and the Montée de la Pomme-d’Or. The truck access will be managed by two traffic lights and will be configured to ensure that the origin and destination of trucks will be the Montée de la Pomme-d’Or and not the Montée Lapierre;
 - Some modifications to the local road network will be gradually required in order to properly handle traffic increases on the neighboring network, improvements such as traffic lights, widening of the roadway, and turning facilities;
 - According to a traffic study, the traffic conditions following the commissioning will be satisfactory at all road crossings, with the exception of the left turn of the northern approach of the Montée de la Pomme-d’Or / Route des Aciéries / West access to Highway 30 at the morning peak hour, when delays could be observed (in the order of 60 seconds).
- › Port Facilities Water Management:
- With respect to sanitary wastewater management, the MPA prioritizes a connection to the City of Contrecoeur’s sanitary network, which is expected to be extended for connection to the MPA site. In the event that the City would not extend its sanitary network, a sealed underground sanitary tank will be installed in order to stock sanitary waste water;
 - A storm water management system will be implemented and will ensure the quality of runoff waters and erosion control during the operation of the terminal. The main runoff water treatment and quality control components proposed are vegetated ditches, hydrodynamic separators, as well as prolonged retention basins.
- › Residual Materials Management:
- Domestic wastes generated by the terminal staff will be transported to off-site facilities with the regulatory approvals;
 - Ships can occasionally eliminate crew domestic waste using the services of authorized companies which manage residual materials according to current regulations;
 - Mechanical maintenance activities will also generate waste oils which will be placed in sealed containers, recovered and disposed of regularly by a supplier accredited for this purpose.
- › Hazardous Materials Management:
- The entry of dangerous goods into the terminal is regulated and monitored by the MPA. Certain classes of identified products will be handled in the presence of a MPA fire prevention inspector;
 - The MPA and the operators have an inventory of hazardous materials and their location on the port’s territory. Depending on the hazard or chemical incompatibilities, the MPA may demand special storage or isolation of goods;
 - The new terminal is not a petroleum handling facility and aims at handling only containerized cargo. No petroleum products storage tank is planned on site, with the exception of a diesel tank to be used to supply an emergency generator. The site’s fleet of vehicles and equipment will be refueled by trucks at supply points planned for such purposes;
 - The hazardous residual materials used at the terminal, for equipment maintenance purposes, will be managed and disposed of in accordance with the *Hazardous Materials Regulations*.

- › Management of Waste Snow and Abrasives:
 - Snow will be loaded and transported offsite to a waste snow disposal site designed in accordance with current standards and regulations;
 - Ice melters such as de-icing salts used for the maintenance of roads, railways, wharves and storage areas will be stored in a dome near the buildings.
- › Maintenance Dredging:
 - It is estimated that maintenance dredging will be required approximately every 4 years to remove small volumes (ranging from 44 to 160 m³).

2.4 Decommissioning and Closure

No decommissioning and closure of the terminal has been assessed since the container terminal should be operated beyond the foreseeable horizon. For example, the current site of the Port of Montreal has been in operation since 1830 and its closure is not being considered, not even in the long term. In the event of closure, a decommissioning plan will be submitted to the Authorities for approval in compliance with applicable regulations at that time.

2.5 Workforce

An estimated 5,000 person-years will be required for the construction of the facilities. Direct jobs at the construction site are estimated at about 270 workers during peak periods (dredging, major excavation), while the minimum is estimated at approximately 180 workers during the final months of the construction phase.

According to the estimates, 1,000 jobs will be created annually during the terminal's operation phase.

3 Alternative Ways of Implementing the Project

The design of a maritime terminal offers several alternatives influencing various aspects of the project such as construction or operation costs, environmental impacts, schedules, facility safety, etc. Alternative sites were also considered for the expansion of the Port of Montreal, before Contrecœur was selected. This section presents the alternatives considered for the main components of the project.

3.1 Alternative Sites

Various studies were carried out in the 1970s and 1980s to identify sites that could be used for the expansion of the Port of Montreal's activities.

For a site to host the construction of a container terminal and adequately meet the MPA's expansion requirements, its size must equal at least 100 ha. It must have a 1,000 m river façade as well as a width of 800 m. The various sites corresponding to these parameters considered for the Contrecœur Maritime Terminal Expansion Project have been comparatively analyzed (Table 3.1).

Hence, the advantages of choosing the Contrecœur site for the construction of a container terminal include the following:

- › Location of the site in the immediate vicinity of the St. Lawrence shipping channel;
- › The geometry of the site and its size (468 ha) are suitable for the operation of a container terminal and meet the criteria for the MPA's port expansion;
- › Proximity to major roads (Highway 30 and Route 132) and to a national rail network. Connectivity with different modes of land transportation, as well as the efficiency of these links, is a determining factor for the competitiveness of the logistics chain for which the terminal is the interface point;
- › Absence of residences, businesses, industries or roads to be relocated for the construction of a terminal;
- › The proximity to the Port of Montreal's facilities providing access to existing services related to the processing of containerized goods (customs, transfer warehouses, empty container yards), to specialized service suppliers, and to trained workforce.

3.2 Terminal Expansion Implementation Areas

Two areas were considered on the Contrecœur land reserve: the "East" and the "West" sectors. The "East" sector refers to the eastern portion, i.e. directly upstream of existing port facilities, while the "West" sector is located at the western end of the MPA land reserve. Table 3.2 compares the impacts of a terminal expansion in the East sector, as initially considered, and its construction in the West Sector, as proposed.

Table 3.1 Alternative Sites Considered for the Expansion Project

Site	Approach Area		Wharf Construction		Infrastructure to be Moved		Other Constraints
	Area to be dredged (m ²)	Volume to be dredged (m ³)	Area to be backfilled in the aquatic environment (m ²)	Volume to be backfilled (m ³)	Residences, businesses, industries, etc.	Roads/Pathways	
Varenes West	207,107	1,025,799	32,144	192,864	› 18 residences.	› Route 132; › Ch. de la côte Bissonnette.	› Difficult access to the shipping channel; › Major ecological area project.
Varenes East	168,901	713,510	20,421	130,694	› 15 residences; › 2 shops.	› Route 132.	› Shipping channel too close to the shore; › Unsafe navigation in the wharf approach area.
Verchères West	304,778	1,590,847	48,975	244,875	› 18 residences; › 1 holiday site.	› Route 132; › CN railway.	› Agricultural lands; › Bifurcation of the shipping channel causing unsafe navigation in the wharf approach area.
Verchères East	308,746	1,150,950	53,008	275,641	› 25 residences; › 1 shop.	› Route 132.	› Agricultural lands.
Tracy West	315,541	1,388,513	16,131	85,494	› 105 residences; › 3 shops ; › 1 industry; › 2 holiday sites.	› Route 132.	› Presence of an archeological site.
Tracy East	574,926	1,906,625	35,501	166,854	› 2 residences; › 2 shops; › 1 institution.	› Route 132; › CN railway.	› Remoteness from the shipping channel.
Lavaltrie	2,250,766	13,675,233	35,509	177,545	› 88 residences; › 4 shops; › 6 holiday sites.	› Road 138.	› Remoteness from the shipping channel.
Lanoraie	1,062,050	3,776,463	11,822	59,110	› 23 residences; › 1 shop.	› Road 138.	› Agricultural lands; › Absence of railway services.
Bécancour	1,154,528	820,233	750,000	5,388,636	› None	› None	› Remoteness from the Port of Montreal; › Outside the statutory boundaries of the MPA.
Contrecoeur ¹	162,972	839,000	79,943	282,000	› None	› None	› None

Note:

¹ The values shown correspond to the most up-to-date values, following the progress of the project's preliminary engineering. The lowest values in terms of volume or surface area are highlighted in gray.

Table 3.2 Comparison of Impacts of the Terminal Construction in the East and West Sectors

Component/Project Activity		Habitat Type	Construction in the East Sector	Construction in the West Sector ¹
Dredging	Dredging area (total) - Approach and berthing area	Fish habitat	26.9 ha	16.3 ha
	Dredging area - Encroachment on aquatic grassbeds	Copper Redhorse feeding habitat	1.86 ha	0.41 ha
	Volume of dredged materials in place	--	1,000,000 m ³	839,000 m ³
Wharf construction and infrastructure development	Embankment in aquatic environment - wharf	Fish habitat	16.2 ha	8.0 ha
	Riparian wetlands	Fish habitat	2.4 ha	2.0 ha
Infilling and diversion of watercourses	Ruisseau 2	Fish habitat	Approximately 400 m	--
	Fossé Noir (and its main tributary)	Fish habitat	--	Approximately 1,050 m
Timeline				Shortened timeline
Cost				Saving of around 10 to 15%

Note:

¹ The values shown are updated as a result of the progress of the project's preliminary engineering.

3.3 Project Planning and Construction

Various development and construction options were assessed for the Contrecoeur Maritime Terminal Expansion Project, notably for the wharf, access roads, traffic lanes, and railway tracks.

With regard to the wharf construction itself, three configurations were considered: steel sheet pile, pile and deck, as well as concrete caissons. The sheet pile option is considered to be the most advantageous from a technical point of view, due to the stability of the structure and compatibility with the site's geotechnical conditions.

Four alternative wharf alignments were also considered. The analysis considered ship maneuvers and safety, geotechnical and seismic performance, construction-related risks, and effects on water levels, current velocities, sedimentation and ice. The alignment chosen has a straight wharf face, with no orientation change, which reduces the amount of sediment to be dredged having little impact on river currents.

With respect to the wharf construction, sheet piling driving can be carried out by ramming (percussion) or by vibration. The impact of the weight generated by the ramming method can

distort the top part of the sheet piles. For this reason, the vibratory driving method is generally preferred, which also limits noise disturbances. However, this method creates a greater risk of clay liquefaction.

3.4 Access Roads and Traffic Lanes

Two alternatives have been considered for the construction of road and railway lanes, i.e. Alternative 1 and Alternative 2. The difference between these two alternatives lies mainly in the location of road and railway accesses (Map 2).

Alternative 1 proposes road and rail accesses closer to the terminal and to the intermodal yard, in the same axis of existing road and rail accesses, which limits the length of roads to be built. However, this proximity means that rail marshalling manoeuvres would significantly impede traffic on Route 132 (for more than one hour). For this reason, this Alternative requires the construction of a railway bridge over Route 132, which in turn will have to be lowered.

Alternative 2 provides access located further from the terminal and from the intermodal yard, near the eastern boundary of the MPA territory. This distance makes train marshalling manoeuvres possible without impeding traffic on Route 132.

The construction of the railway bridge and the lowering of the Route 132 suggested for Alternative 1 are particularly complex because they would be implemented within a developed sector. In addition to costing more than \$ 25 million, this option would encroach on several neighboring properties and would require the relocation of several infrastructures, as well as the excavation of a large quantity of materials (100,000 m³). Moreover, the connection of rail tracks with the CN rail infrastructure could potentially lead to an encroachment into the critical habitat of the Western Chorus Frog.

Alternative 2 accesses are located in a less developed sector and require the relocation of a limited number of infrastructures. This is the retained option. Although it requires a slightly greater encroachment on the natural environment, this alternative is less complex and less costly, while avoiding potential encroachment into the Western Chorus Frog's critical habitat.

Table 3.3 presents a comparison of access roads and traffic lanes for the two alternatives.

Table 3.3 Comparative Table of the Two Alternatives for Roads and Traffic Lanes Accesses

Selection Criteria	Alternative 1	Alternative 2
Total encroachment	› Smaller footprint.	› Larger footprint (about 9%).
Encroachment on natural environments	› No encroachment on wetlands; › Smaller encroachment on aquatic environments; › Risk of encroachment on critical habitat of the Western Chorus Frog.	› Encroachment on a small portion of wetlands (0.65 ha); › Greater encroachment on aquatic environments (125 m, Stream 1); › No risk of encroachment on critical habitat of the Western Chorus Frog.

Table 3.3 Comparative Table of the Two Alternatives for Roads and Traffic Lanes Accesses (cont.)

Selection Criteria	Alternative 1	Alternative 2
Soil management	<ul style="list-style-type: none"> › Significant soil management (approximately 100,000 m³) for the lowering of Route 132 (railway bridge). 	<ul style="list-style-type: none"> › N.A.
Infrastructure and neighboring properties	<ul style="list-style-type: none"> › Greater complexity due to the number of lots affected by the developments (12); › More public services to move; › Temporary diversion road required for several months for the construction of the railway bridge (traffic disruption). 	<ul style="list-style-type: none"> › Fewer lots affected by developments (2); › Fewer public services to move; › Little traffic disruption.
Construction of a railway bridge	<ul style="list-style-type: none"> › Additional costs of \$ 25.8 million. 	<ul style="list-style-type: none"> › N.A.
Other discriminating elements	<ul style="list-style-type: none"> › Establishment of a pumping system for the evacuation of rainwater at the lowering of Route 132; › Pumping of groundwater at this location; › Operation and maintenance costs of the pumping station and a potential treatment system. 	<ul style="list-style-type: none"> › No pumping system needed.

Note: Includes the construction of the railway bridge. Does not include the cost of acquisitions or agreements with neighboring owners.

3.5 Dredging and Sediment Management

Sediment dredging methods can be classified into two categories: mechanical dredging and hydraulic dredging. Considering the type of material to be dredged (silty clay), the will to limit the amount of water to manage and the required surface area to store excavated materials, as well as the need to limit excavated material disturbance to allow its valorization, hydraulic dredging is not the preferred option for this project.

Four options were considered for the transshipment of dredged materials: a station at the existing Berth 2 of the existing terminal, temporary dyke roads (wharf), transshipment at a wharf outside the Contrecœur property and transshipment on the new wharf. The last option was chosen as it reduces encroachment on the aquatic environment and makes it possible to avoid disrupting activities at the existing wharf. Various sediment disposal options have been assessed based on sediment environmental quality, physical properties and volumes to be disposed of, as well as technical and environmental constraints, construction timeline and coordination with the various phases of the project: discharge into open water, valorization on shorelines or riverbanks, containment in riparian environment (backfilling behind the face of the new wharf), disposal in the Port of Montreal Vickers basin, land disposal of sediments on the MPA territory in Contrecœur and off-site land disposal of sediments. The last two options have been selected for the project.

Furthermore, five dewatering methods were considered depending on the preferred (mechanical) dredging mode. Passive drying in storage basins is the preferred option because it allows dredged materials to be stored at a greater thickness and therefore reduces land encroachment of storage areas.

In conclusion, the preferred option includes mechanical dredging of sediments using barge-mounted mechanical clamshell dredgers. The dredged material will then be transported to the shore by barges and then unloaded into watertight dump trucks from a transshipment wharf located on the future wharf. The sediments will then be hauled to an off-site disposal site with the applicable regulatory approvals, and/or to a storage site on the MPA territory in Contrecoeur.

Various areas were considered for the storage of dredged sediments. The impact assessment will consider the use of Storage Area 2 or 4 (areas 4A and 4B) to assess project impacts conservatively (Map 2).

4 Public Participation

The consultation approach used for the purposes of the study is divided into two main phases: preliminary consultations conducted through targeted meetings with key stakeholders, followed by public information and consultation activities. The information gathered through these consultations aims to identify the views and concerns of stakeholders interested in the project as well as factors that could facilitate or impede the integration of the project into its environment.

Table 4.1 summarizes the information and consultation activities carried out within the framework of the project. Table 4.2 summarizes the issues and concerns raised during the consultation process. These were considered in the assessment of the potential impacts of the project and the identification of mitigation measures.

Table 4.1 Information and Consultation Activities Conducted within the Framework of the Project

Activity	Conducted by	Date/Period
Pre-consultations, including open house event	MPA (with the support of H+K Strategies)	April to December 2014
Pre-consultations within the framework of the impact study	SNC-Lavalin	October 2016
Thematic workshops	MPA (with the support of H+K Strategies and SNC-Lavalin)	March 21, 2017
Open house days	MPA (with the support of H+K Strategies and SNC-Lavalin)	May 24 and 25, 2017

Table 4.2 Issues and Concerns Raised during Consultation Activities Related to the Preparation of the Impact Study

Theme	Description
Environmental Issues	
Environmental management	Effective management of the project's environmental impacts (atmospheric emissions, noise, dredging sediments, loss of habitats, etc.) and implementation of appropriate mitigation measures by the MPA.
	Payment of costs related to project's impacts by the MPA and implementation of mitigation measures.
	Compliance with the MPA's commitments towards the host community.
Endangered species	Long-term protection and preservation of endangered species present on the MPA territory, including the Copper Redhorse and the Western Chorus Frog.
	Consideration of habitat connectivity for the Copper Redhorse and other species.
Cumulative impacts	Consideration of the cumulative effects of the major projects planned in the vicinity of the Contrecoeur's port activities in order to better grasp the pressure caused on the environment, in particular on the agricultural area and on environmental components.

Table 4.2 Issues and Concerns Raised during Consultation Activities Related to the Preparation of the Impact Study (cont.)

Theme	Description
	Taking into account other project development phases and other potential sites considered in the impact assessment.
	Increased ship traffic on the St. Lawrence River in relation with the development of other port projects.
Sediments and dredging	Accumulation of sediments in the river near the urban core of Contrecoeur (near the marinas) leading to lower water levels for recreational boating and other recreational and tourism activities and impacts of sediment on the surrounding water intakes.
	Contamination level of dredged sediments and their management.
	Impacts of dredging activities on the bottom of the St. Lawrence River.
	Impact of the wharf's presence on sediment build-up further downstream.
	Need for additional dredging of the shipping channel in the future, in the context of climate change and intensified port operations.
	Concerns that the project, coupled with other river development projects on the St. Lawrence River, will encourage the dredging of the St. Lawrence shipping channel (capital dredging) for economic purposes.
Aquatic and terrestrial environments	Sustainability of wetlands located on and near the MPA territory.
	Project's impact on the heronry and other bird species in the area (noise and vibration).
	Impact of ships and subsequent phases of terminal development on seagrass.
	Relocation of the Fossé Noir
	Impact of increased truck traffic on wildlife (road mortality).
	Compensation projects (fish, wetlands) not defined in the EIA, making it difficult for stakeholders to comment on the acceptability of the project.
	Presence of large wild animals on the terminal's site and their management by the MPA.
Erosion	Monitoring and control of shoreline erosion generated by the wake of passing ships.
	Cumulative impacts of increased wave action from passing ships in the downstream sections of the River.
Invasive plants	Spread of invasive plants during the revegetation and backfilling of work areas on the project site.
Air quality	Air quality deterioration near new MPA facilities due to increased traffic and the presence of heavy machinery.
Water quality	Anticipated environmental impacts of road construction and maintenance (de-icing salt, ditches, permeability, etc.).
Socio-economic Issues	
Transport	Fluidity of traffic on the main roads affected by the project towards Montreal (especially Highways 10, 20 and 30).
	Road safety at the Route 132 / Montée de la Pomme-d'Or intersection.
	Compliance with the prohibition of truck traffic within residential areas in the long-term.
	Compliance with speed limits on Route 132 and possibility to reduce speed limits.
	Accessibility to and safety of Route 132 for current users (cars, trucks, bicycles,

Table 4.2 Issues and Concerns Raised during Consultation Activities Related to the Preparation of the Impact Study (cont.)

Theme	Description
	agricultural machinery) near the project site.
	Safe transport of goods by rail.
	Maintenance and quality of the existing long-term rail network.
	Safety at level crossings and possible constructions such as barriers for this purpose.
	Train frequency and associated impact management (vibration, noise).
	Duration of road traffic obstruction on Route 132 as a 3,050 m (10,000 ft) train passes.
	Risk of blocking emergency services at level crossings in neighboring municipalities due to long railway convoys.
	Impacts of rail traffic beyond the MPA territory, due to a greater number of trains crossing the surrounding cities, and to the length of trains for the cities of Varennes, Boucherville and Verchères.
	Modification (or not) of the Yara and Grantech rail services.
	Long-term cumulative impacts, with Phases 2 and 3 and other projects, on road and rail traffic and taking them into account in regional land planning.
	Risks of congestion in Lac Saint-Pierre related to an increased number of ships waiting on the river.
Concern over response speed, coordination and sharing of responsibilities for operations related to civil protection and spillages considering the territorial boundaries of the various stakeholders.	
Quality of life	Protection of the quality of life of residents living near the MPA territory due to the potential impacts of the project (odors, noise, dust, night lighting, presence of imposing infrastructure, trucking and rail transportation).
	Safety of residents living near the MPA territory due to risks associated with crime and port operations.
	Loss of property value for those located in the vicinity of the project site.
	Management of the project's visual impact due to the presence of imposing infrastructures (especially night light pollution).
	Availability of properties and capacity to host new inhabitants attracted by the MPA project and by other major projects in the area.
Potential nuisance for residents on the North shore of the St. Lawrence (noise, dust, light pollution).	
Agriculture	Protection and availability of agricultural lands currently leased to farmers within and in the vicinity of the MPA territory.
	Potential disruption of the harvest season in the agricultural area by traffic generated during the construction phase, especially during dredging operations.
	Impact caused by the passing of trains for the use of Montée Lapierre by agricultural producers, especially during periods of high agricultural activity.
Economy	Prioritization of local workforce and businesses in employment and business opportunities related to the MPA activities.
	Attraction and retention of skilled workers for the terminal operations.
	Diversification of economic activities within the territory of the City of Contrecoeur.

Table 4.2 Issues and Concerns Raised during Consultation Activities Related to the Preparation of the Impact Study (cont.)

Theme	Description
	Potential shortage of labor to meet trucking needs.
	Anticipated impacts on the operations and facilities of other companies during the construction phase.
	Limited economic benefits for the City of Contrecoeur, the municipality of Verchères and the surrounding areas.
Information and communication	Justification of the location of the new MPA facilities in Contrecoeur.
	Rectification of false information circulating concerning the project, in particular with regard to rail, maritime and road transportation, as well as on the types of goods handled.
	Consideration of the opinions and recommendations of stakeholders consulted during the planning of the project.
Regulations	Respect for the competence of various organizations and agencies with regard to the project's components and the territory where the project will be developed.
	Compliance with applicable standards (provincial or federal).
Recreational and tourism activities	Protection and safe layout of the scenic road (Route 132) and the <i>Route Verte</i> .
MPA infrastructure	Decrease in activity at the MPA's container terminals on the Island of Montreal due to new infrastructure in Contrecoeur.
	Use and risks of long-term abandonment of port infrastructures in Contrecoeur (comparison with the situation of the Mirabel airport infrastructures).

5 Participation of the Aboriginal Peoples

Consultations were initiated by the MPA with the following Aboriginal communities identified by the CEAA:

- › The Abenakis of Odanak;
- › The Abenakis of Wôlinak;
- › The Huron-Wendats of Wendake;
- › The Mohawks of Akwesasne;
- › The Mohawks of Kahnawake;
- › The Mohawks of Kanésatake.

All Aboriginal peoples, with the exception of the Huron-Wendat Nation (HWN), were first contacted in writing by the MPA in October and November 2016. The purpose of these letters was to confirm the holding of an environmental impact assessment, initiate contact and meet with each group in order to establish communication, present the project and discuss their concerns. After a number of telephone calls and emails, the MPA met twice with the Mohawk Council of Kahnawake (MCK) and with the Abenakis of Odanak and Wôlinak, under the aegis of the Grand Council of the Waban-Aki Nation. Following the inclusion of the HWN in the environmental assessment process by the CEAA in February 2017, the community was contacted in March 2017 and a meeting was held in April of the same year.

Although the Aboriginal communities live some distance from the project site (Odanak, the nearest community, is located 60 km from the project area), they expressed concerns about its potential direct environmental and cumulative effects. In fact, the numerous port projects planned on the St. Lawrence River or its tributaries (Trois-Rivières, Québec and Saguenay projects, among others), not to mention Québec's Maritime Strategy, which plans to build Industrial Port Zones (IP Zones) at several locations along the St. Lawrence River, are a major concern for Aboriginal peoples who deplore the absence of a regional strategic study on this subject.

All the Aboriginal peoples met expressed their interest in being involved in the archaeological works required prior to the construction of the project. Land and maritime archaeological potential studies have already been carried out for the purpose of the impact study. However, targeted excavations will need to take place before the works begin. Monitoring during the construction period should also be planned. Archaeological and historical heritage is of interest to the Aboriginal peoples.

In addition, all these communities have expectations with respect to the economic benefits of the project, for instance, through the hiring of Aboriginal firms or of community members. The Abenakis also indicated that they would like to receive advanced notification of the project's workforce requirements in order to have sufficient time to train their members, as appropriate.

Finally, the comments received from the Aboriginal groups were articulated around five main themes:

- › Cumulative effects of port developments;
- › Land use and occupation;
- › Potential direct environmental effects of the project;

- › Protection of archaeological and historical potential; and
- › Economic benefits and their involvement in the project.

Given these concerns, the potential effects of the project were analyzed in relation to the following environmental components:

- › Aboriginal rights and land claims;
- › Aboriginal fisheries - species of interest;
- › Land and resource use for traditional purposes;
- › Health and quality of life;
- › Archaeological and historical heritage;
- › Economic spinoffs and aboriginal employment.

These Aboriginal peoples' concerns have led to the development of specific mitigation measures adapted to the issues raised. Thus, in addition to mitigation measures for the protection of terrestrial and aquatic environments, as well as the protection of the archaeological and historical heritage, specific measures were planned. These measures are summarized in Tables 6.4 and 6.5 and are reiterated in the Environmental and Social Management Plan No.06 for Aboriginal peoples to ensure their monitoring and effectiveness (Chapter 9, Section 9.4.1.5 of the EIA report). These measures concern the development and ensure maintaining dialogue between Aboriginal peoples and the MPA, their involvement in environmental monitoring, in archaeological work, and the possibility of benefiting from the project's economic spinoffs.

Taking into account the importance of cumulative impacts for Aboriginal peoples, a component « protection of the St. Lawrence River and of its ecosystem » has been included in the cumulative impact analysis to address this concern. For this purpose, the MPA has committed to collaborating to regional strategic studies that governments could undertake regarding the cumulative effects of maritime infrastructure projects in the province of Quebec.

5.1 Mohawk Nation

The MCK pointed out that there are numerous port projects on the St. Lawrence River (Saguenay, Quebec, Trois-Rivières and Contrecoeur), in addition to projects stemming from Quebec's Maritime Strategy for which it was not consulted. The MCK is therefore concerned about the cumulative effects of these projects.

The MCK also pointed out that governments should have conducted a strategic study that takes into account the overall effect of port projects and of Quebec Maritime Strategy projects on the St. Lawrence River.

Several environmental issues were raised by the MCK, including the following:

- › Permanent loss of fish habitat and impacts on migratory species, including the Sturgeon, a species of importance to the Mohawks;
- › Effects on banks (grassbeds) and wetlands, especially on the Fossé Noir. The MCK asked whether compensation projects would be put in place;
- › Sediment dispersal during dredging and management of dredged materials;
- › Concern that the project will increase shipping on the St. Lawrence River;

- › Increased noise and luminosity levels that could affect species in the project area.

5.2 Waban-Aki Nation

The Abenakis are concerned about whether the St. Lawrence River has the capacity to support an increase in ship traffic and about the impacts on the species living in the area, especially when considering all the port projects currently being built or under study (Saguenay, Québec, Trois-Rivières and Contrecoeur).

The Abenakis emphasized the relations between the environmental effects of the project and land-use activities. They believe the potential impacts of the project on the ichthyofauna and avifauna, in addition to other impacts, could directly influence hunting and fishing activities the Nation performs for food, ritual or social purposes which would have negative consequences on the exercise of their rights.

Several of the project's potential environmental effects are of concern to the Abenakis. These include the following:

- › The effects of potentially amplified wave action on the Îles de Sorel and on Île Bouchard (located on the opposite side of the project site);
- › Effects on the habitat of the Copper Redhorse and on fish in general, including migratory species. Members of the Nation fish in the river. The Nation wishes to ensure that compensation projects will be put in place;
- › Impacts of increased maritime traffic on the river and its species. In addition, there is a concern that maritime traffic may result in the project area being avoided by members of the Nation;
- › Planned dredging activities, the dredging method used and backfilling in an aquatic environment and in wetlands are a major change to fish habitat;
- › Effects on wetlands.

The lack of data on land use, including fishing and navigation activities on the project site, was also an important concern for the Abenakis. It was suggested to obtain a mandate from the MPA to collect data related to land use, including fishing, by their members in the project study area. The MPA has signed a contract along with financial resources with the GCNWA to document land use by the Nation members in the project's local study area. The draft report produced by the GCNWA was submitted to the MPA in early December 2017.

5.3 Huron-Wendat Nation

The HWN is concerned about the project's cumulative impacts, namely, whether there is a limit to the capacity of the river and its ecosystem to accommodate more ships, and about whether this is documented. Considering the numerous port projects currently being planned or built, the HWN is concerned about their negative cumulative effects on the river, especially considering that its members use the river for Northern Pike, Walleye and Bass fishing, waterfowl hunting and navigation between Montreal and Québec and even downstream. However, the HWN does not have all the available data on the contemporary use of the river by Huron-Wendats in the project area as such. Navigation is believed to be one of their activities.

The HWN inquired about several potential environmental effects of concern:

- › The effects of dredging and the preferred approach for sediment management;
- › Grassbeds and the habitat of the Copper Redhorse and fish in general;
- › The presence of endangered species, including the Western Chorus Frog and turtles;
- › Increased ship traffic caused by the project;
- › The Nation notes that the American Eel is in the process of being registered at the federal level on the list of species at risk, and that its presence at the project site should be monitored;
- › Planned compensation projects. In this regard, the HWN emphasized that it would like to be informed of compensation projects when defined.

The lack of data on land use, including fishing and navigation activities on the project site was also a concern for the HWN. One of the suggestion of mitigation measure was to obtain a mandate from the MPA to collect information related to land use, including fishing, by their members in the project study area. A proposal made by the MPA to document land use by Nation members in the project local study area is under consideration by the HWM.

6 Environmental Effects

6.1 Description of the Environment

6.1.1 Study Areas

The three main study areas were determined by the environmental components (biophysical and human environment) likely to be affected by the project and are shown on Map 1. They are the project area, the MPA territory, and the local study area.

The project area is the area where the project infrastructure will be located. It is used to assess the areas directly affected by the project and has been the subject of detailed field surveys.

The MPA territory regroups all the land belonging to the MPA in Contrecoeur, as well as its littoral area. This area is used to describe the environmental components that will be directly affected, specifically modified, disrupted or destroyed by the project's construction. Field surveys to characterize the physical environment as well as biological inventories were conducted within the MPA territory in order to provide a detailed description.

The local study area includes all the environmental components likely to be affected by the construction and operation of the future container terminal in Contrecoeur. The local study area corresponds to an area of about 7 km by 5 km (35 km²) surrounding the project area, where activities are likely to cause direct and indirect impacts.

A River Study Area has also been defined in order to take into account the aspect of navigation on the St. Lawrence River and to describe the River's hydrodynamic regime. This study area includes the shipping channel between Contrecoeur and Sorel.

Some broader study areas are identified where necessary in order to take regional activities into consideration, as well as components that can be influenced by the project at this scale.

6.1.2 Physical Environment

6.1.2.1 Climate and Air Quality

The Contrecoeur region is characterized by a moderate sub-humid climate with long periods of vegetation growth. The local climate is largely influenced by the presence of the St. Lawrence River, which acts as a thermal buffer and as a source of moisture. The St. Lawrence Valley gives the prevailing winds a north-east/south-west orientation. Precipitations are predominantly in the form of rain and reach an annual average of almost one metre. The region does not go through any dry season. Visibility can be reduced to less than 1 km from December to March due to fog.

Among the main activities likely to influence the current air quality in the Contrecoeur region are industrial activities, followed, to a lesser extent, by road traffic and agricultural activities. These activities can contribute to local increases in the concentrations of total particulate matter and fine particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, metals and volatile organic compounds (VOCs).

6.1.2.1.1 Ambient Air Quality Standards

The air quality sampling results were compared with the ambient air quality standards specified in the Quebec *Clean Air Regulation* (CAR) and the Canadian standards for particulate matter and ozone published in May 2013, with the exception of PM₁₀ for which the pan-Canadian standard proposed in January 2000, but never confirmed, is used since there is no Quebec or federal standard for this parameter.

6.1.2.1.2 Gaseous Contaminants (NO₂, SO₂, CO and O₃)

There were no exceedances of SO₂ standards at the Parc Océanie station from 2013 to 2015, and of NO₂ standards at the Varennes station for the same time period. The concentrations of these contaminants remain significantly below the standards. The same conclusions are applicable for CO concentrations measured at the Saint-Anicet station from 2013 to 2015. For ozone measured from 2013 to 2015 at the Varennes station, the CAR's hourly standard was not exceeded and the CAR's eight-hour standard was exceeded on a single occasion in 2015. Measurements over the same period also meet the 2015 Canadian standard for ozone (63 ppb or 124 µg/m³) and the standard proposed for 2020 (62 ppb or 122 µg/m³).

6.1.2.1.3 Particulate Contaminants (PM_T, PM₁₀ and PM_{2.5})

There were no exceedances of the PM_T and PM₁₀ standards from 2013 to 2015. However, a few exceedances (1 to 2 days per year) of the CAR's daily standard were observed for PM_{2.5} in 2013 and 2015. The 98th percentile of the average daily PM_{2.5} concentrations for the period between 2013 and 2015 is 23.7 µg/m³, thus below the Canadian standards specified for 2015 (28 µg/m³) and 2020 (27 µg/m³). The three-year average (8.7 µg/m³) also meets the 2015 Canadian standard (10 µg/m³) as well as the 2020 Canadian standard (8.8 µg/m³). As is the case with ozone, the exceedances of the PM_{2.5} standards are not representative of a particular situation in the Contrecoeur region, but rather reflect a generalized situation in southwestern Quebec and the north-east of North America.

6.1.2.1.4 Dust and Odors

The environmental complaint registry of the *Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques* (MDDELCC) regional directorate indicates that a few complaints were made each year (2012-2016) by citizens regarding dust emissions from certain industrial facilities in Contrecoeur and, to a lesser extent, regarding odors from facilities located in Contrecoeur or Verchères.

6.1.2.1.5 Air Contaminants and Greenhouse Gas Emissions

The local study area includes a multitude of sources of air contaminants and greenhouse gas (GHG) emissions. Activities in the Contrecoeur heavy industrial area, land and maritime transportation, agricultural and commercial activities, small enterprises and residential heating using wood or fossil fuels combustion are all atmospheric contaminants and GHG sources.

The quantification of atmospheric emissions from all these sources goes beyond the requirements of the project's environmental study for the Contrecoeur container terminal project.

However, by comparing air emissions from major industrial sources to the results of the air emissions inventories conducted in 2017 for the existing MPA facilities in Contrecoeur, it appears that the project's contribution are marginal.

6.1.2.2 Geology and Geomorphology

Contrecoeur is located in the geological province of the St. Lawrence Lowlands consisting of a large homogeneous platform formed mainly of sedimentary rocks. The region is dominated by sandy but mainly clayey marine deposits, often covered by littoral, fluvial or eolian sands. Many islands and morainic ridges, left behind by retreated glaciers, appear here and there. The numerous islands are one of the main features of the Varennes-Contrecoeur section of St. Lawrence River.

Within the local study area, north of Route 132, where most of the project's infrastructure is located, the southern shore of the St. Lawrence River consists of alluvium, followed by river terrace alluvium. In the area south of Route 132, the surface deposits consist of deep water marine fine sediments from the Montée Lapierre to the entrance of the current port facilities. Going further east, they consist of old river terrace alluvium.

Regarding the seismic conditions, the analyses performed reveal a low potential for sudden and catastrophic failure in the site materials.

6.1.2.3 Topography

The MPA territory consists of a relatively flat topography. Elevation is generally of 9.4 to 10.4 m above geodetic datum (GD) in Contrecoeur, meaning in relation to the geodetic survey. It should be noted that the chart datum (CD) is at 4.42 m above geodetic datum in Contrecoeur.

The area's relatively flat topography is also intersected by ditches, generally linear streams, which drain the industrial zone as well as agricultural lands.

6.1.2.4 Pedology

Soils found between the shore and Route 132 are predominantly of class 2 to 3, meaning they have moderate to fairly severe limiting factors, reducing the range of crops that can be grown. Water overabundance is the predominant constraint. Near Route 132 and south of this road, soils switch to class 4 to 7, meaning the presence of constraints for cropping ranging from very severe to no possibility for cropping or grazing due to a lack of moisture, low fertility and erosion.

6.1.2.5 Nature of Soils

Various types of soil are present on the surface of the Contrecoeur site, including fill materials, organic soils and natural soils. Several soil characterization studies have been carried out on the MPA territory. The results show that the soils are composed of six different stratigraphic horizons (organic soils, fill materials, sand deposits, clay deposits, till deposits, and rock).

6.1.2.6 Soil Quality

Soil chemical analyses results obtained were compared with two provincial criteria: the MDDELCC's 2016 *Guide d'intervention – Politique de protection des sols et de réhabilitation des terrains contaminés*, hereafter named *Guide d'intervention*¹, and the limit values in Schedule 1 of the *Regulation Respecting the Burial of Contaminated Soils* (RBCS). Results were also compared with two federal criteria: the Canadian Council of Ministers of the

¹ Schedule 2 – Grille des critères génériques pour les sols

Environment (CCME)'s Federal Recommendations for Soil Quality: Environmental and Human Health (2001) for Industrial Use, and the Canada-wide Standards for Petroleum Hydrocarbons in Soil (2008) for fine grain soils.

6.1.2.6.1 MDDELCC's Guide d'intervention Criteria

Only two boreholes, amongst the 39 located on the MPA territory, have metal concentrations above the C criteria of the MDDELCC's *Guide d'intervention*. There are also two boreholes, amongst the five in the area where the railway access for Alternative 2 is located, that have metal concentrations above the C criteria of the MDDELCC's *Guide d'intervention*.

Three boreholes on the MPA territory and two boreholes in the area where the railway access for Alternative 2 is located have metal concentrations in the B-C range of the MDDELCC's *Guide d'intervention*. These exceedances are located in four of the same boreholes that exceed the criteria C, but for different metals. Metal concentrations in the A-B range of the MDDELCC's *Guide d'intervention* were measured at several locations.

6.1.2.6.2 CCME Criteria

Concentrations of metal (arsenic, chromium, copper, molybdenum, nickel and/or zinc) exceeding the CCME guidelines for industrial use were measured in several locations. The number of samples with concentrations above acceptable limits is higher regarding CCME criteria, particularly for chromium. This is because the CCME value for chromium (87 mg/kg) is below the MDDELCC's *Guide d'intervention* criteria A, which is equivalent to the background levels in the geological provinces of the St. Lawrence lowlands, thus leading to exceedances even within natural soils. For organic parameters, all petroleum hydrocarbons (F1-F4) and polycyclic aromatic hydrocarbon (PAH) concentrations are below the CCME criteria or the detection limit.

6.1.2.7 Residual Materials

Only two samples showed the presence of residual materials near surface, between Yara Canada's storage buildings and Ruisseau 2. No exceedance of the *Regulation Respecting Hazardous Materials* (RHM) was measured.

6.1.2.8 Nature and Quality of Sediments

6.1.2.8.1 Sediment Stratigraphy in the River Zone

In the proposed dredging area, the sedimentary deposit stratigraphy is composed of three main horizons containing, from surface to rock:

- › Contemporary alluvial sediments with an average thickness of 0.55 m. This layer is more significant on the downstream side of the future dredging area in the confluence area with the Fossé Noir;
- › A glaciomarine clay deposit approximately 15 m thick, extending beyond the depth to be reached during dredging;
- › A deposit of glacial origin (till) with a thickness of approximately 16 m.

Overall, the proportion of glaciomarine clay to be dredged is approximately 90%, whereas alluvial sediments represent 10% of the sediments to be dredged.

6.1.2.8.2 Sediments Quality in the River Zone

In the proposed dredging area, metal levels in alluvial sediments of the surface layer are generally lower than the Occasional Effects Concentrations (OEC) of the Sediment Quality Assessment Criteria in Quebec (SQACQ). All samples from the glaciomarine clay horizon comply with the SQACQ's OEC, except for chromium, which is consistently higher than the OEC, but below natural concentrations for postglacial clays. Systematic exceedances of A criteria (range A-B) of the MDDELCC's *Guide d'intervention* for chromium and nickel, as well as occasional exceedances for selenium and copper in the sediments analyzed, are also observed. These exceedances in metal concentrations are related to the natural content associated with postglacial clays of the St. Lawrence River, which have higher background levels for some metals than criterion A of the MDDELCC's *Guide d'intervention*. The same applies to arsenic, barium, copper, chromium, nickel and zinc.

6.1.2.8.3 Quality of Sediments in Streams

Ruisseau 1 sediments, which consist of clay and organic matter, have a higher concentration than the OEC for chromium and copper. Chromium, copper and nickel concentrations are also in range A-B of the MDDELCC's *Guide d'intervention*.

Ruisseau 2 and Fossé Noir sediments are composed of clay, sand and organic matter and have concentrations exceeding the OEC for chromium. However, these concentrations are below criterion A of the MDDELCC's *Guide d'intervention*.

Again, these exceedances in metals are related to the natural metal contents that are present in the St. Lawrence River postglacial clays.

6.1.2.9 Hydrogeology and Groundwater Quality

Two hydrostratigraphic units are present on the study site:

- › The saturated part of the clay and silt unit with a piezometric elevation ranging between 5.88 and 16.97 m;
- › The till unit where the water level varies between 5.46 and 10.59 m.

Regarding groundwater quality, chemical analyses results were compared with the groundwater criteria for Surface Water Resurgence (SWR) of the MDDELCC's *Guide d'intervention*, and with Level 1 (minimum recommendation) of the *Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites* (FIGWQGS) of ECCC.

In some samples, barium, mercury, ammonia nitrogen, chlorides and sulphides concentrations exceed the SWR criteria and the Level 1 of the FIGWQGS. Groundwater is considered to be contaminated and a risk of effect on the St. Lawrence River can be assumed. Concentrations of aluminum, barium, iron, zinc, chlorides, fluorides, sulphides, PAH (naphthalene), silver, arsenic, copper, mercury, lead, selenium and sulphates exceed the CCME criteria in several wells.

Additionally, aluminum, iron, zinc, fluorides, PAH (naphthalene), silver, arsenic, copper, mercury, lead, selenium and sulphates concentrations are also higher than the Level 1 criteria of the FIGWQGS but lower than the SWR criteria in several wells.

The main parameters exceeding criteria in groundwater either come from natural sources or from agricultural activities.

6.1.2.10 Hydrography and Surface Water Quality

Three streams flow across the MPA territory from south to north towards the St. Lawrence River. There are also eight main ditches, which also serve as outlets, draining the entire MPA territory towards the St. Lawrence River. In addition, a ditch at the eastern boundary of the MPA territory drains the marsh present in this area. Some small ditches at the eastern end of the MPA territory also flow into this marsh.

The Fossé Noir modeling revealed a low flow of 0.00267 m³/s, a median flow of 0.0267 m³/s, and a 50-year recurrence flood of 5.4 m³/s.

Part of the MPA territory is located on the St. Lawrence River's floodplain. The high water mark in the area is 7.35 (RG) and corresponds to a 0-2 year flood elevation. Areas under this elevation are flooded during typical flood events and depressions within these areas remain flooded and form isolated ponds as the water level drops.

In terms of water quality, the analysis results were compared to the MDDELCC *Surface Water Quality Criteria for the protection of aquatic life - acute (AALC) and chronic toxicity (CALC)*, as well as the *Canadian Water Quality Guidelines for the Protection of Aquatic Life, short term and long term* (CCME, 2001). Note that the CCME criteria are generally more severe than the MDDELCC criteria.

Ruisseau 1 has clear water, high conductivity, alkaline pH and a low oxygen content. Exceedances of the CCME criteria are observed for aluminum, arsenic, cadmium, chromium, chromium VI, copper, iron and zinc. Exceedances of the MDDELCC's CALC are also observed for total phosphorus (hypereutrophic), ammonia nitrogen, chlorides, aluminum and copper. Aluminum and copper concentrations are above the AALC of MDDELCC.

Ruisseau 2 is meso-eutrophic. The dissolved oxygen concentration is sufficient, being above the CCME criteria, the pH is alkaline and its conductivity level is representative of the area's conductivity level. Water is clear and its temperature is high, mainly due to the discharge of ArcelorMittal's direct and indirect cooling water (after treatment) in this stream. Exceedances of the CCME criteria are observed for chromium VI, copper and aluminum.

In Fossé Noir, conductivity is the highest among all three streams sampled and the waters are turbid. The total phosphorus (hypereutrophic), chlorides and iron concentrations exceeded the CALC. The aluminum concentrations exceed the AALC. Exceedances of the CCME criteria were noted for pyrene, aluminum, copper and iron.

6.1.2.11 St. Lawrence River

6.1.2.11.1 Hydrodynamic Regime

The St. Lawrence River is supplied by the Great Lakes and the Ottawa River Basins. The highest levels are observed during the spring flood (March and April) and, to a lesser extent, during the fall flood (November and December). The lowest levels are observed during the summer low-water period which culminates in September. The proposed port development will not influence water levels or the river flow rate.

The St. Lawrence River is divided into two channels located on either side of the Verchères islands. The South Channel of the St. Lawrence River is used for commercial navigation and has a width of about 800 m. Along the south shore, the channel is bordered by a shallow platform about 250 to 300 m wide narrowing down to less than 150 m wide in front of the future

wharf. The depth maintained in the shipping channel is 11.3 m (CD) varying along the South Channel reaching 17 m in the channel, in front of the future wharf.

Besides tributaries, the suspended sediments carried by the St. Lawrence River come from bank erosion and erosion of the River's bottom. The main sections affected by erosion are the banks of Grande Île (west of Verchères), Île Bouchard upstream and in front of the project site, as well as the Duval, Cache and Croix islands downstream (Îles de Contrecoeur).

At the future wharf, the current velocities vary according to water flow rates. For a minimum flow condition (6,500 m³/s), maximum velocities of approximately 0.8 m/s to 0.85 m/s are observed. Current velocity near the banks is less than 0.7 m/s. The current's velocity increases significantly over the entire South Channel for a maximum flow rate (20,500 m³/s) with speeds of approximately 1.5 m/s. At a current velocity of approximately 0.7 m/s, observations show that a grain the size of fine gravel is maintained in motion. It can therefore be assumed that, at the location of the future wharf, the river has sufficient transport capacity to carry away sand-sized to very fine gravel unconsolidated sediments under all flow conditions. The South Channel should therefore be considered as a sedimentary transit area.

Commercial navigation on the St. Lawrence River is maintained throughout the year, all the way to Montreal, requiring an intervention strategy combining the ice cover management and the operation of a de-icing service in the river section by the Canadian Coast Guard.

6.1.2.11.2 *St. Lawrence Surface Water Quality*

Overall, from 2012 to 2014, the bacteriological and physicochemical quality index (BWQI) of the St. Lawrence's water indicates a quality ranging from satisfactory to good, at sampling stations located upstream and downstream of the project area, with the exception of station # 96 where the quality of the water is considered very poor due to high concentrations of fecal coliforms. Generally, the bacteriological contamination of the area downstream of Montreal is generated by water treatment plants in the cities of Montreal, Longueuil and Repentigny which do not completely disinfect treated wastewater, and by overflows of combined networks during heavy rainfall periods in the Montreal area.

For the period from 2013 to 2015, exceedances of the MDDELCC surface water quality criteria (chronic effects) were observed for extractable aluminum and exceedance of the CCME criteria (protection of aquatic life in the long term) was observed for extractable iron.

6.1.2.12 **Noise Environment**

Noise readings were executed by the MPA for the purpose of the environmental assessment in order to determine the initial daytime and nighttime noise levels prior to the project's implementation. Five measuring stations (1, 2, 3, 4 and 9) were located at the residences nearest to the project and three other stations (5, 6 and 7) were located within the limits of the MPA territory. The noise limits to be applied for the project during construction and operation will be the MDDELCC limits. Noise limits for stationary sources during the operation phase are presented in Table 6.1 while noise limits during the construction phase are presented in Table 6.2, together with the results of the initial noise readings.

Table 6.1 Summary of Noise Limits Criteria for the Operation of the Project’s Fixed Sources

Station	Zoning	Period ⁽¹⁾	MDDELCC Limit $L_{Ar\ 1\ h}$ (dBA) ⁽²⁾	Initial Noise Measured L_{Aeq1h} (dBA)
No. 1 1220, Marie-Victorin, Verchères	Agricultural (A1)	Day	59 ^(2,4)	59 to 63
		Night	46 ^(2,4)	46 to 60
No. 2 1219, Marie-Victorin, Verchères	Agricultural (A1)	Day	45 ⁽²⁾	41 to 51
		Night	40 ⁽²⁾	40 to 46
No. 3 986, Montée Lapierre, Contrecoeur	Agricultural (A1-2)	Day	56 ^(2,4)	56 to 70
		Night	43 ^(2,4)	43 to 70
No. 4 2389, Marie-Victorin, Contrecoeur	Light industry (I2-6)	Day	56 ^(3,4)	56 to 61
		Night	50 ⁽³⁾	46 to 59
No. 8 368, Chemin des Seigneurs, Saint- Sulpice	Agricultural (AGR-10)	Day	45 ⁽²⁾	-- ⁽⁵⁾
		Night	40 ⁽²⁾	-- ⁽⁵⁾
No. 9 1205, Marie-Victorin, Verchères	Single-family (A-314)	Day	47 ⁽⁴⁾	47 to 51
		Night	41 ⁽⁴⁾	41 to 56
Project area boundaries (No. 5, 6, 7)	Heavy Industry (I3)	Day and Night	70	43 to 60 ⁽⁶⁾

Notes:

1. Day from 7 am to 7 pm and night from 7 pm to 7 am (MDDELCC, 2016).
2. On the land of an existing residence in an agricultural area.
3. On the land of an existing residence in an industrial area.
4. In these cases, the acceptability criterion is equivalent to the initial noise (the lowest hourly level of the period), because the latter is higher than the maximum permitted level according to the zoning.
5. No reading at this station.
6. $L_{Aeq\ 20-25\ min}$.

Table 6.2 Summary of Noise Limits for the Construction of the Project

Station	Zoning	Period ⁽¹⁾	MDDELCC ⁽²⁾ Limit (dBA)	Initial Noise Measured (dBA)
No. 1 1220, Marie-Victorin, Verchères	Agricultural (A1)	Day	$L_{Ar\ 12\ h} = 61$ ⁽³⁾	$L_{Aeq12h} = 61$
		Evening	$L_{Ar\ 1\ h} = 56$ ⁽³⁾	$L_{Aeq1h} = 56$ to 58
		Night	$L_{Ar\ 1\ h} = 46$ ⁽³⁾	$L_{Aeq1h} = 46$ to 60
No. 2 1219, Marie-Victorin, Verchères	Agricultural (A1)	Day	$L_{Ar\ 12\ h} = 55$	$L_{Aeq12h} = 46$
		Evening	$L_{Ar\ 1\ h} = 45$	$L_{Aeq1h} = 41$ to 46
		Night	$L_{Ar\ 1\ h} = 45$	$L_{Aeq1h} = 40$ to 45
No. 3 986, Montée Lapierre, Contrecoeur	Agricultural (A1-2)	Day	$L_{Ar\ 12\ h} = 63$ ⁽³⁾	$L_{Aeq12h} = 63$
		Evening	$L_{Ar\ 1\ h} = 49$	$L_{Aeq1h} = 49$ to 70
		Night	$L_{Ar\ 1\ h} = 45$	$L_{Aeq1h} = 43$ to 66
No. 4 2389, Marie-Victorin, Contrecoeur	Light industry (I2-6)	Day	$L_{Ar\ 12\ h} = 59$ ⁽³⁾	$L_{Aeq12h} = 59$
		Evening	$L_{Ar\ 1\ h} = 53$ ⁽³⁾	$L_{Aeq1h} = 53$ to 56
		Night	$L_{Ar\ 1\ h} = 46$ ⁽³⁾	$L_{Aeq1h} = 46$ to 59
No. 8 Isolated building, Île Bouchard	Agricultural (AGR-10)	Day	$L_{Ar\ 12\ h} = 55$	-- ⁽⁴⁾
		Evening	$L_{Ar\ 1\ h} = 45$	-- ⁽⁴⁾
		Night	$L_{Ar\ 1\ h} = 45$	-- ⁽⁴⁾
No. 9 1205, Marie-Victorin, Verchères	Single-family (A-314)	Day	$L_{Ar\ 12\ h} = 55$	$L_{Aeq12h} = 49$
		Evening	$L_{Ar\ 1\ h} = 45$	$L_{Aeq1h} = 45$ to 50
		Night	$L_{Ar\ 1\ h} = 45$	$L_{Aeq1h} = 41$ to 56

Notes :

1. Day from 7 am to 7 pm, evening from 7 pm to 10 pm, night between 10 pm and 7 am (MDDELCC, 2015).
2. At any reception point serving as a residence or the equivalent (hospital, institution, school). In the evening, when the situation warrants it, the sound level can reach $L_{Aeq3h} = 55$ dBA.
3. In these cases, the acceptability criterion is equivalent to the initial noise (the lowest hourly level of the period), because the latter is higher than the maximum permitted level according to the zoning.
4. No reading at this station.

6.1.3 Biological Environment

6.1.3.1 Terrestrial and Wetland Vegetation

The local study area is located in the bioclimatic area of the sugar maple-hickory stands containing Quebec's most southern flora species. Forests in this area are quite diversified. Vegetation in the local study area is dominated by agricultural fields and fallow lands, but some forest stands are also present. Forest stands along Highway 30 are part of a forest corridor identified by the Montreal Metropolitan Community (MMC), which connects them to the *Bois de Contrecoeur*.

Wetlands also occupy a considerable part of the local study area and are mostly composed of swamps, marshes, wet meadows and shallow waters. In fact, part of the Île Bouchard's Great Marsh is a recognized plant habitat that is home to a large population of Green Dragon, a species considered as threatened at the provincial level and of special concern at the federal level.

The MPA territory is occupied by marshes, wet meadows and swamps. The ecological value of these wetlands varies from low to high. The MPA territory's littoral area is colonized by grassbeds with a cover varying from scattered to high, and an ecological value ranging from medium to high.

The *Centre de données sur le patrimoine naturel du Québec* (CDPNQ) reports the presence of nine (9) special-status species in the local study area: Lovely Shadbush, Green Dragon, Northern Long Sedge, St. Lawrence Water-Horehound, Rough Water-Horehound, Switch Grass, Wild Bean, and Estuarine Wild Rice. None of these occurrences is located within the MPA territory and these species were not found during inventories in the project area.

Three special-status species were observed during inventories carried out within the MPA territory: Canada Wild Ginger, Ostrich Fern and Bloodroot. These three species are designated as vulnerable to harvesting in Quebec and do not have a federal status.

6.1.3.2 Benthic Fauna

The benthic fauna found in the MPA territory's littoral area consists of various organisms such as gastropods, sphaeriidae, dreissenidae, unionidae and a category designated as "others" that includes amphipods, chironomids, worms, odonates, ceratopogonids, trichoptera and fish.

Ten mussel species were listed on the shoreline of the MPA territory. Four of these mussel species have provincial level status or could soon be given federal status: Elephantear, Spike, Fragile Papershell, and Hickorynut. Only the last species is designated as endangered.

6.1.3.3 Fish and Fish Habitat

Between 1995 and 2007, 73 fish species were listed in the Quebec portion of the St. Lawrence's freshwaters, including 53 species listed in the Montreal-Sorel river section.

Fishing surveys conducted on the river's shoreline in 2008, 2009 and 2016 carried out by the MPA resulted in the inventory of 53 species of fish, while 12 species were listed in streams, ditches and wetlands within the project area. However, the majority of the species were caught on the banks of the St. Lawrence River or in river marshes.

The presence of eight special-status species was confirmed in the MPA territory and its littoral area: American Eel, Cutlips Minnow, River Redhorse, Lake Sturgeon, Channel Darter, Bridle Shiner, Brassy Minnow, and, Rosyface Shiner. The Copper Redhorse could also frequent aquatic grassbeds in the area. The Eastern Sand Darter is another endangered species which could be present in the area.

Three fish breeding habitats are listed in the local study area:

- › In the floodplain on the south shore of the St. Lawrence River, opposite Île au Dragon;
- › In Île Bouchard's Great Marsh, more than 750 m from the future terminal;
- › In the section of the St. Lawrence River between îles Robinet (upstream of the local study area) and the northeast of Île Bouchard. This area is recognized as a juvenile feeding area for the Lake Sturgeon.

Outside the St. Lawrence River boundaries, some streams and ditches in the MPA territory also consist in fish habitat. With the exception of areas at their mouths, these streams are not believed to be of high quality for fish.

The use of wetlands as rearing areas has also been confirmed. Cyprinid fries were caught at the mouth of the Fossé Noir, while Catostomid and larger fish fries were seen at the mouth of Ruisseau 2. Also, the presence of large schools of Longnose Gar and carps at the mouth of this stream in June 2009 indicates that these species probably spawn in this area.

6.1.3.4 Herpetofauna

Inventories carried out in 2008, 2009, 2014 and 2016 confirmed the presence of nine species of amphibians and three species of reptiles on or near the MPA territory.

With respect to special-status species, the Western Chorus Frog was confirmed in the part of the MPA territory located south of the railway. The Snapping Turtle has also been listed on the MPA territory. In addition, all endangered reptile species whose geographic distribution overlaps with the local study area are likely to find favorable habitats on the MPA territory. These species include the Eastern Milksnake as well as the Wood Turtle and the Map Turtle. The CDPNQ reports records of Map Turtle occurrences on the St. Lawrence Islands in front of Contrecoeur. However, this species was not listed on the MPA territory.

The most important sites for amphibian breeding include the marsh between the Fossé Noir and Ruisseau 2, and swamp areas and wet woodlands south of the railway.

6.1.3.5 Birds and their Habitat

The St. Lawrence River and the Verchères Islands in the local study area are a recognized Waterfowl Gathering Area (WFGA). The Îles de Contrecoeur and watercourses surrounding them also constitute WFGA. These islands are also a National Wildlife Area under federal law and are recognized as an Important Bird and Biodiversity Area (IBA) in Canada. The project area encroaches on the WFGA which includes MPA territory littoral area. The IBA is located just east of the MPA territory around the Îles de Contrecoeur. A heronry is located on Île Bouchard, inside the local study area. This designated wildlife habitat is located approximately 970 m away from the project area.

An estimated 145 species are believed to nest in the St. Lawrence River section from Varennes to Contrecoeur. A large variety of birds can be observed on the Islands, especially in the Varennes archipelago.

Several bird surveys were carried out between 2008 and 2016 throughout the MPA territory in Contrecoeur, where 114 species were confirmed. Nine of these species have a special-status: Peregrine Falcon, Wood Thrush, Bank Swallow, Barn Swallow, Eastern Wood Pewee, Least Bittern, Rusty Blackbird, Sedge Wren, and Eastern Meadowlark. However, the presence of the Peregrine Falcon remains uncertain.

The St. Lawrence riverside areas are used more by birds during the spring migration period than during the nesting period, and are used even less during the autumn migration period. In the spring, several waterfowl species were listed there, mainly in marshes at the mouth of Ruisseau 2 and Fossé Noir. During the nesting period, the Canada Goose, the Mallard and the Gadwall were the only waterfowl species listed in addition to two sandpiper species. The other species associated with the aquatic environment (cormorants, gulls, osprey, terns and herons) were all observed during the nesting period. This is also the case for the Bank Swallows, which nests in colonies along the riverbank.

Several wooded parcels, fallow lands and small wetlands punctuate the MPA territory landscape. Agro-forest habitats mainly occupy the western part of the territory as well as the areas south of the railway. The most common species in these habitats are the Song Sparrow, the Red-winged Blackbird, the Yellow Warbler, the Common Yellowthroat, the Veery and the American Robin. In mature forests south of the railway track, the avifauna community is dominated by forest species such as the Veery, the Wood Thrush, the Ovenbird, the Yellow-bellied Sapsucker and the Eastern Wood Pewee.

The most abundant breeding pairs belong to the following species: Song Sparrow, Red-winged Blackbird, Veery, Gray Catbird, Least Flycatcher, Yellow Warbler, Common Yellowthroat and Warbling Vireo.

6.1.3.6 Mammals

Approximately fifteen small wildlife species are found in the local study area, of which the Beaver and the Muskrat are most commonly captured. The local study area includes five designated Muskrat habitats, on Île Bouchard and the Îles de Contrecoeur. There are very few moose and black bears among the large wildlife community in the study area, but the White-tailed Deer is abundant there.

Inventories carried out in 2008 on the MPA territory revealed the presence of 16 mammal species that are all common and relatively tolerant towards human activities.

Six bat species have been confirmed on the MPA territory during the 2016 inventory, the most active being the Big Brown Bat. Five of these species have a special-status: Silver-haired Bat, Hoary Bat, Red Bat, Little Brown Bat and Tri-colored Bat. Habitats of particular interest to bats identified in the local study area are characterized by water bodies, wetlands, riparian forest habitats, and mature and over-mature stands.

6.1.3.7 Other Species

The Monarch Butterfly is potentially present on the MPA territory since areas covered with flowering plants, including Milkweed, are present. However, no inventories were specifically carried out and no observation was noted. This special-status species is endangered.

6.1.3.8 Invasive Alien Species

Flora Invasive Alien Species (IAS) present in the study area are as follows: Common Reed, Reed Canarygrass, Yellow Iris, Ash-leaved Maple, Dame's Violet, Purple Loosestrife, and Flowering Rush. Four wildlife IAS can be found in the St. Lawrence River within the study area: Zebra Mussel, Quagga Mussel, Round Goby and Asian Carp.

6.1.4 Human Environment (other than Aboriginal)

6.1.4.1 Administrative Context

The project area of the future container terminal is located within the boundaries of the MPA territory and of the boundaries of the City of Contrecœur, approximately 2.3 km west of the urban core of the city. The project site is adjacent to the municipality of Verchères. Contrecœur and Verchères are part of the RCM Marguerite-D'Youville located in the administrative region of Montérégie and inside the MCC territory.

Contrecœur has a coastline greater than 20 km on the St. Lawrence River and covers a terrestrial area of 62.6 km². The municipality of Verchères has 10 km of shoreline on the river and covers an area of 72.9 km².

6.1.4.2 Socio-Economic Profile

In 2011, the population of Contrecœur was of approximately 6,300 residents, while Verchères had a population of nearly 5,700. Approximately 67% of the populations of Contrecœur and Verchères are of working age and the median age was 44 and 41 years respectively.

Contrecœur and Verchères are part of the *Commission scolaire des Patriotes* bringing together 64 primary and secondary schools, adult and vocational training institutions, as well as business-oriented services.

The City of Contrecœur has a smaller proportion of people who have pursued university studies than Verchères. The main preferred fields of study are architecture, engineering and related services, as well as trade, management and public administration. Health and related fields also attract several students from the area. Compared to Verchères, Contrecœur has a higher proportion of residents who do not have a post-secondary certificate, diploma or degree.

The economic structure of the region is more oriented towards the secondary sector (manufacturing and construction). The region has a lower unemployment rate than that of the province.

The RCM of Marguerite-D'Youville has experienced a significant population growth in the past few decades, which came together with the development of its economic activities. Employment is mainly concentrated in Varennes, Sainte-Julie and Contrecœur. In recent years, the agricultural sector has experienced a decline in the number of agricultural farms, as several animal and vegetable farms shifted towards crop production. Manufacturing and construction play an important role in the RCM economy. There are also industrial areas: a municipal industrial park and a private industrial area in Contrecœur, a "scientifically oriented" industrial area located in Varennes, and a private industrial area in Verchères. The RCM also has a very active research and development center.

The City of Contrecœur has an industrial park designed mainly for large companies and Small and Medium Enterprises (SME). A dozen companies working in industrial ecology,

environmental technology, high precision mechanics or transportation are now based in this industrial park. Contrecœur's industrial sector is crucial to the local economy as it is responsible for 3,000 direct jobs. Steel production and processing cover almost all industrial activities.

6.1.4.3 Land Use

The water system occupies 25% of the local study area and consists mainly of the St. Lawrence River. Agricultural lands occupy 21% of the local study area and are mostly used for the production of soybean, corn and wheat to a lesser extent. It should be noted that the MPA leases part of its land to farmers.

Wetlands account for 19% of the local study area and are concentrated on the Île Bouchard and inside Contrecœur's industrial area.

Woodlands cover 7% of the local study area and are concentrated mainly in the south of Contrecœur's industrial area along Highway 30. The forest in this area corresponds to the Bois de Contrecœur. A smaller forest cover is also found in the MPA territory along the St. Lawrence River.

Industrial activities occupy 12% of the local study area. The built environment occupies 1% of the local study, notably along the St. Lawrence River towards Verchères. The nearest residence is located approximately 140 m from the project area.

6.1.4.4 Infrastructure and Public Services

6.1.4.4.1 Road, Rail and Maritime Networks

The local study area is directly accessible via Route 132. Heavy vehicles access the MPA facilities in Contrecœur via Highway 30, Montée Lapierre and Montée de la Pomme-d'Or. Other local roads exist in the study area. There are currently no traffic issues at peak hours.

A CN railway crosses Contrecœur's industrial area. This railway network provides a link between the Sorel area and the rest of the North American network. It crosses several municipalities including Boucherville, Varennes, Verchères, Contrecœur and Sorel-Tracy. The main goods transported are dry bulk commodities such as iron ore and fertilizers

Current maritime activities in Contrecœur are related to the handling and storage of dry bulk, either iron pellets, fertilizers, stone pellets and transshipment activities. Other products (coal, ash, residues and aluminum ore) are handled, but in smaller quantities. Facilities include a wharf, roads and railways, an electrical grid, as well as ancillary buildings and warehouses, four industrial water intakes and a lighted range (2 navigation towers).

A commercial fisherman uses specific fishing areas, especially in the vicinity of the Saint-Ours, Bouchard and Contrecœur islands.

6.1.4.4.2 Electric Power Network

The Hydro-Québec power network is present via two substations located within the ArcelorMittal properties. A Hydro-Québec distribution line also runs along the north side of Route 132 and feeds companies present in the area. Further south, there are four more power lines located along Highway 30.

6.1.4.4.3 *Telecommunication and Cable Network, and Gas Network*

There are three telecommunication towers within the local study area. The Gaz Métro distribution network is mainly limited to the industrial and urbanized sectors of Contrecœur. One pipeline belonging to Air Liquide, coming from Verchères, is located along the CN railway (on the northern side) and reaches ArcelorMittal installations.

6.1.4.4.4 *Industrial Service Water, Drinking Water and Wastewater*

There are four industrial water intakes on either side of the wharf at the existing Contrecœur terminal. An aqueduct line is present on the north side of Route 132, serving the industrial area from the Contrecœur urban core. The industrial area is not connected to the municipal sewer system.

Contrecœur's drinking water and wastewater treatment facilities are located outside the local area of study.

6.1.4.4.5 *Residual Materials Management*

The management of residual materials in the local study area is the responsibility of RCM of Marguerite-D'Youville's.

The local study area includes the Ecocentre of the northern sector. ArcelorMittal also has scrap processing facilities. Other companies have residual materials management facilities on Montée de la Pomme-d'Or. These companies include ChemTECH Environnement (recycling of oils, paints, HHW and compostable materials), Nortex Environnement (topsoil recycling) and Écolomondo International Corporation (recycling of oils, paints, household hazardous waste [HHW]). Two used snow disposal sites are located at approximately 7 km away from the project site, south of the urban centers of Contrecœur and Verchères.

Harsco Minerals has metallurgical industry waste management facilities. The RCM of Marguerite-D'Youville's land-use plan identifies facilities where potentially dangerous residual materials may be eliminated, as well as one car carcass disposal site which is located in Contrecœur industrial area, south of the CN railway.

6.1.4.4.6 *Public Safety*

The *Régie intermunicipale de police Richelieu-Saint-Laurent* (RIPRSL) provides protection services to citizens across the RCM of Marguerite-D'Youville. The City of Contrecœur has a fire department based approximately 4 km from the MPA territory. The municipality of Verchères also has a fire department whose station is located about 7 km away from the project site.

6.1.4.4.7 *Health*

The *Centre local de service communautaire* (CLSC) of the Seigneuries de Contrecœur is located near the MPA facilities (6 km). The city also has a private medical clinic, a health co-operative with physicians and complementary services, a Residential and Long-term Care Centre (CHSLD), seniors' residences and several specialist physicians' clinics. As for the municipality of Verchères, it has a CLSC, a medical clinic, a residence for the elderly and specialist physicians' clinics. These health services are located outside the local study area.

6.1.4.4.8 *Tourism and Recreational Services*

Within the boundaries of the local study area there are a number of sightseeing tours, tourist trails and attractions, including: the *Route Verte* bike path, the *Route Bleue* section, a snowmobile and quad trail, a heritage circuit in Contrecoeur, two views along the scenic Route 132, and a golf course.

6.1.4.5 **Historic and Archaeological Heritage**

There is no listed archaeological site in the project's local study area. However, 15 prehistoric and historical sites are located in the vicinity of the local study area, within a radius of 5 km. Studies have been carried out to describe the historical and archaeological potential of the MPA territory in Contrecoeur. Several locations of the project area have land, maritime and underwater archaeological potential.

6.1.4.6 **Visual Environment**

The photometric readings executed at the boundaries of the project area concerning night luminosity have established that the area can be considered one without ambient lighting, when excluding the lighting produced by the street lamps.

The local study area is part of the regional landscape of the St. Lawrence lowlands which are formed by an agroforestry plain often cut out in an angle perpendicular to the St. Lawrence River where several tributaries and various urban or rural agglomerations are present. The St. Lawrence River is undoubtedly the main strength of this regional landscape and is a source of interest to observers.

With the exception of urban agglomerations, observers are mainly located along Routes 138 and 132, on either side of the river, and on either side of roads that cross the agricultural territory. The area's flat terrain, coupled with the agricultural fields and visual clearance of the St. Lawrence River, allows broad and deep views at several locations. Small and scattered woodlands are observed on the agricultural lands.

The visual landmarks of the study area are mainly industrial in nature. Some high-rise facilities owned by the industries of Grantech Inc., Argonal and ArcelorMittal, and the existing ship-to-shore crane at the Contrecoeur terminal are visible from several observation points of the five types of landscape units identified (urban, agricultural, river, island and industrial), on either side of the St. Lawrence River shores.

6.1.5 **Aboriginal Peoples**

The Aboriginal peoples likely to be affected by the project or for whom the project area is of interest are as follows:

- › The Abenakis of Odanak;
- › The Abenakis of Wôlinak;
- › The Huron-Wendats of Wendake;
- › The Mohawks of Akwesasne;
- › The Mohawks of Kahnawake;
- › The Mohawks of Kanésatake.

These aboriginal communities are included in the extended study area.

6.1.5.1 Administrative Context, Territory and Land Claims

Generally, the band councils are responsible for the administration and organization of reserves, as stipulated in the *Indian Act*. In addition to the responsibilities set out in this Act, several First Nations have negotiated and signed agreements with governments in order to gain more authority over reserves management and services.

Table 6.3 briefly describes the band council administrations as well as their land claims. In addition to their ongoing comprehensive and specific land claims, Aboriginal peoples allege that they have rights in the territory under consideration.

Table 6.3 Aboriginal Communities and Current Comprehensive Land Claims

Community	Nation	Band Council	Head of Band Council	Distance from community to project	Current Comprehensive Land Claims
Mohawks of Kahnawake ⁽¹⁾	Mohawk Nation	Kahnawake Band Council	Joseph Tokwirot Norton	> 80 km	> Sault St-Louis.
Mohawks of Kanesatake ⁽⁴⁾		Kanesatake Mohawk Council	Serge Otsi Simon	> 120 km	> Seigneurie des Deux-Montagnes.
Mohawks of Akwesasne ⁽²⁾		Akwesasne Band Council	Abram Benedict	> 180 km	> Dundee.
Abenakis of Odanak ⁽³⁾	Waban-Aki Nation	Council of the Odanak Abenakis	Richard O'Bomsawin	> 60 km	> Transfer of 38 plots in Abenakis domain of Saint-François; > Original boundaries of Odanak.
Abenakis of Wôlinak ⁽³⁾		Council of the Wôlinak Abenakis	Michel R. Bernard	> 100 km	> Coleraine Reserve (1847-1933); > Original boundaries of Wôlinak : Seigneurie de Bécancour.
Huron-Wendats of Wendake	Huron-Wendat Nation	Council of the Huron-Wendat Nation	Konrad H. Sioui	> 240 km	> Comprehensive land claim (Nionwentsio), 2008; > Reserve of Rockmont.

Notes:

¹ The Mohawks of Kahnawake and Kanesatake share a territory called Tiowero:ton. It is located near Ste-Lucie-des-Laurentides and covers a surface area of 183.8 km². This territory is jointly managed by the Mohawk Council of Kahnawake and the Mohawk Council of Kanesatake.

² The community of Akwesasne is located on the Canada-United States border, in Ontario, Quebec and in the State of New York.

³ The Odanak and Wôlinak bands also operate under the Grand Council of the Waban-Aki Nation (GCNWA).

⁴ The community of Kanesatake is not a reserve within the meaning of the *Indian Act*. It is composed of about 50 non-contiguous parcels, most of which are located in the City of Oka.

6.1.5.2 Sociodemographic Profile and Economics

6.1.5.2.1 Mohawk Nation

The Mohawk Nation is the most populous of the Aboriginal populations of Quebec. With nearly 12,350 members, the Akwesasne community is the largest. The populations of Kahnawake and Kanésatake have approximately 10,920 and 2,500 members respectively. Most of the Mohawks live on their reserve. Women account for the largest portion of the population in all Mohawk communities.

The three communities offer primary and secondary educational services. Little information is available on the educational attainment of the Mohawk population.

Kahnawake hosts more than 250 businesses represented mainly by the retail, utilities and arts/recreation sectors. Kanésatake is believed to have twenty businesses that are largely devoted to retail trade, utilities, forest maintenance and orchard management. Akwesasne has more than 350 businesses, including several operating in the construction and professional services sectors.

6.1.5.2.2 Waban-Aki Nation

Odanak has nearly 2,450 inhabitants while Wôlinak has about 350. A small portion of the Odanak (12%) and Wôlinak (20%) members live on reserve. The median age of the population of the two reserves is 39.

Primary and secondary schools attended by students in Odanak and Wôlinak are not located on the reserves. However, Odanak has a post-secondary institution.

The economies of the Odanak and Wôlinak communities are integrated with those of their respective regions, although they have developed some local services offering. There are some 30 businesses in Odanak, and tourism and forestry are believed to be the dominant economic sectors. Wôlinak has a dozen businesses and is home to the GCNWA administrative center. For both communities, activity, employment and unemployment rates are comparable to those of the entire province of Quebec.

6.1.5.2.3 Huron-Wendat Nation

The community of Wendake has 4,042 registered members. The majority of the Huron-Wendats live outside the reserve. Members aged 0-19 would account for 20% of the population.

The community includes a primary school. Wendake also has a Huron-Wendat Labor Development and Training Center, the *Centre de développement de la formation et de la main d'œuvre huronne-wendat* (CDFM), to allow students to obtain their high school diploma or the prerequisites for entering vocational training, college or university programs. Technical training is provided.

There would be more than 215 businesses of all types on the Wendake Reserve.

6.1.5.3 Infrastructure and Public Services

6.1.5.3.1 Mohawk Nation

Mohawk communities are generally located near major urban centers and have access to the same road, railway and airport infrastructure as the non-natives. All Mohawk communities provide health and municipal services to their members.

6.1.5.3.2 Waban-Aki Nation

The communities of Odanak and Wôlinak are located quite close to major urban centers and therefore have access to the same road, rail and airport networks as non-Aboriginal people in general. These communities have a health center and provide some municipal services. If needed, their members can count on hospital services offered in nearby major centers.

6.1.5.3.3 Huron-Wendat Nation

The community of Wendake is located near Québec City and benefits from all its access roads and airport services. The community also provides health and social services to their members. The Wendake police is responsible for the law enforcement and for the security of the Nation's members. Fire and other municipal services are provided by Québec City.

6.1.5.4 Land Use

6.1.5.4.1 Mohawk Nation

Most of the traditional activities of the Mohawks of Kahnawake and Kanesatake appear to be taking place near the reserves and in the territory of Tioweró:ton (Doncaster Reserve). This territory is highly frequented, especially during the summer season, between June and October.

The Mohawk communities and the Tioweró:ton territory are located some long distance away from the project site. For the Mohawks, fishing and hunting are not just activities; they are also aboriginal rights practiced by the Mohawks. In fact, the Mohawks allege that these aboriginal rights are protected by section 35 (1) of the Constitution (1982). According to the Mohawks, these rights include, among others, fishing rights recognized by the Adams Supreme Court Judgments in 1996², as well as hunting rights, harvesting rights (especially medicinal plants), trade rights, cultural rights (including archaeological heritage) and environmental stewardship rights. The Mohawks allege that these rights apply to the project site.

6.1.5.4.2 Waban-Aki Nation

The ancestral territory of the Abenakis is the Ndakinna. Activities related to the land use and land occupation are valued by the Abenakis. These practices play a major role in subsistence, in social relations and in the consolidation of social ties, in the transmission of knowledge, and in the strengthening of social relations, to name a few. The Abenakis practice several activities; hunting, fishing, trapping and gathering of various species, particularly in the Lac Saint-Pierre region (especially on its southern shore), including the islands of Sorel. They value the St. Lawrence River and its ecosystem, where several sensitive areas have been located. Many of these activities involve navigation on the St. Lawrence River.

² <https://scc-csc.lexum.com/scc-csc/scc-csc/fr/item/1420/index.do>

6.1.5.4.3 Huron-Wendat Nation

The Nionwentsio is the ancestral territory of the HWN, and the members continue to use this territory to practice their traditional activities (hunting for moose, small game and migratory birds, fishing various species as well as trapping fur-bearing animals, among others). The Huron-Wendats sometimes visit the portion of the river between Montreal and Québec to practice their activities, including fishing and navigation. The HWN is currently working on documenting the land use practices of its members with precision.

6.1.5.5 Historic and Archaeological Heritage

Consultations with Aboriginal peoples demonstrated the importance of prehistoric and historical heritage to the groups involved in this study. There is no archaeological site identified in the local study area. However, 15 prehistoric and historical sites are located in the vicinity of the local study area within a 5 km radius. Overall, the MPA territory in Contrecoeur is located in an area that has an archaeological potential, both at land, maritime and underwater.

6.1.5.6 Visual Environment

Given the great distance between the planned terminal facilities and the Mohawk, Huron-Wendat and Abenakis communities, they will not see any change in their immediate landscape. However, the aboriginal land users who visit the area occasionally may experience changes in the landscape. However, they are not permanent observers. Note that the infrastructure of the project will not be visible from the Îles-de-Sorel or the Lac St-Pierre, which are visited by the Abenakis.

6.2 Environmental Effects

A summary of the positive and negative environmental effects, both temporary and permanent, associated with the construction and operation of the Contrecoeur Maritime Terminal Expansion Project, as well as impacts sources, mitigation measures and residual impacts is presented in Tables 6.4 and 6.5 respectively. The analysis results from the foreseeable interaction between the sources of impacts, i.e. the work to be carried out, and the presence and operation of the permanent infrastructures on the area's physical, biological and human valued components. The evaluation presented is based on information available at the end of the project's preliminary engineering study.

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
PHYSICAL ENVIRONMENT							
Air Quality	<ul style="list-style-type: none"> › Dust-generating site preparation and construction works in general; › Truck traffic and construction activities, which generate dust and combustion gases (mainly equipment with diesel-fueled engines); › Dredging works, dredgers and tug-boats generating combustion gases. 	<ul style="list-style-type: none"> › Emission of dust and contaminants in the air generated by the combustion of equipment, boats and trucks. 	-	Moderate (Human health)	<ul style="list-style-type: none"> › Implementation of a dust management program as soon as construction begins; › Control of fugitive emissions of particulate matter on roads used by trucks; › Regular watering of unpaved roads or application of authorized dust suppressants and regular cleaning of paved roads; › Installation of a truck washing area. 	Moderate (Human health)	MP # 8 Earthwork, Excavation and Leveling Works; MP # 14 Air Quality.
Greenhouse Gas (GHG) Emissions	<ul style="list-style-type: none"> › Truck and machinery traffic during construction activities, generating combustion gases (equipment mainly equipped with diesel engines); › Dredging works, dredgers and tug boats generating combustion gases. 	<ul style="list-style-type: none"> › The estimated annual GHG emissions at the project site during the four-year construction period range from 6,200 to 7,600 tons of CO₂eq, depending on the year. 	-	Very Low (Human health)	---	Very Low (Human health)	MP # 15 Greenhouse Gas Emissions.
Hydrography	<ul style="list-style-type: none"> › Site preparation works, in particular the installation of the drainage system, culverts and underground pipes; › Preparation of dredged materials storage areas. 	<ul style="list-style-type: none"> › Conversion of natural land surfaces to impervious cover; › Modification of the local hydrography. 	-	---	<ul style="list-style-type: none"> › Installation of vegetated ditches; › Installation of surface retention basins to store water generated by an annual rainfall and evacuate them at a flowrate that allows the release of heavy, short-duration rains over a period of 24 hours, in order to control erosion; › Installation of a sedimentation basin on the Fossé Noir, upstream of the project area; › Fossé Noir possibly recreated in its original natural bed which will restore natural hydrology in the area. 	---	MP # 8 Earthwork, Excavation and Leveling Works; MP # 9 In-Water Works.
St. Lawrence River Currents and Sediment Regime	<ul style="list-style-type: none"> › Dredging works. 	<ul style="list-style-type: none"> › Sediment plume increasing Total suspended solids (TSS), that will be quickly dissolved past the dredging area; › Area of low sediment accumulation downstream of the dredging area, limited to the area between the future wharf and the existing wharf. 	-	---	<ul style="list-style-type: none"> › Installation of a flap between the barge and the wharf during sediment transshipment; › Regular monitoring of TSS concentration; › Operational controls to reduce TSS generation and migration could be put in place if water quality criteria are not met; › Reduce the pace of dredging activities; › Reduce bucket lifting speed, especially as it comes out of water; › Reduce the over-penetration of the bucket that could cause the expulsion of sediments through the vent holes or the accumulation of loose sediments on top of the clamshell, that will be leached out during lifting; › Eliminate barge overflow during dredging or transportation; › Adapt dredging operation methods to weather conditions such as waves, currents and winds. 	---	MP # 10 Dredging Works.

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Surface Water Quality	<ul style="list-style-type: none"> › Site preparation works that could alter water quality as a result of sediment generation; › Installation of the drainage system; › Construction of the wharf, including the installation of the sheet pile wall and backfilling works behind the wall; › Concreting works for the construction of the wharf, the container yard, the intermodal yard, etc.; › Dredging works; › Storage and dewatering of dredged materials. 	<ul style="list-style-type: none"> › Soil erosion creating sediment input in runoff water; › Suspension of sediments and temporary degradation of water quality; › The water quality parameters most likely to be affected are pH, TSS, turbidity and C₁₀-C₅₀. 	-	---	<p><u>In-water works for the development of the drainage network</u></p> <ul style="list-style-type: none"> › Respect the in-water works restriction periods in order to protect fish and fish habitat; › Favor the use of clean materials (steel plates, concrete blocks, etc.) for the construction of cofferdams in order to limit the emission of fine particles in the St. Lawrence River and watercourses; › Install, when possible, sediment catchment systems (sediment barrier) in ditches and watercourses to limit the migration of suspended particulate matter downstream; › Drive aquatic fauna away before creating an enclosure using an appropriate method; › Collect fish trapped in the enclosure and release them into the watercourse; › Use temporary stabilization or sediment catchment measures on waterbanks where there is a risk of erosion in order to minimize sediment input into the watercourse; › Inform users (boaters, City of Contrecoeur) downstream, about the risks associated with these works, their timing and about the possible consequences of this temporary impact, if necessary; › Stabilize banks at the end of works in order to reduce erosion risks; › Restore the vegetation cover on riverbanks using endemic species. <p><u>Site preparation works</u></p> <ul style="list-style-type: none"> › The stripping, clearing, excavation, backfilling and leveling of work areas will be limited to an absolute minimum in order to respect natural topography and prevent erosion; › Uncovered soils, excavated and backfill materials, must be stored outside the riparian strip of the St. Lawrence (30 m) and of other watercourses present in the area; › Sediment barriers will be deployed along streams and ditches during site preparation work. As far as possible, a vegetation strip will be preserved on the banks of watercourses, which will make it possible to limit the sediment input; › Temporary stabilization measures or sediment barriers will be implemented where necessary to reduce the risk of sediment and particulate matter migration in streams; › Recurrent inspections of the site drainage system will be carried out to ensure it is functional and efficient. A follow-up program of drainage water discharge points in the receiving environment will be implemented to ensure that water treatment is effective and that corrective measures are applied when necessary. TSS concentrations and turbidity shall be monitored, among other parameters. <p><u>Construction of the wharf and concreting works</u></p> <ul style="list-style-type: none"> › Conduct concreting works according to appropriate working methods in order to circumscribe the exact location of the work areas and limit the runoff of concrete residues into the water; 	---	<p>MP # 8 Earthwork, Excavation and Leveling Works; MP # 9 In-Water Works; MP # 10 Dredging Works; MP # 11 Transportation and Storage of Dredged Materials; MP # 12 Equipment Maintenance and Refuelling. MP # 17 Surface Waters.</p>

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
					<p><u>Dredging works</u></p> <ul style="list-style-type: none"> › Installation of a flap between the barge and the wharf during sediment transshipment; › Regular monitoring of TSS concentrations will be implemented; › Where necessary, operational controls to reduce TSS emission and migration may be implemented if water quality criteria are not met. 		
Nature and Quality of Soils	<ul style="list-style-type: none"> › Site preparation works, including deforestation and earthmoving activities; › Storage and dewatering of dredged materials 	<ul style="list-style-type: none"> › Alteration of soil properties in worksite areas; › Change in soil composition in dredged materials storage areas. 	-	---	<ul style="list-style-type: none"> › Remain within the boundaries of the project area and access roads; › Restrict to an absolute minimum the stripping, clearing, excavation, backfilling and leveling of work areas in order to maintain natural topography and prevent erosion; › Stabilize surfaces by adding topsoil on the surface and by rapidly restoring the vegetation cover. Where possible, the organic horizons of soils to be stripped and preserved will be used to renaturalize areas not required for the container terminal's infrastructure; › Establish a monitoring program during excavation to avoid cross-contamination; › Manage soils with a contamination potential or presenting visual and olfactory indicators in a way to prevent these soils from being a new source of environment contamination. Temporarily store them in a pre-determined area on waterproof fabric, covered and protected from weather conditions (more than 30 m away from the St. Lawrence River, watercourses or ditches). 	---	<p>MP # 8 Earthwork, Excavation and Leveling Works; MP # 11 Transportation and Storage of Dredged Materials; MP # 12 Equipment Maintenance and Refuelling; MP # 13 Demobilization and Rehabilitation of Work Areas; MP # 18 Contaminated Soils; MP # 25 Residual Hazardous Materials.</p>
Noise Environment	<ul style="list-style-type: none"> › Site preparation works; › Dredging works; › Management of dredged materials; › Infrastructure development. 	<ul style="list-style-type: none"> › Increased noise levels; › Projected noise levels meet MDDELCC acceptability criteria at all assessment points; › The increase in the % highly annoyed (HA) (during vs. before the works) is below 6.5% at all assessment points. 	-	Low	<ul style="list-style-type: none"> › Construction of a barrier wall which will take the form of a 4 m high embankment along the site's periphery; › Top the visual barrier wall by a 6 m noise barrier at the west end of the site, over a length of 150 m; › No excavation by blasting; › Installation of sheet piles by vibratory driving if technically feasible; › Select equipment that minimizes noise and vibration; › Select equipment incorporating acoustic measures into their design (e.g. generators); › Wherever possible, locate stationary noise sources (generators, compressors) away from inhabited areas or noise-sensitive ecosystems; › Install speed limit signs at construction sites; › Establish a vehicle maintenance and inspection plan to ensure that they are equipped with appropriate anti-noise and anti-vibration devices in good working order; › Follow best practices so that noise levels in the work area do not exceed the values prescribed for the protection of workers and residents. 	Low	<p>MP # 16 Noise and Vibration.</p>

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
BIOLOGICAL ENVIRONMENT							
Terrestrial Vegetation	<ul style="list-style-type: none"> › Site preparation works including deforestation and removal of vegetation cover; › Machinery and heavy vehicle traffic. 	<ul style="list-style-type: none"> › Loss of vegetation cover due to the construction of project infrastructure over 74.1 ha; › Loss of vegetation cover due to the establishment of dredged material storage areas on the MPA territory over 27.9 ha of agricultural lands (Storage Area 2) or 23.3 ha of forest environment or fallow lands (Storage Area 4); › Disturbance of vegetation near the construction site due to dust generation. 	-	Low	<ul style="list-style-type: none"> › Limit the areas to be deforested to avoid unnecessary clearing; › Protection of trees and vegetation at the limits of areas to be cleared; › Limit machinery traffic to work areas; › Conservation of certain woodlots and creation of green islands next to the infrastructures (parking, administrative buildings); › Sowing and/or reforestation of temporary disturbed areas at the end of the construction works; › Implementation of a reforestation program as soon as construction begins, including at the foot and on the barrier walls to be built around the project area or in strategic areas to reduce the visual impact from residential homes; › Cleaning the excavating machines prior to their arrival on site to prevent the spread of IAS and when exiting the work, at least 30 m away from watercourses, and threatened or vulnerable species, in an area unsuitable for seed germination or plant development. Dispose of waste generated by cleaning operations at an engineered landfill (EL); › Revegetation of all soils uncovered during works, as works progress, with a mixture of indigenous species adapted to local conditions and free from IAS. 	Low	MP # 07 Deforestation; MP # 13 Demobilization and Rehabilitation of Work Areas; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 20 Reduction of the Spread of Invasive Alien Species.
Aquatic Vegetation and Wetlands	<ul style="list-style-type: none"> › Deforestation and vegetation removal; › Machinery and heavy vehicle traffic; › Construction of the wharf, including the installation of the sheet pile wall and backfilling works behind this wall; › Dredging works. 	<ul style="list-style-type: none"> › Loss of wetlands over an area of 3 ha; › Modification of wetland drainage near the worksites and along diverted streams or stream put in underground piping; › Loss of 0.4 ha of aquatic grassbeds; › Temporary silting of grassbeds downstream from the dredging works. 	-	Moderate	<ul style="list-style-type: none"> › To the extent possible, carry out work during low-water periods and avoid periods of spring flood or heavy rainfall; › Maintain drainage conditions in wetlands on the boundary of work areas; › Restoration of the surface drainage conditions, if modified; › Restore the new banks of the Fossé Noir diversion segment in a way to facilitate the rehabilitation of riparian wetlands; › Protection of grassbeds in the vicinity of the dredging area during the construction phase, in particular by prohibiting barge and tug boat traffic in the grassbed areas; › Wash dredging equipment (dredges, clamshell dredgers, barges, cranes) after each dredging season, when mobilizing and demobilizing equipment, in order to limit the spread of IASs, such as Eurasian Water-milfoil. 	Moderate	MP # 07 Deforestation; MP # 13 Demobilization and Rehabilitation of Work Areas; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 20 Reduction of the Spread of Invasive Alien Species.
Special-status Plant Species	<ul style="list-style-type: none"> › Deforestation and removal of vegetation; › Machinery and heavy vehicle traffic. 	<ul style="list-style-type: none"> › Loss of habitat in areas where three floristic species vulnerable to harvesting are present: Canada Wild Ginger, Ostrich Fern, Bloodroot. 	-	Low	<ul style="list-style-type: none"> › All the measures identified to limit impacts on terrestrial vegetation and wetlands. 	Low	MP # 07 Deforestation; MP # 13 Demobilization and Rehabilitation of Work Areas; MP # 19 Vegetation Cover and Wetlands Protection and Restoration.

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Benthic Fauna	<ul style="list-style-type: none"> › Dredging works; › Construction of the wharf. 	<ul style="list-style-type: none"> › Permanent loss of benthic fauna habitat over 8.3 ha (wharf); › Modification of the benthic fauna habitat over 16.3 ha (dredging area). 	-	Moderate	<ul style="list-style-type: none"> › All the measures identified to limit impacts on surface water quality, in particular those intended to limit TSS input; › Protection of grassbeds in the vicinity of the dredging area during the construction phase, in particular by clearly limiting the dredging area and prohibiting barge and tug boat traffic outside that area. 	Low	MP # 10 Dredging Works; MP # 17 Surface Waters .
Fish and Fish Habitat	<ul style="list-style-type: none"> › All the sources of impact on surface water quality; › Construction of the wharf; › Dredging works; › Installation of the drainage network. 	<ul style="list-style-type: none"> › Loss of fish habitat over approximately 8.3 ha caused by the construction of the wharf; › Modification of fish habitat over 16.3 ha caused by dredging works, including the loss of 0.4 ha of aquatic grassbeds; › Loss of fish habitat by the backfilling of the Fossé Noir and its tributary along 1,050 m; › Loss of fish habitat by the backfilling of Ruisseau 1 along 440 m (if Storage Area 4). › Loss of fish habitat upstream of the underground piping of Ruisseau 2, along approximately 2,110 m. › New diversion of Fossé Noir recreating similar habitat over 370 m; › Underwater noise and vibration during the construction of the wharf causing temporary fish disturbance; › Degradation of fish habitat quality due to water quality degradation (TSS, turbidity). 	-	High	<ul style="list-style-type: none"> › All the measures identified to limit impacts on surface water quality, in particular those intended to limit TSS input; › A restriction period for in-water works will be applied to protect fish during their reproduction period: April 1 to September 15; › Limit work areas to avoid unnecessary encroachment into fish habitat; › Protection of grassbeds in the vicinity of the dredging area during the construction phase, in particular by clearly limiting the dredging area and prohibiting barge and tug boat traffic outside that area; › Maintain, as much as possible, the free movement of fish in stream flow beds during the construction phase; › With respect to in-water works, drive aquatic fauna away using an appropriate method before blocking a natural watercourse with a barrier and creating a water retention area upstream; collection of fish in the water retention area to then release them downstream of the barrier; › Removal of aquatic fauna and fish relocation prior to the closure of the wharf enclosure (before and after the installation of the sheet piles) to limit fish mortality in the space behind the wharf; › Rehabilitation of disturbed fish habitat areas upon work completion in a given area, including during culvert or underground piping installation; › Rehabilitation of the diverted section of the Fossé Noir to help the development of fish habitat; › Installation of a retention system to prevent materials, debris or scrap from falling into the fish habitat. 	Moderate	MP # 9 In-Water Works; MP # 10 Dredging Works ; MP # 16 Noise and Vibration; MP # 17 Surface Waters; MP # 21 Fish and Fish Habitat.
Herpetofauna	<ul style="list-style-type: none"> › Deforestation and removal of vegetation; › Disturbance caused by noise generated by the construction works and vehicle and machinery traffic; › Risk of collisions caused by increased truck and machinery traffic. 	<ul style="list-style-type: none"> › Loss of riparian wetlands at the location of the wharf and container yard (2 ha) and loss of fallow lands (20 ha) for Storage Area 2 (or 21 ha for Storage Area 4) causing habitat loss; › Disturbance of some streams affecting herpetofauna, especially anurans and turtles that use aquatic environments; › Disturbance near the work area caused by noise and vibration; › Machinery and truck traffic that could cause the mortality of amphibians and reptiles. 	-	Low	<ul style="list-style-type: none"> › Application of measures to protect terrestrial vegetation and wetlands; › Limit work areas and protection of vegetation outside these areas to minimize deforestation on the shoreline; › Prohibit vehicles and machinery traffic outside the designated access roads and works areas; › Restore disturbed areas on the shoreline in order to facilitate the recovery of the vegetation cover; › Noise reduction measure. 	Low	MP # 9 In-Water Works; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Birds and their Habitat	<ul style="list-style-type: none"> › Deforestation and vegetation removal; › Disturbance caused by noise generated by the construction works and vehicle and machinery traffic; › Dredging works, due to their effects on certain aquatic grassbeds; › Diversion of the Fossé Noir resulting in the loss or degradation of bird habitat at the mouth of the St. Lawrence River. 	<ul style="list-style-type: none"> › Loss of 29.3 ha of potential avifauna habitat (including wetlands, fallow lands and woodlands); › If Storage Area 4 is used, loss of another 23.3 ha of potential habitat; › Encroachment of the wharf and the dredging area in the WFGA, altering waterfowl habitat; › Disturbance of wildlife near the work area due to noise and vibrations. 	-	Low	<ul style="list-style-type: none"> › Apply measures to protect terrestrial vegetation and wetlands; › Conduct deforestation activities between September 1 and April 1, before the nesting period, in order to reduce potential impacts on the breeding of forest birds, as stipulated in the Migratory Birds Regulations; › Ensure that no active nest is present at the work site before the beginning of construction activities if deforestation takes place outside the prescribed period; › Apply noise reduction measures; › Apply measures to reduce the effects of luminosity. 	Low	MP # 9 In-Water Works; MP # 16 Noise and Vibration; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.
Mammals	<ul style="list-style-type: none"> › Deforestation and removal of vegetation leading to habitat loss or deterioration; › Noise disturbance caused by the construction work and vehicles and machinery traffic. 	<ul style="list-style-type: none"> › Loss of 29.3 ha of potential habitat (including wetlands, fallow lands and woodlands); › If Storage Area 4 is used, loss of another 23.3 ha of potential habitat; › Potential loss of habitat for bats (approximately 0.8 ha of riparian swamps); › Disturbance of wildlife near the work area due to noise and vibrations. 	-	Very low	<ul style="list-style-type: none"> › Implementation of terrestrial vegetation protection measures (e.g., limit deforestation to work areas); › Implementation of wetland protection measures; › Apply noise reduction measures; › Apply measures to reduce the effects of luminosity. 	Very low	MP # 16 Noise and Vibration; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.
Special-status Wildlife Species	<ul style="list-style-type: none"> › The impact sources are the same as those presented in the respective sections of this table for wildlife groups of which special-status species are part. 	See respective section of Table for each wildlife group: <ul style="list-style-type: none"> › Benthic Fauna: Elephantear, Spike, Fragile Papershell, and Hickorynut; › Fish: American Eel, Splitnose Rockfish, River Redhorse, Lake Sturgeon, Channel Darter, Bridle Shiner, Brassy Minnow, and, Rosyface Shiner; › Herpetofauna: Western Chorus Frog, Eastern Milksnake, and Wood Turtle, Map Turtle and Snapping Turtle; › Birds: Least Bittern, Peregrine Falcon, Wood Thrush, Bank Swallow, Barn Swallow, Eastern Wood Pewee, Rusty Blackbird and Eastern Meadowlark; › Mammals: Silver-haired Bat, Hoary Bat, Red Bat, Little Brown Bat, and 	-	Benthic Fauna: Moderate Fish: Very high Herpetofauna: Moderate Birds: Moderate Mammals: Moderate Other wildlife species: Moderate	<ul style="list-style-type: none"> › Capture and relocation of mussels found in work areas; › Compensation of any potential Copper Redhorse habitat losses; › Installation of devices to prevent Map Turtles and Snapping Turtles from laying eggs on the bank where the wharf will be built (before June, which corresponds to the egg laying period); › Prior to the nesting period, generally before mid-April, and before the beginning of the construction works, install scaring devices to deter Bank Swallows from nesting and establishing a colony in work areas; › The rail connection construction works will be planned to avoid work being carried out in the area close to the Western Chorus Frog critical habitat during its breeding period, in order to avoid noise generated by the work site to disturb the species' breeding between mid-April and mid-May. › MPA follow-up of the use of its territory by the Western Chorus Frog during the construction phase; › Identification of areas suitable for the growth of Milkweed on the MPA Territory and Milkweed plantation, including during landscaping of the barrier walls or other areas at the end of the work. 	Benthic Fauna: Low Fish: High Herpetofauna: Low Birds: Moderate Mammals: Low Other wildlife species: Low	MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 21 Fish and Fish Habitat; MP # 22 Terrestrial Wildlife.

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
		Tri-colored Bat; › Other wildlife species: Monarch Butterfly.					
HUMAN ENVIRONMENT (other than Aboriginal)							
Agricultural Activities	› Site preparation (deforestation and earthworks).	› Loss of use of leased land currently used for agricultural purposes.	-	Low	› When possible, continue to lease residual agricultural lands available within the MPA territory that are not affected by the works; › Inform farmers in a timely manner of the loss and unavailability of leased agricultural lands during construction.	Low	
Recreotouristic Activities	› Vehicle and heavy machinery traffic; › Deforestation and earthworks for the future container yard; › Dredging and sediment transportation operations.	› Disturbance of the Route Verte by increased traffic; › Disturbance of recreational boating activities, in particular the Route Bleue; › Very low (hardly noticeable) effects on resources for fishing (fish) and hunting (waterfowl).	-	Low	› Constantly inform stakeholders about the project's activities and progress, including work schedules, current temporary circulation bans, complaint management mechanism; › Install appropriate hazard and traffic signs on Route 132 and on Montée Lapierre and Montée de la Pomme-d'Or; › Ensure flaggers are present to monitor vehicle and equipment traffic during the construction phase if required; › Limit deforestation to the work area; › Raise awareness amongst St. Lawrence River users on the presence of voluntary speed reduction areas through the Canadian Coast Guard and through Navigation notices.	Low	MP – # 05 Health and Safety of Local Populations MP – # 10 Dredging Works
Public Infrastructure	› Vehicle and heavy machinery traffic; › Dredging and sediment transport operations; › Construction of railway links.	› Increased workers traffic and trucks on roads; › Degradation of road conditions; › Disturbance of public utilities (required displacement, protection or follow-up): power distribution line, power supply line, telecommunication line, gas pipelines, Air Liquide pipeline, water system pipes, water intake; › Temporary disturbance of rail operations and rail access to certain properties; › Encroachment on adjacent lands.	-	Moderate	› Coordinate the necessary works with the companies concerned and the City of Contrecoeur before the beginning of construction activities at the new terminal; › Coordinate the necessary road works with the Ministry of Transports; › Inform relevant stakeholders in a timely manner of the project's activities and their potential impacts (construction schedule, temporary bans, complaint management mechanism, etc.); › Acquire pieces of land or conclude agreements with landowners for the construction of road and railway links; › Limit vehicle and heavy machinery traffic outside access roads and designated works areas; › Create a traffic plan before works begin; › Establish permitted trucking hours during construction works; › Use dust suppressants and clean roads used by trucks; › Install appropriate hazard and traffic signs on Route 132 and on Montée Lapierre; › Ensure flaggers are present to monitor vehicle and equipment traffic during the construction phase, if required; › Protect water intakes (both municipal and industrial) during dredging activities.	Moderate	

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Visual Environment (Landscape and Luminosity)	<ul style="list-style-type: none"> › Ship-to-shore cranes (eight cranes with a maximum height of 95 m when the boom is raised); › Container yard; › Gantry cranes of the intermodal yard; › Marshalling yard and railway tracks; › Storage areas for dredged materials; › Support buildings; › Degree of luminosity generated by the project. 	<ul style="list-style-type: none"> › Modification of the visual landscape mainly for mobile observers; › Increased nighttime light sources. 	-	Based on the landscape: <ul style="list-style-type: none"> › FL (River): Major › UR 1, AG 1, AG 2, IS 1: moderate › IS 2: minor › UR 2, UR 3, IDI: Nil 	<ul style="list-style-type: none"> › Use a neutral color for the ship-to-shore cranes; › Installation of a visual screen consisting of a vegetated slope along the northern edge of Route 132 and the western boundary of the MPA territory; › Plantation of coniferous trees along some residences; › Reduction of luminous flux towards the sky; › Optimization of the density and the level of illumination (lux); › Use a specific lighting colour (e.g. amber colour); › Use lighting fixtures in accordance with standard BNQ 4930-100 / 2016 › Reduction of luminous flux crossing the property limits; › Tree plantation as soon as construction begins thru a reforestation program. 	Based on the landscape: <ul style="list-style-type: none"> › FL (River): Moderate › UR1, AG1, AG2, IS1, IS2: minor › UR2, UR3, ID: Nil 	MP # 07 Deforestation; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP #27 Visual Environment.
Public Safety	<ul style="list-style-type: none"> › Vehicle and machinery traffic; › Dredging operations; › Handling and storage of hydrocarbons and hazardous materials. 	<ul style="list-style-type: none"> › Risk of hazardous materials spillages; › Risk of collisions. 	-	Moderate	<ul style="list-style-type: none"> › Update the emergency plan; › Establish a traffic plan before work begins; › Inform stakeholders, in a timely manner, about project activities and potential impacts (construction work schedule, temporary bans, complaint management mechanism, etc.); › Establishing preferred trucking periods; › Install appropriate hazard and traffic signs on Route 132 and on Montée Lapierre; › Issue the required notices to navigation during dredging works and wharf construction. 	Low	MP # 01 Communication with Stakeholders; MP # 04 Health and Safety of Employees and Workers during Construction; MP # 05 Health and Safety of Local Populations; MP # 12 Equipment Maintenance and Refueling; MP # 23 Transportation and Traffic; MP # 25 Residual Hazardous Materials.
Archaeological and Historical Heritage	<ul style="list-style-type: none"> › Deforestation and earthworks; › Dredging, transportation, transshipment and disposal of sediments. 	<ul style="list-style-type: none"> › Potential disturbance of archaeological remains. 	-	Very high	<u>On land</u> <ul style="list-style-type: none"> › An archaeological inventory involving visual inspection and sampling will be carried out in areas of prehistoric and historical archaeological potential. This inventory will require obtaining archaeological research permits if applicable; › If this inventory leads to the discovery of remains, excavations must be carried out before the construction of the project begins; › If artifacts are found, and depending on their nature, an agreement will be reached with a local museum or with Aboriginal organizations to receive the remains for conservation purposes; › During earthworks in areas with archaeological potential, monitoring will be 	Nil (positive)	MP # 08 Earthworks, Excavation and Leveling Works; MP # 26 Heritage and Archaeological Sites.

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
					carried out; › A protocol will be established in the event of accidental discovery. Construction at the site of the discovery or within a perimeter deemed relevant will then have to stop until an expert's opinion is rendered and possibly until appropriate excavations have taken place. <u>In water</u> › Visual inspection of the banks at the surface and underwater; › An inventory of the maritime area by remote-sensing with a side-scan sonar or high-resolution multibeam echosounder; › A diving survey of two known sensitive areas in order to identify, locate and conduct preliminary surveys of potential remains, especially in the former Fiset wharf area; › Additional surveys may be required if remains of the former Fiset wharf justify it; › If required following the inventories, archaeological monitoring during the dredging and construction of the wharf shall be carried out; › A protocol will have to be established in case of accidental discovery.		
Economic Spinoffs and Employment	› All project activities.	› \$650 million investment; › Jobs equivalent to 5,000 person-years; › \$65 million revenues for the provincial government; › \$30 million revenues for the federal government.	+	Very high	› Information session with local development agencies immediately after securing the required authorizations and permits; › Dialogue with local development agencies will be maintained on a regular basis during the detailed engineering and construction phases of the project; › Exploration of training opportunities for local workers, especially in areas where there is already a labor shortage, such as trucking, and value-added logistic services.	Very high	MP # 03 Local benefits
Quality of Life and Health	› Vehicle and heavy machinery traffic; › Removal of vegetation cover; › Earthworks; › Dredging; › Sediment transportation and storage; › Construction of the new wharf.	› Disturbance and loss of quality of life due to increased nuisance; › Prejudice caused to some valued components affecting the quality of life and health: air quality, sound and visual environments, water surface quality, public infrastructure and equipment, recreotouristic activities and economic benefits.	-	See each valued component	› See each valued component.		MP # 01 Communication with Stakeholders; MP # 02 Complaint Management; MP # 03 Local Benefits; MP # 04 Health and Safety of Employees and Workers during Construction; MP # 05 Health and Safety of Local Populations; MP # 14 Air Quality; MP # 16

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
							Noise and Vibration; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 23 Transportation and Traffic; MP # 27 Visual Environment.
ABORIGINAL PEOPLES							
Aboriginal Rights and Land Claims	<ul style="list-style-type: none"> › All project activities 	<ul style="list-style-type: none"> › The proposed project does not interfere with any comprehensive or specific claims under way; › Recognition of such rights fall within the jurisdiction of the Crown. 		Undetermined	<ul style="list-style-type: none"> › The MPA will meet with each of the Aboriginal groups twice a year during construction in order to keep them informed of the works. › A first meeting will be held around April to present the work planning for the summer season and the environmental and social protection measures that will be implemented. This meeting will be accompanied by a site visit; › A second meeting will be held around December to discuss the results of the work season (including dredging) and the effectiveness of environmental and social protection measures. › The agenda will be established in a collaborative manner. 	Undetermined	MP # 06 Aboriginal Peoples.
Aboriginal Fisheries - Species of Interest	<ul style="list-style-type: none"> › All activities that may affect surface water quality (site preparation, dredging, storage, dewatering of dredged material and concreting); › Construction of the wharf; › Installation of the drainage system (backfilling of a section of the Fossé Noir and Ruisseau 1 (storage area 4), underground piping of Ruisseau 2. › Noise caused by the construction of the wharf, particularly the installation of piles and sheet piles; › Dredging. 	<ul style="list-style-type: none"> › Consultations with Aboriginal groups highlighted the importance of fishing and species that are valued by Aboriginal groups; › According to the MPA's experience, the project site would rarely be used for fishing; › No spawning area is identified in the project area; › For Lac Saint-Pierre and its archipelago, the modeling of the dredging plume shows that quality criteria for TSS concentration will not be exceeded. The water quality in Lac Saint-Pierre and its archipelago would therefore not be affected; › Aboriginal groups have also raised concerns about the copper redhorse and its habitat; › The proposed project site is not a vital site for Eels. 	-	Negligible	<p>In response to concerns expressed by Aboriginal groups regarding fishing and the protection of fish and fish habitat:</p> <p><u>Before construction</u></p> <ul style="list-style-type: none"> › If additional surveys of species present in the project area are required, the MPA will invite Aboriginal groups to participate. <p><u>Construction Phase</u></p> <ul style="list-style-type: none"> › The MPA is committed to involving Aboriginal groups in monitoring programs related to fish and fish habitats, to the extent possible and within their jurisdictions; › During the biennial meetings, the MPA will present measures put in place for the protection of fish and fish habitat during construction and the effectiveness of these measures; › Aboriginal groups may contact the MPA at any time to obtain information or to report concerns about this component. 	Negligible	MP # 06 Aboriginal Peoples; MP # 17 Surface Waters; MP # 20 Reduction of the Spread of Invasive Alien Species; MP # 21 Fish and Fish Habitat.

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Land and Resource Use for Traditional Purposes	<ul style="list-style-type: none"> › All project activities 	<ul style="list-style-type: none"> › Significance of traditional activities for Aboriginal groups and concerns about maintaining activities on the St. Lawrence River; › The MPA territory is surrounded by industrial and agricultural activities, and by the Contrecoeur and Verchères municipalities. It is unlikely that members of the Aboriginal communities will exercise rights (hunting, fishing, trapping or other recreational activities) at this location; › Some species and habitats will be affected by construction activities in the project area, but the project will not have a direct impact on the use of lands and resources by Aboriginal groups; › The project will not cause impediments to recreational boating on the St. Lawrence River. 	-	Negligible	<p>In response to concerns expressed by Aboriginal groups:</p> <p><u>Before construction</u></p> <ul style="list-style-type: none"> › If additional surveys of species present in the project area are required, the MPA will invite Aboriginal groups to participate. <p><u>Construction phase</u></p> <ul style="list-style-type: none"> › The environmental management plan implemented during the construction phase will include an Aboriginal component, which will aim to communicate the effectiveness of the measures put in place; › The MPA will carry out environmental follow-ups as required by concerned authorities. Aboriginal groups will be invited to accompany the MPA team during these follow-ups; › Specific monitoring will be required for sediment management. Aboriginal concerns about the St. Lawrence River and its environment will be addressed by the MPA; › The MPA will present environmental monitoring results during construction at the biennial meetings between the MPA and the Aboriginal groups. 	Negligible	<p>MP # 06 Aboriginal Peoples; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.</p>
Health and Quality of Life		<ul style="list-style-type: none"> › None of the construction activities will directly affect Aboriginal Peoples whose communities are located several kilometers away from the project site and outside the local study area. 	-	Negligible	<ul style="list-style-type: none"> › All mitigation measures and specific measures relative to environmental protection apply to this component, including those related to the involvement of Aboriginal groups in environmental monitoring; › If issues related to the health and quality of life of Aboriginal populations were to arise during the project, these will be discussed during the biennial meetings planned during construction; › The MPA remains available to Aboriginal groups to respond to any questions. 	Negligible	<p>MP # 04 Health and Safety of Employees and Workers during Construction; MP # 06 Aboriginal Peoples.</p>
Archaeological and Historical Heritage	<ul style="list-style-type: none"> › Deforestation and earthworks; › Dredging, transportation, transshipment and disposal of sediments. 	<ul style="list-style-type: none"> › Potential disturbance of archaeological remains. 	-	Very High	<p>In addition to the mitigation measures proposed above, specific measures for Aboriginal groups will be implemented:</p> <p><u>On land</u></p> <ul style="list-style-type: none"> › Involvement of Aboriginal groups in archaeological inventories to take place before the project construction begins; › If archaeological excavations were to take place, the MPA commits to involve Aboriginal groups; › Aboriginal groups will have the opportunity to review archaeological excavation reports; › If artifacts are found, and depending on their nature, an agreement will be reached with a local museum or with Aboriginal organizations to receive the remains for conservation purposes; › Aboriginal groups will be involved in archaeological monitoring; 	Nil (positive)	<p>MP # 06 Aboriginal Peoples; MP # 08 Earthworks, Excavation and Leveling Works; MP # 26 Heritage and Archaeological Sites.</p>

Table 6.4 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Construction Phase (cont.)

Environmental Component	Impact Source	Impact Description	Impact		Prevention, Mitigation, or Compensation Measures	Significance of Residual Effects	Management Plans
			+/-	Impact Significance ¹			
					<ul style="list-style-type: none"> › Aboriginal groups will be consulted during the preparation of the protocol for accidental discovery. <u>In water</u> › Aboriginal people will collaborate in inventories including visual inspection of surface and underwater banks, remote sensing inventory, diving surveys of the two sensitive areas identified, and additional surveys if required; › Aboriginal groups will be involved in archaeological monitoring during dredging; › Aboriginal groups will be consulted during the preparation of the protocol for accidental discovery. 		
Economic Spinoffs and Aboriginal Employment	› All project activities	<ul style="list-style-type: none"> › \$650 million investment; › Jobs equivalent to 5,000 person-years; › \$65 million revenues for the provincial government; › \$30 million revenues for the federal government. 	+	Undetermined	<p>In response to concerns expressed by Aboriginal groups:</p> <ul style="list-style-type: none"> › The MPA will convene an initial meeting with Aboriginal groups to discuss the future labor needs, services and skills of each of the Aboriginal groups, and training needs. <p>In addition, the MPA commits to:</p> <ul style="list-style-type: none"> › Inform Aboriginal groups directly about the operation of the MPA's tendering process; › Establish a monitoring system for Aboriginal groups economic benefits; › Discuss issues related to economic spinoffs of the project during the biennial meetings. 	Undetermined	MP # 06 Aboriginal Peoples.

Note:

¹ For the biological and human environments only.

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
PHYSICAL ENVIRONMENT							
Air Quality	<ul style="list-style-type: none"> › Combustion of fossil fuels by trucks and container handling vehicles engines, and by locomotives generators, refrigerated containers and ship engines; › Road transportation activities generating fugitive emissions of particulate matters. 	<ul style="list-style-type: none"> › Increased concentrations of contaminants in ambient air, especially NO₂ and particulate matters; › Maximum project contribution ranging from less than 1% to 35% of standards, depending on contaminant. 	-	Low (human health)	<ul style="list-style-type: none"> › Electric cranes; › Use of electric vehicles for container handling; › Use of multi-generator locomotives; › Shore power connections for docked ships, for ships fitted with this type of connection; › Cleaning of the terminal's roads, traffic areas and container storage areas. 	Low (human health)	MP # 14 Air Quality.
Greenhouse Gas (GHG) Emissions	<ul style="list-style-type: none"> › Transportation and handling of containers. 	<ul style="list-style-type: none"> › The annual GHG emissions at the project site during the operation are estimated to be approximately 30,000 tons of CO₂ equivalent per year. 	-	Moderate (human health)	<ul style="list-style-type: none"> › Electric cranes; › Use of electric vehicles for container handling; › Use of multi-generator locomotives; › Shore power connections for docked ships, for ships fitted with this type of connection. 	Moderate (human health)	MP # 15 Greenhouse Gas Emissions.
Hydrography	<ul style="list-style-type: none"> › Presence of the drainage system, culverts and underground pipes; › Presence of the dredged material storage areas. 	<ul style="list-style-type: none"> › Conversion of natural land surfaces to impervious cover; › Modification of local hydrography. 	-	---	<ul style="list-style-type: none"> › Installation of vegetated ditches; › Installation of surface retention basins to store water generated by an annual rainfall and evacuate them at a flowrate that allows the release of heavy, short-duration rains over a period of 24 hours, in order to control erosion; › Fossé Noir possibly recreated in its original natural bed which will restore natural hydrology in the area. 	---	MP # 8 Earthworks, Excavation and Leveling Works; MP # 9 In-Water Works.
St. Lawrence River Current and Sediment Regime	<ul style="list-style-type: none"> › Presence of the approach area; › Presence of the wharf; › Maintenance dredging. 	<ul style="list-style-type: none"> › Disturbance of the flow pattern nearby the wharf; › Limited increase in current velocity and sediment mobility upstream and downstream of the wharf; › Sediment suspension and disposal during maintenance dredging. 	-	---	<ul style="list-style-type: none"> › Increase substrate roughness by adding pebbles and blocks could contribute to reducing current velocity near the bottom, if required; › A follow-up program of seagrass beds will be implemented to verify the simulations results; › Operational controls put in place to limit the generation and migration of TSS during maintenance dredging works; 	---	MP # 10 Dredging works.
Ice in the St. Lawrence River	<ul style="list-style-type: none"> › Presence of the wharf and approach area. 	<ul style="list-style-type: none"> › The changes anticipated in the current's flow pattern and velocity will influence ice formation and drift in the immediate vicinity of the wharf. 	-	---	<ul style="list-style-type: none"> › Presence of tug boats to break ice accumulations if necessary. 	---	
Wake Wave and Erosion of the St. Lawrence Shoreline	<ul style="list-style-type: none"> › Ship sailing; › Maneuvering of ships and tugs. 	<ul style="list-style-type: none"> › Maximum potential increase ranging from 2.6% to 4% in the annual total shoreline recession, when operated at full capacity. 	-	---	<ul style="list-style-type: none"> › Pursue the voluntary ship speed reduction program. 	---	

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase (cont.)

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Surface Water Quality	<ul style="list-style-type: none"> › Discharge of runoff water; › De-icing and waste snow management; › Ship sailing and maneuvering; › Maintenance dredging; › Maintenance of watercourses; › Trucks, train, and machinery traffic. 	<ul style="list-style-type: none"> › Hydrocarbons, TSS, dissolved salts or organic matter inputs. 	-	---	<ul style="list-style-type: none"> › Periodic inspections of the site's drainage network and water treatment equipment; › Monitoring program for drainage waters and discharge points into the receiving environment; › Environmental monitoring during maintenance dredging. 	---	MP # 10 Dredging Works; MP # 12 Equipment Maintenance and Refueling; MP # 17 Surface Waters; MP # 25 Residual Hazardous Materials.
Nature and Quality of Soils	<ul style="list-style-type: none"> › No significant effects are anticipated on the nature and the quality of soils. 	---	-	---	---	---	---
Noise Environment	<ul style="list-style-type: none"> › Docked ships; › Transshipment and handling of containers between the wharf, the container yard and the intermodal yard; › Trucks and trains on site. 	<ul style="list-style-type: none"> › Noise levels increase; › With the installation of the visual and sound barriers, the anticipated sound levels will meet the MDDELCC acceptability criteria at all assessment points. 	-	Low to moderate	<ul style="list-style-type: none"> › A 4 m visual barrier with a 6 m sound barrier, for a total height of 10 m, over a length of 150 m, on the southwestern boundary of the project area; › Use of wide frequency band motion alarms; › Programmed deceleration of lifting yokes and gantry cranes reducing impact noise; › Shore power connections for docked ships, for those fitted with this type of connection; › Noise level monitoring program. 	Low to moderate	MP # 16 Noise and Vibrations.
BIOLOGICAL ENVIRONMENT							
Terrestrial Vegetation	<ul style="list-style-type: none"> › Presence of infrastructure; › Machinery and heavy vehicle traffic. 	<ul style="list-style-type: none"> › Permanent loss of terrestrial vegetation; › Disturbance of terrestrial vegetation near facilities by generation of dust. 	-	Low	<ul style="list-style-type: none"> › Limit vehicles traffic to authorized areas; › Monitoring of vegetation recovery in re-vegetated areas, particularly along Route 132 where trees were planted. 	Low	MP # 13 Demobilization and Rehabilitation of Work Areas; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 20 Reduction of the Spread of Invasive Alien Species.
Aquatic Vegetation and Wetlands	<ul style="list-style-type: none"> › Navigation; › Ship approach and departure maneuvers; › Presence of the wharf; › Maintenance dredging. 	<ul style="list-style-type: none"> › Modification of the hydrosedimentological regime leading to a potential degradation of seagrass beds; › Inflow of sediment in seagrass beds during maintenance dredging. 	-	High	<ul style="list-style-type: none"> › Program to monitor the evolution of seagrass beds surface area and quality; › In the event of significant changes, additional mitigation measures will be identified. 	Moderate	MP # 10 Dredging Works; MP # 19 Vegetation Cover and Wetlands Protection and Restoration.

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase (cont.)

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Special-Status Plant Species	<ul style="list-style-type: none"> › Machinery and heavy vehicle traffic. 	<ul style="list-style-type: none"> › Protection of three plant species vulnerable to harvesting: Wild Ginger, Ostrich Fern and Bloodroots. 	-	Low	<ul style="list-style-type: none"> › Limit vehicles traffic to work areas; › Controlled access; › Prohibit employees to harvest or pick plants. 	Low	MP # 13 Demobilization and Rehabilitation of Work Areas; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 20 Reduction of the Spread of Invasive Alien Species.
Benthic Fauna	<ul style="list-style-type: none"> › Maintenance dredging; › Navigation; › Ship approach and departure maneuvers. 	<ul style="list-style-type: none"> › Modification of the hydrosedimentological regime leading to potential degradation of seagrass; › Possible introduction of invasive alien species due to presence of additional ships; › Modification of benthic fauna habitat during maintenance dredging. 	-	Low	<ul style="list-style-type: none"> › Continue the implementation of ballast water management measures; › Measures identified to preserve surface water quality. 	Low	MP # 10 Dredging Works; MP # 17 Surface Waters.
Fish and Fish Habitat	<ul style="list-style-type: none"> › Physical presence of the wharf; › Maintenance dredging; › Maintenance of watercourses; › Ship sailing and maneuvering; › Discharge of runoff water; › De-icing and waste snow management; › Navigation. 	<ul style="list-style-type: none"> › Modification of the hydrosedimentological regime leading to potential degradation of seagrass and therefore of fish habitat; › Decreased water quality and degradation of fish habitat; › Underwater noise. 	-	High	<ul style="list-style-type: none"> › Measures identified to preserve surface water quality; › Establishment of a follow-up program to monitor progress of seagrass beds and potential changes to habitats; › In the event of significant changes to fish habitat downstream of the wharf, the compensation program will be enhanced; › Biological monitoring program of wildlife species on the MPA territory in Contrecoeur. 	Moderate	MP # 10 Dredging Works; MP # 17 Surface Waters; MP # 21 Fish and Fish Habitat.
Herpetofauna	<ul style="list-style-type: none"> › Transshipment operations; › Loading and unloading of trucks and trains; › Truck and train traffic. 	<ul style="list-style-type: none"> › Disturbance caused by noise and light; › Mortality due to collision. 	-	Moderate	<ul style="list-style-type: none"> › Luminosity reduction measures; › Noise reduction measures; › Reduced risk of road mortality through measures to control the speed of transporters and terminal workers, including awareness raising, setting up signs and the presence of speed bumps. 	Moderate	MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.
Birds and their Habitats	<ul style="list-style-type: none"> › Truck and train traffic; › Activities at the terminal. 	<ul style="list-style-type: none"> › Disturbance caused by noise and light. 	-	Moderate	<ul style="list-style-type: none"> › Luminosity reduction measures; › Noise reduction measures. 	Moderate	MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase (cont.)

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Mammals	<ul style="list-style-type: none"> › Truck and train traffic; › Activities at the terminal; › Installation of a peripheral fence. 	<ul style="list-style-type: none"> › Disturbance caused by noise and light; › Mortality due to collisions; › Reduction of use of fenced environments by large wildlife. 	-	Low	<ul style="list-style-type: none"> › Luminosity reduction measures; › Noise reduction measures; › Fencing of the project site, limiting the intrusion of large wildlife on the traffic lanes of the terminal; › Measures to reduce risk of collision and control the speed of transports and terminal workers by raising awareness, putting up signs and the presence of speed bumps. 	Low	MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.
Special-status Wildlife Species	<ul style="list-style-type: none"> › Impact sources in the operation phase are the same as those affecting species with no special-status. 	<ul style="list-style-type: none"> › See the respective table section for each wildlife group for the following: <ul style="list-style-type: none"> – Benthic Fauna: Elephant ear, Spike, Fragile Papershell and Hickorynut; – Fish: American Eel, Splitnose Rockfish, River Redhorse, Rainbow Smelt, Lake Sturgeon, Channel Darter, Bridle Shiner, Brassy Minnow and Rosyface Shiner; – Herpetofauna: Western Chorus Frog, Eastern Milk snake, Wood Turtle, Map Turtle and Snapping Turtle; – Birds: Least Bittern, Peregrine Falcon, Wood Thrush, Bank Swallow, Barn Swallow, Eastern Wood Pewee, Rusty Blackbird and Eastern Meadowlark; – Mammals: Silver-haired Bat, Hoary Bat Eastern Red Bat, Little Brown Bat and Tri-colored Bat; – Other wildlife species: Monarch Butterfly. 	-	Benthic Fauna: Moderate Fish: High Herpetofauna: High Birds: Moderate Mammals: High Other wildlife species: Nil	<ul style="list-style-type: none"> › Monitoring of seagrass beds downstream of the wharf and enhancement of the Copper Redhorse habitat compensation plan in the event of significant changes to fish habitat; › Continue the long-term monitoring of the Western Chorus Frog population within the MPA territory; › Continue long-term monitoring of wildlife in general within the MPA territory. 	Benthic Fauna: Moderate Fish: Moderate Herpetofauna: Moderate Birds: Moderate Mammals: Moderate Other wildlife species: Nil	MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 21 Fish and Fish Habitat; MP # 22 Terrestrial Wildlife.
HUMAN ENVIRONMENT (other than Aboriginal)							
Agricultural Activities	<ul style="list-style-type: none"> › Permanent presence of the wharf, the container storage area and the transportation infrastructure (intermodal yard, railway and access road). 	<ul style="list-style-type: none"> › Fragmentation of agricultural lands on the MPA territory; › Disturbance of agricultural machinery traffic. 	-	Low	<ul style="list-style-type: none"> › Make reduced areas available to accommodate agricultural activities within the MPA territory, if possible. 	Low	
Tourism Activities	<ul style="list-style-type: none"> › Ship approach and departure maneuvers; › Goods transshipment; › Maintenance dredging. 	<ul style="list-style-type: none"> › Loss of the hunting potential near the wharf; › Disruption of recreational boating activities; › New potential bike path on the barrier wall along the Route 132; › Disruption of quad and snowmobile traffic at the intersection with the Montée de la Pomme-d'Or; 	-	Low	<ul style="list-style-type: none"> › Maintain/add wooded areas along Route 132; › Install appropriate hazard and traffic signs on Route 132, Montée Lapierre and Montée de la Pomme-d'Or; › Inform stakeholders in advance of project activities that may have a temporary impact on recreational activities; › Raise awareness amongst boaters and paddlers, through associations or group of users, on the presence of port facilities and goods transshipment operations. 	Low	MP # 01 Communication with Stakeholders; MP # 02 Complaint Management; MP # 05 Health and Safety of Local Populations.

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase (cont.)

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
		<ul style="list-style-type: none"> › Very low (hardly noticeable) effects on resources for fishing (fish) and hunting (waterfowl). 					
Public Infrastructures	<ul style="list-style-type: none"> › Presence and movement of workers; › Transportation of goods by truck and by train; › Drinking water supply; › Sanitary wastewater management. 	<ul style="list-style-type: none"> › Increased pressure on road and railway networks by trucks and worker's vehicle traffic, and of trains on the railway; › Increased residential needs in Contrecoeur and surrounding cities. 	-	Moderate	<ul style="list-style-type: none"> › Proceed to required interventions on the local road network in order to guarantee functional and safe traffic conditions; › In a timely manner, inform stakeholders about terminal activities and potential impacts; › Install appropriate hazard and traffic signs on Route 132, Montée Lapierre and Montée de la Pomme-d'Or; › Reduced speed and speed bumps on the project site; › Clean roadways with a street cleaner if necessary; › Coordinate the required road works with the Ministry of Transports, if necessary; › Monitor industrial and municipal water intakes during maintenance dredging. 	Moderate	<ul style="list-style-type: none"> MP # 01 Communication with Stakeholders; MP # 02 Complaint Management; MP # 05 Health and Safety of Local Populations; MP # 23 Transportation and Traffic; MP # 24 Residual Materials.
Commercial Shipping	<ul style="list-style-type: none"> › Transit of ships to the new port terminal; › Goods transshipment operations. 	<ul style="list-style-type: none"> › Increased maritime traffic. 	-	Low	<ul style="list-style-type: none"> › Optimize the port facilities layout, especially the approach and docking area, based on maneuver simulations; › Follow current navigation rules and procedures; › Provide ships with the required equipment and support to facilitate their approach, mooring and sail-setting; › Raise awareness amongst St. Lawrence River users on the presence of voluntary speed reduction areas through the Canadian Coast Guard and through Navigation notices; › In a timely manner, inform stakeholders about project activities and potential impacts on commercial shipping (temporary bans, complaint management mechanism, etc.). 	Low	
Visual Environment (Landscape and Luminosity)	<ul style="list-style-type: none"> › Ship-to-shore cranes (eight cranes with a maximum height of 95 m when the boom is raised); › Container yard; › Gantry cranes of the intermodal yard; › Marshalling yard and railway tracks; › Storage areas for dredged materials; › Support buildings; › Degree of luminosity generated by the project. 	<ul style="list-style-type: none"> › Modification of the visual landscape mainly for mobile observers; › Increased nighttime light sources. 	-	Based on the landscape FL: Major UR1, AG1, AG2, IS1: moderate IS2: minor UR2, UR3, ID: Nil	<ul style="list-style-type: none"> › Use of a neutral color for the ship-to-shore cranes; › Installation of a visual screen consisting of a vegetated slope along the northern edge of Route 132 and the western boundary of the MPA territory; › Plantation of coniferous trees along some residences; › Reduction of luminous flux towards the sky; › Optimization of the density and the level of illumination (lux); › Use of a specific lighting color (e.g. amber color); › Use lighting fixtures in accordance with standard BNQ 4930-100 / 2016; › Reduction of luminous flux crossing the property limits; › Tree plantation as soon as construction begins through a reforestation program. 	Based on the landscape FL: Moderate UR1, AG1, AG2, IS1, IS2: minor UR2, UR3, ID: Nil.	<ul style="list-style-type: none"> MP # 07 Deforestation; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 27 Visual Environment.

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase (cont.)

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Public Safety	<ul style="list-style-type: none"> › Transportation of hazardous materials; › Goods transshipment operations; › Truck and train traffic. 	<ul style="list-style-type: none"> › Risk of hazardous materials spillage; › Risk of collisions. 	-	High	<ul style="list-style-type: none"> › Observe current regulations on the transportation of hazardous materials; › Store hazardous goods at various locations in the container yard; › Establish hazardous materials monitoring procedures (handling and storage); › Establish an emergency plan in case of spills or collisions; › Presence of customs authorities at the port site; › Presence of an MPA fire prevention officer during hazardous material transshipment activities; › In a timely manner, inform stakeholders about project activities and potential impacts (e.g. schedule of maintenance dredging works); › Install appropriate traffic signs on Route 132, Montée Lapierre and Montée de la Pomme-d'Or; › Secure access to port facilities; › Put in place a security team; › Apply Transport Canada's and border services safety measures and MPA control measures and monitor their implementation; › Raise awareness amongst St. Lawrence River users on the presence of voluntary speed reduction areas through the Canadian Coast Guard and through Navigation notices. 	Moderate	MP # 01 Communication with Stakeholders; MP # 02 Complaint Management; MP # 05 Health and Safety of Local Populations; MP # 23 Transportation and Traffic; MP # 24 Residual Materials; MP # 25 Residual Hazardous Materials.
Archaeological and Historical Heritage	<ul style="list-style-type: none"> › Given the analyses, inventories and excavations carried out during the construction phase, no project activity will affect the archaeological remains that will remain in the project area. 			Nil	<ul style="list-style-type: none"> › If further excavation work is to be carried out outside the developed areas during the operation phase, the same mitigation measures as during the construction period will apply. 	Nil	MP # 26 Heritage and Archaeological Sites.
Economic Benefits	<ul style="list-style-type: none"> › All terminal operations. 	<ul style="list-style-type: none"> › 950 jobs/year in Quebec; › 123 jobs/year in the rest of Canada; › \$18 million/year of revenue for Quebec; › \$9 million/year of revenue for Canada. 	+	Very high	<ul style="list-style-type: none"> › Maintain communication with local development agencies and chambers of commerce to keep companies informed on labor, goods and services needs; › Define and communicate labor requirements in advance to relevant organizations, in order to train local workers and maximize their involvement in project operations; › Contribute to the diversification of economic activities within the territory of the city of Contrecoeur and the region, in collaboration with local organizations. 	Very high	MP # 03 Local Benefits.

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase (cont.)

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Quality of Life and Health of the Population	<ul style="list-style-type: none"> › Ship approach, mooring and sail-setting; › Transshipment of container ships; › Handling and storage of containers on the MPA site; › Truck and train traffic; › Presence of workers. 	<ul style="list-style-type: none"> › Disturbance and loss of quality of life due to increased nuisances; › Prejudice caused to some valued components affecting the quality of life and health: air quality, noise and visual environments, water surface quality, public infrastructure and equipment, recreotouristic activities and economic benefits. 	-	See each valued component	Measures affecting the valued environmental components are related to: <ul style="list-style-type: none"> › Communication; › Complaint management; › Economic spin-offs and employment; › The health and safety of workers, the public and the local population; › Control of nuisances such as air quality, noise and vibration; › Traffic on local roads; Mitigation measures are presented in the management plans for each of these components.	Moderate	MP # 01 Communication with Stakeholders; MP # 02 Complaint Management; MP # 03 Local Benefits; MP # 04 Health and Safety of Employees and Workers during Construction; MP # 05 Health and Safety of Local Populations; MP # 14 Air Quality; MP # 16 Noise and Vibrations; MP # 23 Transportation and Traffic; MP # 27 Visual Environment.
ABORIGINAL PEOPLES							
Aboriginal Rights and Land Claims	<ul style="list-style-type: none"> › All project activities. 	<ul style="list-style-type: none"> › The proposed project does not interfere with any comprehensive or specific claims under way; › Recognition of such rights is the responsibility of the Crown. 		Undetermined	<ul style="list-style-type: none"> › The MPA will annually meet with each Aboriginal group to report on port operations and to discuss issues of concern to Aboriginal groups; › The agenda will be established in a collaborative manner; › Site visits can be made upon request. 	Undetermined	MP # 06 Aboriginal Peoples.
Aboriginal Fisheries - Species of Interest	During operation, sources of impact on fish habitat are related to activities that will affect surface water quality and hydrodynamics: <ul style="list-style-type: none"> › Presence of the wharf; › Maintenance dredging; › Maintenance of the drainage network; › Navigation and maneuvering of ships; › Runoff discharge; › De-icing and waste snow management. 	<ul style="list-style-type: none"> › No particular effects are anticipated on American Eel, Yellow Perch and Sturgeon, which are species of particular concern to Aboriginal groups; › Only a small portion of the Lake Sturgeon juvenile feeding area is likely to have minimal effects, and other similar habitats are nearby; › The Lac Saint-Pierre and its archipelago should not be affected by the terminal operation. Maintenance dredging will be much less than the dredging required for construction and, thus, it is anticipated that TSS and their dispersion will not affect this sector. 	-	Negligible	<ul style="list-style-type: none"> › In response to concerns expressed by Aboriginal groups regarding fishing and the protection of fish and fish habitat; › Involvement of Aboriginal groups in the biological monitoring program for wildlife species, which will include monitoring of fish species in streams and shoreline of the MPA territory, as well as in the monitoring of grassbeds and Copper Redhorse habitat; › If mitigation measures are required based on the observed changes, the MPA will inform and involve Aboriginal groups. The same applies in the case where compensation measures should be improved; › MPA will report the results of the follow-ups during the annual meetings. MPA will also present measures identified to preserve water quality and follow-ups that apply; › Aboriginal groups may contact the MPA at any time to obtain information or to report concerns about this component. 	Negligible	MP # 06 Aboriginal Peoples; MP # 17 Surface Waters; MP # 20 Reduction of the Spread of Invasive Alien Species; MP # 21 Fish and Fish Habitat.

Table 6.5 Summary of Impacts and of Prevention, Mitigation or Compensation Measures during the Operation Phase (cont.)

Environmental Impact	Impact Source	Impact Description	Impact		Prevention, Mitigation or Compensation Measures	Significance of the Residual Effects	Management Plans
			+/-	Impact Significance ¹			
Land and Resource Use for Traditional Purposes	<ul style="list-style-type: none"> Noise disturbance by terminal activities, operations of trucks, trains and machinery, increasing mortality risk on roads; Installation of a peripheral fence. 	<ul style="list-style-type: none"> Significance of traditional activities for Aboriginal groups and concerns about maintaining activities in the St. Lawrence River; The MPA's territory is surrounded by industrial and agricultural activities, and by the Contrecoeur and Verchères municipalities. It is unlikely that members of the Aboriginal communities will exercise rights (hunting, fishing, trapping or other recreational activities) at this location; Some species and habitats will be affected by the operation of the terminal, but the project will not have a direct impact on the use of lands and resources by Aboriginal groups; The operation phase will not cause impediments to recreational boating on the St. Lawrence River. 		Negligible	In response to concerns expressed by Aboriginal groups: <ul style="list-style-type: none"> The MPA will meet with each Aboriginal group on an annual basis. An annual review of port operations will be presented, as well as the environmental protection and monitoring elements that apply. The agenda will be established in a collaborative manner with each group; The MPA remains available at all times to discuss issues related to future terminal operations. 	Negligible	MP # 06 Aboriginal Peoples; MP # 19 Vegetation Cover and Wetlands Protection and Restoration; MP # 22 Terrestrial Wildlife.
Health and Quality of Life	<ul style="list-style-type: none"> During the operational phase, no impact sources will directly affect Aboriginal groups whose communities are located at several kilometers from the project site and outside the local study area. 		-	Negligible	<ul style="list-style-type: none"> All mitigation measures and specific measures relative to environmental protection apply to this component, including those relating to the involvement of Aboriginal groups in environmental monitoring; If issues related to the health and quality of life of Aboriginal populations were to arise during operation, these will be discussed during the planned annual meetings; The MPA remains available to Aboriginal groups to respond to any questions. 	Negligible	MP # 06 Aboriginal Peoples.
Archaeological and Historical Heritage	<ul style="list-style-type: none"> Given the analyses, inventories and excavations carried out during the construction phase, no project activity will affect the archaeological remains that will remain in the project's right-of-way. 			Nil	<ul style="list-style-type: none"> If further excavation work is to be carried out outside the developed areas during the operation phase, the same mitigation measures as during the construction period will apply. 	Nil	MP # 26 Heritage and Archaeological Sites.
Economic Spin-offs and Aboriginal Employment	<ul style="list-style-type: none"> All project activities. 	<ul style="list-style-type: none"> 950 jobs/year in Quebec; 123 jobs/year in the rest of Canada; \$18 million/year of revenue for Quebec; \$9 million/year of revenue for Canada. 	+	Undetermined	In response to concerns expressed by Aboriginal groups: <ul style="list-style-type: none"> Directly inform Aboriginal groups about how the MPA's tendering process works; Establish a monitoring system for Aboriginal groups economic benefits; Discuss issues related to economic spinoffs of the project during annual meetings. 	Undetermined	MP # 06 Aboriginal Peoples.

Note:
¹ For the biological and human environments only.

6.3 Cumulative Effects

The cumulative effects of the project were described and assessed in accordance with the Operational Policy Statement titled *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012*. Cumulative effects are the changes to the environment caused by the project, combined with the effects of other works or projects, past, present and reasonably foreseeable in the future.

Spatial and temporal boundaries have been fixed to examine both the potential environmental effects on the project's CVs and those of other concrete activities past or future. Spatial boundaries are adapted to each component and generally extend to the local study area and beyond. In the particular case of the biological components, a Montreal-Sorel regional study area was defined to include the section of the St-Lawrence River between these two municipalities as well as its riparian areas.

The past temporal boundary was fixed at 1954, when industrial activities began in Contrecoeur, which also allows to include the urban and economic development in the region. The future temporal boundary includes the three phases of completion of the Contrecoeur Maritime Terminal Expansion Project and extends to 2080.

A list of the main projects and past, present and future activities most likely to affect the selected valued components was drawn up from the available literature. These are presented in Table 6.6.

Among the future projects considered, the implementation of Phases 2 and 3 of the Contrecoeur Maritime Terminal includes the development of the entire western sector of the existing wharf, which would ultimately accommodate a container terminal reaching an annual capacity of 3.5 million TEUs. The completion of these subsequent phases will depend on the economic context and on the growth of container handling activities.

Table 6.6 Past, Present and Future Activities, Projects and Events Likely to Impact Valued Components

Activity/ Project/Event	Past	Present	Future	Air quality and GHG	Hydrosedimentological regime of the St. Lawrence River	Water quality	Terrestrial vegetation, wetlands and riparian areas	Fish and fish Habitat	Birds and their habitats	Special-status wildlife species	Agricultural activities	Public infrastructures and facilities	Public safety	Quality of life	Protection of the St. Lawrence River and of its ecosystem
Increase of commercial shipping on St. Lawrence River	X	X	X		X	X	X	X	X	X					X
Dredging and maintenance of the shipping channel	X	X	X		X	X	X	X	X	X					X
Urbanization and development in riparian areas	X	X	X			X	X	X	X	X	X				X
Consolidation of the Contrecœur Industrial Zone	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Phases 2 and 3 - Contrecœur Maritime terminal			X	X	X	X	X	X	X	X	X	X	X	X	
Contrecœur Logistics Hub			X	X		X	X		X	X	X	X	X	X	
Contrecœur-Varennes IP Zone			X	X		X	X		X	X	X	X	X	X	
Contrecœur Technopole			X	X		X	X		X	X		X	X	X	
Cité 3000			X	X		X	X		X	X		X	X	X	

6.3.1 Air Quality and GHG

Historically, for the 1950 to 1970 period, air quality in southwestern Quebec has gradually deteriorated with the industrial development and the rapid expansion of automobile use. Since then, air quality has improved significantly with the emergence of environmental laws and various regulations at various levels of government limiting air emissions from different sectors.

The future development phases of the Contrecœur Maritime Terminal will result in GHG emissions. Future fuel consumption rates are likely to be lower as engines are likely to perform better or be reliant on electricity. It is difficult to estimate the impact on air quality and GHG emissions of other identified future projects. Contrecœur’s Logistics Hub, which is expected to improve the efficiency of regional trucking and train transportation services, could potentially contribute to reduced regional air emissions.

Air quality related to the container handling activities in Contrecoeur will be monitored during the operation of the project currently under study. The follow-up program will be extended and adapted during subsequent phases of the terminal's development.

6.3.2 Hydrosedimentological Regime of the St. Lawrence River

The flow of the St-Lawrence River has been generally modified in the past by the implementation of dams and of other regulating structures, but also by important works carried out in the fluvial section during the 20th century (dredging of the shipping channel, deposit of dredged material, etc.).

Development Phases 2 and 3 of the Contrecoeur Maritime Terminal will have impacts on the local hydrosedimentological regime. Extending the wharf over a total distance of almost 2 km and increasing the dredged area will potentially impact the hydrodynamic regime of the St. Lawrence River. Development Phases 2 and 3 involve a gradual extension of the length of the wharf, from 675 m (Phase 1) to 1,325 m (Phase 2) and then to about 2,000 m (Phase 3).

During dredging work for Phases 2 and 3 of the terminal's expansion, the mitigation measures identified to reduce the impact of the Phase 1 dredging work on surface water quality will be implemented. This will decrease sediment deposition rates.

The design and alignment of the wharf were completed with a long-term vision taking into account the three phases of the terminal's development and were assessed in order to limit hydrological impacts on the St. Lawrence River.

6.3.3 Water Quality

According to the overall state of the St. Lawrence River, the water quality has reached a critical level in the early 1970s. Interventions carried out in the late 1980s and early 1990s as part of the municipal water treatment program, among others, have greatly improved the quality of its waters.

The construction work for the subsequent phases of the Terminal's development may generally impact water quality on a site-specific and temporary basis. In fact, these future projects, such as Phase 1, involve numerous in-water works for the construction of wharves and the underground piping/diversion of watercourses.

With respect to other projects in the area, notably the Logistics Hub located upstream of the Fossé Noir, their construction could also lead to a degradation of surface water quality.

The creation of an Industrial Port Zone and the Technopole project will consolidate the development of the Contrecoeur industrial area, mainly by attracting new companies in the area. Depending on the specific type of industries that will develop in the area, the additional industrial effluents to be generated and the treatment systems to be put in place, the water quality of small streams flowing into the St. Lawrence River may be somewhat affected.

For the construction of Phases 2 and 3, all mitigation measures identified for Phase 1 and in applicable management plans will be adapted to the projects and environmental requirements in effect at the time of implementation.

During the operation of the new wharves in Phases 2 and 3, the stormwater monitoring program and, more importantly, discharge points into the receiving environment will be adapted to ensure that water treatment is effective and complies with environmental requirements.

6.3.4 Terrestrial Vegetation, Wetlands and Riparian Areas

The industrial, commercial and residential development has affected a large proportion of the riparian vegetation in the Montreal-Sorel section. Erosion has also resulted in a gradual degradation of the shoreline.

Table 6.7 summarizes estimated losses of terrestrial vegetation and wetlands for various projects that may have cumulative impacts, as well as the loss of grassbeds, specifically for the future development phases of the Contrecoeur Terminal. Overall, if all of the anticipated development projects materialize, this will have a significant impact on the vegetation of the local study area. It is estimated that more than 25% of the vegetation currently present in the local study area would be lost and replaced by industrial and commercial areas.

At the scale of the St. Lawrence River region from Montreal to Sorel, the economic development related to new port facilities and associated projects will likely increase residential and commercial development in the region, particularly on the south shore of the River, leading to increased pressure on vegetation and wetlands. The anticipated increase in commercial shipping, linked to the three development phases of the Contrecoeur maritime terminal, could lead to an increase in shoreline erosion.

The proposed additional mitigation measures and monitoring program are as follows:

- › Identify areas of ecological significance to be protected within the MPA's territory and develop a management plan for the territory's natural habitats based on ecological value;
- › Prepare a compensation plan for the loss of wetlands for each of the development phases 2 and 3;
- › Prepare a compensation plan for the loss of aquatic grassbeds (Copper Redhorse habitat) for each of the development phases 2 and 3;
- › Continuation of the voluntary ship speed reduction program.

Table 6.7 Type of Terrestrial Vegetation, Wetlands and Aquatic Environment in the Footprint of Various Projects under Study

Environment Type	Phase 1	Phase 2	Phase 3	Logistics Hub	Cité 3000	Technopole	Total	Total LSA ¹	% of the LSA
Agricultural area	47.8	2.0	8.4	178.9	-	-	237.1	694	34%
Forest environment	4.1 to 6.7	3.6	0.3	47.6	17.0	0.4	75.5	237.0	32%
Wetlands	2.0 to 2.6	7.7	4.4	15.4	1.7	1.6	33.4	637.0	5%
Fallow lands	16.6 to 19.6	8.0	8.6	82.4	3.6	18.4	140.8	328.0 ²	43%
Total terrestrial vegetation and wetlands	70.5 to 76.9	21.3	21.6	324.3	22.2	20.4	486.8	1,896.0	26%
Total aquatic vegetation (grassbeds)	0.4	1.5	2.2	-	-	-	4.0	n.a. ³	n.a. ³

Notes:

¹ LSA: Local Study Area;

² Includes areas identified as a grassy plain;

³ Accurate limits of aquatic grassbeds throughout the local study area are not available.

6.3.5 Fish and Fish Habitat

During the 20th century, the St. Lawrence River ecosystems suffered numerous disturbances which affected the fish populations such as: changes in the flow regime, degradation of the water quality, artificialization and shoreline erosion, decline of some plant and animal communities, etc.

The wharf extension for the development phases 2 and 3 will result in additional encroachment onto fish habitat. Losses below the 0-2 year flood elevation are estimated at 16.2 ha and 21.1 ha for Phases 2 and 3, respectively. If the losses generated during Phase 1 of the project are accounted for, there will be a cumulative loss of approximately 45 ha of fish habitat. Dredging operations will also affect fish habitat. Additional areas will need to be dredged if these projects occur, approximately 13.6 ha for Phase 2 and 21.6 ha for Phase 3. The total dredged area would extend over 51.5 ha for all three development phases (1, 2 and 3).

These new developments will add to existing pressures on fish populations related to, urbanization in the region, the dredging of the shipping channel in recent decades and shoreline erosion linked in part to the commercial shipping growth, among others.

The proposed additional mitigation measures and proposed monitoring program are as follows:

- › Prepare a compensation plan for the loss of fish habitat for each of the development phases 2 and 3;
- › Prepare a compensation plan specifically for the loss of grassbeds for each of the development phases 2 and 3;
- › All mitigation measures for the “fish and fish habitat” component identified for Phase 1 will also be implemented to reduce cumulative impacts in Phases 2 and 3, in addition to the measures that will be required by the authorities responsible for authorizing the expansion projects.

6.3.6 Birds and their Habitats

The riparian area between Montreal and Sorel underwent strong development pressure in recent decades. This has led to the degradation of natural riparian habitats, and a large proportion of shorelines are now artificialized.

If all anticipated development projects take place, it is estimated that approximately 30% of woodlands and 5% of wetlands in the local study area will disappear and be replaced by industrial or commercial facilities. Over time, birds will increasingly avoid the industrial and port sector of Contrecoeur due to a lack of favorable habitat.

Natural shores west of the existing wharf will gradually disappear due to the wharf’s construction over a total distance of nearly 2 km for Phases 2 and 3. Since these future infrastructures are located in a WFGA, they will affect waterfowl and shorebirds habitat in the area. Waterfowl and shorebirds could eventually completely avoid this area which will be dedicated to port activities.

Other projects implemented in the area, such as the Logistics Hub, the creation of an industrial port area and the Technopole project, will lead to increased noise and luminosity, which will, adding to habitat loss, also lead to the local study area’s industrial sector being less frequented by the avifauna community.

The economic development related to the new port facilities and associated projects will increase the demand for residential and commercial development at the regional level, resulting in increased pressure on bird habitats.

Shoreline erosion potentially caused by additional commercial navigation could affect the riparian habitats of birds. This navigation can also be a source of potential disturbance to birdlife.

The proposed additional mitigation measures and monitoring program are as follows:

- › Identify areas of ecological significance to be protected within the MPA's territory and develop a management plan for the territory's natural habitats;
- › Prepare a compensation plan for the loss of wetlands for each of the development Phases 2 and 3.

6.3.7 Special-Status Wildlife Species

Cumulative impacts on special-status wildlife species are anticipated, including benthic, fish, herpetofauna, birds and mammal species. The increase in activities in Contrecoeur's industrial sector is likely to increase the current pressures on these species.

The Sand Martin and the Copper Redhorse are particularly sensitive to pressures related to shoreline artificialization and erosion that could be accentuated with the subsequent phases of the project. As the Sand Martin has a large distribution area corresponding to almost all of Canada, the cumulative impacts of the project will be low. The Copper Redhorse will suffer cumulative impacts of the project of average importance; the largest seagrass beds in the Montreal River sector in Sorel should be preserved in the long term.

The Western Chorus Frog is particularly affected by the loss of habitats related to urbanization. The cumulative impact on the Western Chorus Frog is mainly based on future development pressures in areas near the terminal where the presence of this species is confirmed. The potential impacts are difficult to predict considering the legislation that protects the species and its habitat. It should be noted that future installations are not planned in the area of the Western Chorus Frog in the port territory.

The proposed additional mitigation measure is as follows:

- › Take into consideration the presence of special-status species in the development of a management plan for natural habitats in the MPA territory in Contrecoeur.

6.3.8 Agricultural Activities

The total cumulative impacts caused by all past, current and future projects, activities and events on agricultural activities are considered to be low since the implementation of the projects mentioned would gradually increase industrial-port activities within the Contrecoeur industrial area and an adjacent, well-defined agricultural area.

6.3.9 Public Infrastructure and Facilities

The total cumulative impacts caused by all past, current and future projects, activities and events on public infrastructure and facilities are considered high. Pressure due to goods transportation, activities of other projects in the area and the presence of workers will lead relevant authorities to adapt certain services, as well as road and rail infrastructures in order to meet the needs of their residents. However, these efforts will be made possible by new tax revenues at all government levels.

Additional mitigation measures undertaken by the MPA for the completion of the subsequent phases of the Port Expansion Project include the following:

- › Build a rail bridge on Route 132;
- › Participate in an eventual industry committee for the Contrecœur industrial area.

The follow-up program for Phases 2 and 3 of the MPA project will build on the Environmental and Social Management Plan (ESMP) prepared for Phase 1.

6.3.10 Public Safety

The total cumulative impacts on people's safety, caused by all past, current and future projects, activities and events are considered to be low. In fact, the strengthening of industrial activities related to the handling of containerized goods, as well as the presence of new SMEs near the Contrecœur Technopole does not pose a major risk to the safety of the closest residents. Alternative routes exist to bypass the Contrecœur industrial area and reach neighboring municipalities.

Additional mitigation measures undertaken by the MPA for the completion of subsequent phases of the Contrecœur Maritime Terminal Expansion Project include, the participation to an eventual committee composed of enterprises from the Contrecoeur industrial area. The follow-up program for Phases 2 and 3 of the MPA project will build on the ESMP prepared for Phase 1 and on the requirements of the competent authorities at the time of authorizing the various expansion phases.

6.3.11 Quality of Life of the Population

The total cumulative impacts on quality of life, caused by all past, present and future projects, activities and events are considered moderate since the identified projects will be located within or near the Contrecœur industrial area. Residents of Verchères near the industrial area are the ones who will experience the most direct impacts during Phases 2 and 3.

Additional mitigation measures undertaken by the MPA for the completion of subsequent phases of the Port Expansion Project include the following:

- › Maintenance of the vegetated barrier and noise barrier built during Phase 1;
- › Gradual increase in the electrification of machinery used for container handling.

The follow-up program for Phases 2 and 3 of the MPA project will build on the ESMP prepared for Phase 1 and on the requirements of the competent authorities at the time of authorizing the various expansion phases.

6.3.12 Component Valued by the Aboriginal Communities

The protection of the St. Lawrence River and its ecosystem is the valued component mentioned by Aboriginal peoples.

Planned projects (particularly Phases 2 and 3) will have several effects on the river and its ecosystem, including:

- › Increased GHG emissions;
- › Effects on the local hydrosedimentological regime;
- › Increased number of ships;

- › Increase in the amount of runoff waters;
- › Loss of approximately 25% of the vegetation currently present in the local study area and loss of aquatic grassbeds;
- › Additional encroachments into fish habitat;
- › Modification of the natural shoreline west of the existing wharf;
- › Temporary degradation of water quality during the construction of other projects in the local study area.

The St. Lawrence River and its ecosystem in the extended study area will therefore be affected by current and future projects, activities or events, especially Phases 2 and 3 of the project. However, it should be noted that the Aboriginal people's concern goes well beyond the study area and applies to the St. Lawrence River more generally.

Several additional mitigation measures are proposed in the previous sections to address the cumulative effects described above. These measures include, but are not limited to, the implementation of a management plan for natural habitats, compensation plans for the loss of wetlands, fish habitats and aquatic grassbeds. In addition, for some of the components or activities, including dredging and fish and its habitat, the mitigation measures for Phase 1 of the project will minimally have to be extended for Phases 2 and 3. In addition, the MPA will collaborate, where appropriate, in regional strategic studies that governments may undertake with respect to the cumulative effects of maritime infrastructure projects in the Province of Quebec.

6.4 Technological Risks

The sensitive elements of the environment are those which, because of their proximity, could be affected by a major accident occurring at the new port facilities. These include, for example, the population, buildings or public places, infrastructures, sensitive or protected environmental elements, or industrial or commercial activities involving the use, storage or transportation of hazardous materials. Table 6.8 lists the main sensitive components of the environment in the local study area.

Table 6.8 Main Sensitive Components of the Study Area, with the exception of activities involving hazardous materials

Category	Description	Distance from the APM Territory
Population and employees of other nearby industries and businesses	Residences on Route 132.	Adjacent to southwest.
	Residence on Montée Lapierre (currently uninhabited).	Adjacent to the south.
	Residence coupled with a autobody repair shop (2389 Marie-Victorin).	Adjacent to the northeast.
	Residences on Rang des Terres-Noires.	About 2 km southwest.
	Residences on Île Bouchard and Île Ronde.	To the west and south-west (about 1.5 km for the nearest).
	Employees of other industries/shops near the port.	Variable.

Table 6.8 Main Sensitive Components of the Study Area, with the exception of activities involving hazardous materials (cont.)

Category	Description	Distance from the APM Territory
Public infrastructures	Route 132 (Marie-Victorin).	On the eastern side.
	Montée Lapierre.	To the East.
	Montée de la Pomme-d'Or.	To the North.
	Autoroute de l'Acier (Highway 30).	Approximately 1.2 km to the Southeast.
	High-voltage electricity transmission lines and substations.	Main line along Highway 30, from which secondary lines serve local industries.
	Drinking water intake of the Contrecoeur filtration plant.	In the river, about 5 km downstream.
Private infrastructure	ArcelorMittal (3) and Logistec industrial water intakes (1).	At the bulk cargo wharf on the MPA territory.
	Communication antenna.	At least 500 m to the east.
	Telephone and cable lines.	Along Route 132.
	Air Liquide's gas line.	Along the railway.
	Gaz Métro's gas line.	Along Route 132.
Environmental components	St. Lawrence River.	Adjacent to the north-west.
	Wildlife habitats on the MPA territory.	Inside the territory.
	Wildlife habitats on Île Bouchard.	In the St. Lawrence opposite the project.
	Wildlife habitats on Contrecoeur Islands.	At approximately 2 km.

Sensitive environment components of the River section located between Contrecoeur and Sorel, in particular those defined in section 5 of CEAA (2012), are:

- › The Waterfowl Gathering Area (WFGA);
- › Important Bird and Biodiversity Area (IBA);
- › The heronry of Bouchard Island;
- › The protected areas in the Islands of Contrecoeur and Île Saint-Ours;
- › The muskrat habitats at various locations along the St. Lawrence section;
- › The shallow water seagrass beds (fish feeding areas).

This River section also includes Contrecoeur and Lavaltrie drinking water intakes, industrial water intakes at the existing wharf, as well as recreational and commercial fishing activities.

Tables 6.9 and 6.10 present the probabilities of the causes and severity of the potential consequences of accidents, while taking into account the preventive and protective measures in place, for containerized hazardous materials and ship fuel, respectively.

Table 6.11 presents the probabilities of causes and severities of the potential consequences related to accidents for maritime transport between Contrecoeur and Sorel. Table 6.12 presents the probabilities of the causes and the severity of the potential consequences related to accidents for road and rail transportation at the terminal site.

The prevention and protection measures planned for maritime transport are as follows:

- › Legislative framework in place to govern maritime transportation in Canada;
- › Transport Canada's Ship Control Program;
- › International maritime conventions;
- › Safety Management System in accordance with the International Safety Management (ISM) Code of the International Maritime Organization (IMO);
- › Mandatory pilotage by the Laurentian Pilotage Authority (LPA) for vessels on the St. Lawrence River;
- › Rules applicable to the minimum under-keel clearance of vessels on the St. Lawrence;
- › Post-Panamax vessels are subject to special crossing and by-passing rules in certain sections of the shipping channel with the aim of reducing hydraulic interactions between vessels.

The prevention and protection measures planned for road and rail transportation are as follows:

- › Verification of trucks and drivers;
- › Verification of the transport documents and of the certification of the driver's competence;
- › Reduced speed (variable according to existing conditions) and speed bumps;
- › Lighting (10 lux for the traffic lanes, 30 lux for the railway area);
- › Circulation plan;
- › Identification plates for dangerous substances (shipping document / manifest);
- › Pre-departure inspection of dangerous substances (80 identified);
- › Inspection / maintenance of equipment and training of employees working on the rail network.

Five levels are used to evaluate the probabilities of accidents, as recommended by the *Major Industrial Accidents Reduction Council* (MIARC): 1= improbable, 2= very rare, 3=rare, 4= not-frequent, 5= frequent. The severity of accidents is also scored on a scale of 1 to 5 according to the potential effects on people located outside of the project site, on workers at the port site and on the environment: 1= moderate, 2= serious, 3= important, 4= critical, 5= disastrous. Finally, these two scores were multiplied in order to obtain a risk quotation on a scale of 1 to 25:

- › 1 to 4: The green section represents accident scenarios for which the risk is considered low.
- › 5 to 13: The yellow section represents accident scenarios for which the risk is considered moderate and for which additional risk reduction measures could be put in place if the cost involved is reasonable when considering the anticipated benefits.
- › 14 to 25: The red section represents accident scenarios for which the risk is considered high and for which risk reduction measures must be put in place.

Table 6.9 Hazard Analysis Results – Containerized Hazardous Materials

Causes	Prevention measures to reduce such probability	Accidental Event	Potential Consequences	Protection Measures to reduce severity	Probability (1-5)	Severity ¹ (1-5)	Risk ² (1-25)	Comments
Earthquake or strong winds causing a container to fall.	<ul style="list-style-type: none"> › Storage height limited to 5 containers and particular attention paid to the alignment of the stacks; › No stacking for class 1, max height of 2 containers for class 5.1 and 5.2; › Storage limits per m2 according to pre-established grids; › Instructions to employees and visitors to stay alert during strong winds; › If strong winds are predictable, lower storage height applied. 	Leak, spill or explosion of containerized HAZMAT			1	-	Max 4	<ul style="list-style-type: none"> › Low-seismicity area; › For strong winds, risk mainly for empty containers; › Risk rated with maximum severity-(4) for spills in aquatic environments.
Bad stacking causing a container to fall.	<ul style="list-style-type: none"> › Storage height limited to 5 containers and particular attention paid to the alignment of the stacks; › No stacking for class 1, max height of 2 containers for class 5.1 and 5.2; › Storage limits per m2 according to pre-established grids; › Inspections and employee training. 				2	-	Max 8	<ul style="list-style-type: none"> › Risk rated with maximum severity-(4) for spills in aquatic environments.
Rain, snow, ice or fog affecting visibility or creating slippery conditions.	<ul style="list-style-type: none"> › Operations suspended under hazardous conditions (100 m critical visibility). 				1	-	Max 4	<ul style="list-style-type: none"> › Risk rated with maximum severity-(4) for spills in aquatic environments.
Container overturned as a result of ship colliding with the wharf or with another ship (mechanical problem, human error).	<ul style="list-style-type: none"> › Mandatory pilotage by the Laurentian Pilotage Authority for ships on the St. Lawrence River; › Docking station off the wharf; › Commercial ship inspection (Transport Canada). 				2	-	Max 8	<ul style="list-style-type: none"> › Risk rated with maximum severity-(4) for spills in aquatic environments.
Container is dropped or struck by a crane (mechanical breakdown, human error).	<ul style="list-style-type: none"> › Inspection and maintenance of equipment, employee training. 				2	-	Max 8	<ul style="list-style-type: none"> › Risk rated with maximum severity-(4) for spills in aquatic environments.
Container is dropped or impacted by mobile handling equipment (mechanical problem, human error, defective navigation system).	<ul style="list-style-type: none"> › Stacking by crane, which facilitates maneuvers within the stacks; › Defined circulation corridors with direction indicated; › Reduced speed (variable according to prevailing conditions); › Lighting (30 lux in the container yard); › Equipment inspection and maintenance; › Employee training. 				3	-	Max 9	<ul style="list-style-type: none"> › Risk rated with maximum severity-(3) for leaks or spills in terrestrial environments.

Table 6.9 Hazard Analysis Results – Containerized Hazardous Materials (cont.)

Causes	Prevention measures to reduce such probability	Accidental Event	Potential Consequences	Protection Measures to reduce severity	Probability (1-5)	Severity ¹ (1-5)	Risk ² (1-25)	Comments
Container is dropped or impacted while being trucked to the site (mechanical problem, human error).	<ul style="list-style-type: none"> › Truck checks; › Pre-departure inspection of all 80 materials identified; › Reduced speed (variable according to prevailing conditions) and speed bumps; › Lighting (10 lux on road); › Traffic plan; › HM identification plates, shipping document (carrier manifest). 	Leak, spill or explosion of containerized HAZMAT			3	-	Max 9	› Risk rated with maximum severity- (3) for leaks or spills on land.
Container is dropped or impacted while being rail transported to the site (derailment, wrong switching, mechanical problem, human error).	<ul style="list-style-type: none"> › Equipment inspection/maintenance and training of employees working on the railway network; › Reduced speed; › Lighting (30 lux for the railway area); › HAZMAT identification plates. 				2	-	Max 6	› Risk rated with maximum severity- (3) for leaks or spills on land.
Accidents at nearby industrial facilities causing a domino effect at the Port (explosion at Yara).	<ul style="list-style-type: none"> › Report to the MPA Control Center; › Notice to the Coast Guard (Search and Rescue), ECCC and the MDDELCC. 				1	-	Max 4	› Risk rated with maximum severity-(4) for spills in aquatic environments.
Vandalism, terrorism.	<ul style="list-style-type: none"> › Site fenced, site access control station operational 24 hours a day, surveillance systems (cameras, drone), security guards. 				1	-	Max 4	› Container ports are not specifically targeted by terrorism; › Risk rated with maximum severity-(4) for spills in aquatic environments.
All of the above.	<ul style="list-style-type: none"> › HAZMATs identification system; › Camera monitoring system; HAZMAT training; › Special monitoring of certain sensitive materials; › Scanning of imported products containers for radioactivity; › Inspector present on site to apply HAZMAT-specific procedures; › Presence of a MPA fire prevention inspector mandatory during the handling of certain HAZMATs (explosives, liquefied petroleum gases, radioactive materials, etc.); › Segregation management and control system. 							

Table 6.9 Hazard Analysis Results – Containerized Hazardous Materials (cont.)

Causes	Prevention measures to reduce such probability	Accidental Event	Potential Consequences	Protection Measures to reduce severity	Probability (1-5)	Severity ¹ (1-5)	Risk ² (1-25)	Comments
			Explosion (HAZMAT, Class 1) - Overpressures cause an explosion, injuries to site workers and residents, and damage to property.	<ul style="list-style-type: none"> › Area remote from the population. 	-	1 – 3 (P, W)	--	<ul style="list-style-type: none"> › Severity varies depending on quantity involved; › Relatively few HAZMATs belonging to this category, especially Class 1.1 materials, transit via containers.
		Leak, spill or explosion of containerized HAZMAT	Flammable liquefied gas leak (HAZMAT, class 2.1) – Pool fire or torch fire, formation and dispersion in the atmosphere of a cloud of flammable gas (flash fire if ignition is delayed, explosion if ignited in a congested/confined environment).	<ul style="list-style-type: none"> › Response equipment (HAZMAT vehicle, personal protection); weather station; › Fire protection system and fire brigade for flammables; area remote from the population. 	-	1 – 3 (P, W)	-	<ul style="list-style-type: none"> › Severity varies depending on quantity involved.
			Flammable liquefied gas leak (HAZMAT class 2.3) - Formation and dispersion of a toxic gas cloud into the atmosphere.		-	1 – 3 (P, W)	-	<ul style="list-style-type: none"> › Severity varies depending on quantity involved.
			Spill of a liquid or solid class 3 to class 9 HAZMAT into the St. Lawrence River.	<ul style="list-style-type: none"> › Intervention by Eastern Canada Response Corporation (ECRC); › Notification to owners of water intakes downstream. 	-	1 – 4 (E, P)	-	<ul style="list-style-type: none"> › Severity varies depending on HAZMAT type and quantity involved.
			Spill of a liquid or solid class 3 to class 9 HAZMAT on the wharf.	<ul style="list-style-type: none"> › Response equipment (spill and recovery kits, HAZMAT vehicle, personal protection); › Cleaning company; › Fire protection system (portable fire extinguishers, hoses, water hydrants, foam); fire brigade; › Mobile retention tank for spills (pool); › Detection and communication equipment; › Sorel-Tracy HAZMAT equipment. 	-	1 – 2 (W, E)	-	<ul style="list-style-type: none"> › Severity varies depending on HAZMAT type and quantity involved.

Table 6.9 Hazard Analysis Results – Containerized Hazardous Materials (cont.)

Causes	Prevention measures to reduce such probability	Accidental Event	Potential Consequences	Protection Measures to reduce severity	Probability (1-5)	Severity ¹ (1-5)	Risk ² (1-25)	Comments
			Explosion (HAZMAT class 1) - Overpressure generates an explosion, injuries to site workers and the population, property damage.	<ul style="list-style-type: none"> › Area remote from the population. 	-	1 – 3 (P, W)	-	<ul style="list-style-type: none"> › Severity varies depending on quantity involved; › Relatively few HAZMATs belonging to this category, especially Class 1.1 materials, transit via containers.
		Leak, spill or explosion of containerized HAZMAT.	All of the above consequences.	<ul style="list-style-type: none"> › Report to the MPA Control Center; › Notification to the Coast Guard (Search and Rescue), ECCC and the MDDELCC; › The Contrecoeur Fire Department has two mutual assistance agreements. The first one is mutual assistance with the RCM, which is composed of Verchères', Varennes', Sainte-Julie's and Saint-Amable's fire departments. The second is mutual assistance with the fire departments of Sorel-Tracy, Saint-Roch, Saint-Antoine and Saint-Marc-sur-Richelieu. Under these mutual assistance agreements, the Contrecoeur fire department can mobilize about 50 firefighters in 45 minutes; › Detection equipment: Safe Site (VOC, CO, gaseous radiation, fuel gas, lack of O2, chemical warfare agent, industrial chemicals), Altair 4 gas detector (fuel, CO, H2S, O2), MiniRAE 2000 (VOC), identiFINDER R300, ACE-ID. 				

Notes:

¹ Severity is specified for persons outside the port (P), for workers at the port (W) or for the environment (E).

² The maximum risk is rated only at a probability level, by multiplying each probability (cause) with the maximum severity (consequence).

HAZMAT = Hazardous material

Table 6.10 Hazard Analysis Results – Ship Fuel (marine diesel, fuel oil, liquefied natural gas [LNG])

Causes	Prevention Measures	Accidental Event	Potential Consequences	Protection Measures	Probability (1-5)	Severity * (1-5)	Risk (1-25)	Comments
Grounding (poor weather, mechanical breakdown or human error) and loss of fuel.	<ul style="list-style-type: none"> › Mandatory pilotage by the Laurentian Pilotage Authority for ships on the St. Lawrence River; › Docking station off the wharf; › Commercial ship inspection (Transport Canada, International Maritime Organization (IMO) standards supervised by classification societies). 	Fuel spill in the river from a ship.			1	-	Max 4	› Risk rated with maximum severity- (4).
Collision with the wharf (poor weather, mechanical breakdown or human error) and loss of fuel.					1	-	Max 4	› Risk rated with maximum severity- (4).
Collision with another ship (poor weather, mechanical breakdown, human error) and loss of fuel.					1	-	Max 4	› Risk rated with maximum severity- (4).
Mechanical breakdown of ship causing a loss of fuel (without collision or grounding).	› Commercial ship inspection (Transport Canada).				4	-	4	› Risk rated with a severity of 1 (minor spill only in the absence of collision).
Vandalism, terrorism.	› Site fenced, Site access control station operated 24 hours a day, Surveillance systems (cameras, drone).				1	-	Max 4	› Container ports are not specifically targeted by terrorism; › Risk rated with maximum severity- (4).
			› Major fuel slick (diesel fuel, fuel oil) in the St. Lawrence River and contamination of the water.	› Any incident/pollution should be reported to the MPA Control Center;	-	3 – 4 (E, P)	-	
			› Minor fuel slick (diesel fuel, fuel oil) in the St. Lawrence River and contamination of the water.	› Notification of the Coast Guard (Search and Rescue), ECCC and the MDDELCC;	-	1 – 2 (E)	-	
			› Fuel slick (diesel fuel, fuel oil) in the water, ignition and pool fire on the water.	› Intervention by ECRC;	-	1 – 4 (E, W)	-	
			› Major leakage of LNG, formation of a cloud of flammable gas or LNG fire on the ship or on the water.	› Notification to owners of downstream water intakes (city, industries);	-	1 – 4 (E, W)	-	
			› Major leakage of LNG, formation of a cloud of flammable gas or LNG fire on the ship or on the water.	› Fire equipment on ship ready for use.	-	3 – 4 (W, P)	-	
			› Minor leakage of LNG, formation of a cloud of flammable gas or LNG fire on the ship or on the water.	› Any incident should be reported to the MPA Control Center;	-	3 – 4 (W, P)	-	
				› Notification of the Coast Guard (Search and Rescue), ECCC and the MDDELCC;	-	1 – 2 (W)	-	
				› Flammable gas detectors on ships using LNG;				
				› LNG fire-fighting equipment on board such ships (powder fire extinguishers);				
				› Dispersion of a flammable gas cloud with water.				

Table 6.10 Hazard Analysis Results – Ship Fuel (marine diesel, fuel oil, liquefied natural gas [LNG]) (cont.)

Causes	Prevention Measures	Accidental Event	Potential Consequences	Protection Measures	Probability (1-5)	Severity* (1-5)	Risk (1-25)	Comments
Overfilling of the ship's tank during refueling by barge or tanker truck.	<ul style="list-style-type: none"> › Emergency stop valve on refueling equipment; › Constant presence of operator during refueling; › Testing of the competence of refueling companies' employees; › High-level detector. 	Fuel spill during ship refueling operations.			3	-	Max 6	› Risk rated with a severity of 2 (minor fuel slick in the river).
Mechanical breakage of a transfer hose or other transfer equipment during refueling.	<ul style="list-style-type: none"> › Emergency stop valve on refueling equipment; › Constant presence of operator during refueling; › Periodic equipment inspection; › MPA Practices and Procedures Handbook; › Breakaway couplings for LNG hoses. 				4	-	4	› Risk rated with a severity of 1 (small fuel spill on the wharf).
Operational error during refueling Poor connection, poor draining of the hose during disconnection.	<ul style="list-style-type: none"> › Mandatory qualified staff; › Safety procedures in place; › Drip containers under pipe fittings. 				4	-	4	› Risk rated with a severity of 1 (minor fuel spill on the wharf).
Collision of the fuel tanker with mobile equipment on the wharf or a falling container.	<ul style="list-style-type: none"> › Safety area with driving or navigating ban implemented around refueling equipment; › Lighting standards. 				3	-	6	› Risk rated with a severity of 2 (major fuel spill on the wharf).
Collision of refueling barge with another ship or falling container.					1	-	Max 4	› Risk rated with maximum severity- (4).
Vandalism, terrorism.	<ul style="list-style-type: none"> › Site fenced, Site access control station operated 24 hours a day, Surveillance systems (cameras, drone). 				1	-	Max 4	<ul style="list-style-type: none"> › Container ports are not specifically targeted by terrorism; › Risk rated with maximum severity- (4).
Lightning.	<ul style="list-style-type: none"> › In the event of a storm, truck and ship grounding must be disconnected and pumping must cease. 				1	-	Max 4	› Risk rated with maximum severity- (4).
Ignition following a leak.	<ul style="list-style-type: none"> › No smoking policy during refueling. › Explosion-proof equipment when required. 				1	-	Max 4	<ul style="list-style-type: none"> › Fuel with little volatility; › Risk rated with maximum severity- (4).

Table 6.10 Hazard Analysis Results – Ship Fuel (marine diesel, fuel oil, liquefied natural gas [LNG]) (cont.)

Causes	Prevention Measures	Accidental Event	Potential Consequences	Protection Measures	Probability (1-5)	Severity * (1-5)	Risk (1-25)	Comments
		Fuel spill during ship refueling operations	› Major fuel slick (diesel fuel, fuel oil) in the St. Lawrence River and contamination of the water.	› Intervention by ECRC; › Notification of owners of downstream water intakes; › Fire equipment on ship ready for use; › Availability of booms, dispersants.	-	3 – 4 (E, P)	-	
	› Minor fuel slick (diesel fuel, fuel oil) in the St. Lawrence River and contamination of the water.		-		1 – 2 (E, P)	-		
	› Fuel slick (diesel fuel, fuel oil) in the water, ignition and pool fire on the water.		-		1 – 4 (E, W, P)	-		
			› Major fuel spill (diesel, fuel oil) on the wharf.	› Drip pan at each end of the hose; › Spill kits, sump covers, response equipment (HAZMAT vehicle, personal protection); › Cleaning companies.	-	2 (E)	-	
			› Minor fuel spill (diesel, fuel oil) on the wharf.		-	1 (E)	-	
			› Fuel spill (diesel oil, fuel oil) on the wharf, fire ignition and pool fire.	› Fire protection system (portable fire extinguishers, hoses, hydrants, foam), fire brigade, industrial mutual assistance.	-	1 – 2 (W, E)	-	
			› Major leakage of LNG, formation of a flammable gas cloud or LNG fire on the ship, on the wharf or on the water.	› Flammable gas detectors on tanker trucks and ships using LNG; › LNG firefighting equipment on board ships and at the wharf (powder fire extinguishers); › Dispersion of flammable gas cloud with water jet.	-	3 – 4 (W, P)	-	
			› Minor leakage of LNG, formation of a flammable gas cloud or LNG fire on the ship, on the wharf or on the water.		-	1 – 2 (W)	-	
			› All of the consequences above.	› All incidents should be reported to the MPA Control Center; › Notification of the Coast Guard (Search and Rescue), ECCC and the MDDELCC; › Communication plan for the perimeter at risk; › Evacuation plan to be put in place according to the severity of emergencies.				

Notes:

¹ Severity is specified for persons outside the port (P), for workers at the port (W) or for the environment (E).

² The maximum risk is rated only at a probability level, by multiplying each probability (cause) with the maximum gravity (consequence).

Table 6.11 Causes and Potential Consequences of Accidental Events for Maritime Transport between Contrecoeur and Sorel

Accidental Event	Potential Cause	Potential Consequence	Probability	Gravity ¹	Risk (1-25)
Spill of liquid fuel or lubricating oil from the container ship.	Stranding or collision with another vessel or fixed structure resulting in damage to the container ship due to: <ul style="list-style-type: none"> › a human error (navigation); › a mechanical problem with the engine or the rudder; › bad weather conditions (fog). 	Contamination of the St.Lawrence River; Impact on aquatic and riparian fauna and flora, water intakes, fishing activities.	1	3 (E, P)	3
Spill or leak of LNG (container ship fuel).	Stranding or collision with another vessel or with a fixed structure resulting in damage to the container ship due to: <ul style="list-style-type: none"> › a human error (navigation); › a mechanical problem with the engine or the rudder; › bad weather conditions (fog). 	Formation and dispersion in the atmosphere of a cloud of flammable gas (flash fire if delayed ignition, explosion if ignition in a congested / confined environment).	1	2 (P, W)	2
Spill, leak, fire or explosion of a dangerous containerized substance.	Stranding or collision with another vessel or fixed structure resulting in damage to the container ship due to: <ul style="list-style-type: none"> › a human error (navigation); › a mechanical problem with the engine or rudder; › bad weather conditions (fog). 		1		Max 3 ²
	Drop of a container without stranding or collision due to: <ul style="list-style-type: none"> › a strong swell and destabilization of the stacks of containers; › the breakage of twist locks. 		1		
	Loss of containment of the substance in the container then leak to the St-Lawrence due to: <ul style="list-style-type: none"> › the poor stowage of the goods inside the containers. 		1		
	Loss of tightness of a tank container during transport resulting in small leaks due to: <ul style="list-style-type: none"> › wear; › a design / manufacturing default. 		1		
		Class 1 (explosives): overpressure causing injury to ship's workers, material damage to the ship.		3 (P, W)	
		Class 2.1 (flammable liquefied gas): pool fire, formation and dispersion in the atmosphere of a flammable gas cloud (flash fire if delayed ignition, explosion if ignition in a congested / confined environment).		2 (P, W)	
		Class 2.3 (toxic liquefied gas): formation and dispersion in the atmosphere of a toxic gas cloud.		2 (P, W)	
		Class 3 to 9 (liquid or solid hazardous substance): contamination of the river; impact on aquatic and riparian fauna and flora, water intakes, fishing activities.		3 (E, P)	
Spill of a dangerous substance from another ship.	Collision with a container ship due to: <ul style="list-style-type: none"> › a human error (navigation); › a mechanical problem with the engine or the rudder; bad weather conditions (fog). 	Very variable consequences depending on the type of substance released and the quantity involved.	1	Max 4 (E)	Max 4

⁽¹⁾ Maximum severity evaluated for (E) environment; (P) population; (W) workers.

⁽²⁾ Assessed with maximum probability and severity.

Table 6.12 Causes and Potential Consequences of Accidental Events for Road and Rail Transport on the Terminal Site

Accidental Event	Potential Cause	Potential Consequence	Probability	Gravity ²	Risk (1-25)
Spill of liquid fuel ¹ , lubricating oil.	Collision with another vehicle or with a fixed structure causing fuel tanks to break due to: <ul style="list-style-type: none"> › a mechanical problem; › a human error, misdirection (rail only); › bad weather conditions (fog). 	Contamination of soils and ditches on the site.	2	1 (E)	2
		Fire if ignition.		1 (W)	
Spill or leak of LNG ¹ .	Collision with another vehicle or with a fixed structure causing fuel tanks to break due to: <ul style="list-style-type: none"> › a mechanical problem; › a human error, misdirection (rail only); › bad weather conditions (fog). 	Formation and dispersion in the atmosphere of a cloud of flammable gas (flash fire if delayed ignition, explosion if ignition in a congested / confined environment).	2	1 (P, W)	Max 2
		Pool fire on the ground if ignition.		1 (P, W)	
Spill, leak, fire or explosion of a dangerous containerized substance.	Collision with another vehicle or with a fixed structure causing fuel tanks to break due to: <ul style="list-style-type: none"> › a mechanical problem; › a human error, misdirection (rail only); › bad weather conditions (fog). 		1		
	Fall of a container without collision due to: <ul style="list-style-type: none"> › a unsecured container on the wagon or truck; › a derailment (rail transportation only); › a breakage of twist locks ; › a human error. 		1		Max 2 ³
	Loss of containment of the substance in the container and then to the ground due to: <ul style="list-style-type: none"> › poor stowage of the goods inside the containers. 		1		
	Loss of watertightness of a tank container during transport resulting in small leaks due to: <ul style="list-style-type: none"> › wear; › a design / manufacturing default. 		1		
		Class 1 (explosives) : Overpressure causing injury to terminal workers, surrounding businesses and Marie-Victorin road users, property damage.		1 (P, W)	
		Class 2.1 (flammable liquefied gas) : pool fire, formation and dispersion in the atmosphere of a cloud of flammable gas (flash fire if delayed ignition, explosion if ignition in a congested / confined environment).		1 (P, W)	
		Class 2.3 (toxic liquefied gas) : formation and dispersion in the atmosphere of a cloud of toxic gas.		1 (P, W)	
		Class 3 to 9 (liquid or solid hazardous substance): contamination of soil and ditches on the site.		2 (E)	

⁽¹⁾ Fuel used or transported by tanker trucks for ship refueling;

⁽²⁾ Maximum severity evaluated for (E) environment; (P) population; (W) workers;

⁽³⁾ Assessed with maximum probability and severity.

Some accidents involving hazardous materials could affect people outside the port, nearby industries or the environment. However, the potential consequences are limited by the amount of hazardous materials in a container. The MPA has a contingency plan for its current operations at the Contrecœur terminal. The objectives of the plan are as follows:

- › Ensure employees, contractors, external stakeholders and the public safety;
- › Reduce the risk of property damage and impact on the environment and the community in the event of an accident;
- › Plan emergency procedures to minimize response and recovery times and costs;
- › Define the responsibilities of internal and external responders in the planning and implementation of an emergency response.

This plan will be modified to take into account new equipment and operations of the Contrecœur Maritime Terminal Expansion Project.

7 Monitoring and Follow-up Program

The Environmental and Social Management Plan (ESMP) is a tool designed to guide the implementation of the project. It describes the measures, actions and means that will be implemented to prevent and mitigate the negative environmental impacts associated with the project, but also to optimise the benefits or positive impacts. It is divided into separate management plans (MPs) for activities or components that deserve special attention due to the issues and requirements associated with them. Management plans are grouped into three categories:

1) General Management Plans:

- MP # 01 Communication with Stakeholders (non-aboriginal);
- MP # 02 Complaint Management;
- MP # 03 Local Benefits;
- MP # 04 Health and Safety of Employees and Workers during Construction;
- MP # 05 Health and Safety of Local Populations;
- MP # 06 Aboriginal Peoples.

2) Management Plans for Specific Works:

- MP # 07 Deforestation;
- MP # 08 Earthworks, Excavation and Leveling Works;
- MP # 09 In-Water Works;
- MP # 10 Dredging Works;
- MP # 11 Transportation and Storage of Dredged Material;
- MP # 12 Equipment Maintenance and Refueling;
- MP # 13 Demobilization and Rehabilitation of Work Areas.

3) Management Plans for Specific Environmental Components (physical, biological or human environments):

Physical Environment

- MP # 14 Air Quality;
- MP # 15 Greenhouse Gas Emissions;
- MP # 16 Noise and Vibration;
- MP # 17 Surface Waters;
- MP # 18 Contaminated Soils.

Biological Environment

- MP # 19 Vegetation Cover and Wetlands Protection and Restoration;
- MP # 20 Reduction of the Spread of Invasive Alien Species;
- MP # 21 Fish and Fish Habitat;
- MP # 22 Terrestrial Wildlife.

Socioeconomic Environment

MP # 23 Transportation and Traffic;
MP # 24 Residual Materials;
MP # 25 Residual Hazardous Materials;
MP # 26 Heritage and Archaeological Sites;
MP # 27 Visual Environment.

7.1 Monitoring Program

Overall, the monitoring program goal is to protect the environment during the construction phase of the Contrecoeur Maritime Terminal Expansion Project. In particular, it ensures the proper conduct of works, the operational efficiency of the equipment and facilities in place, and the monitoring of any environmental disturbance caused by the construction or operation of the project. It aims to ensure compliance with the following:

- › Requirements pertaining to applicable laws and regulations;
- › Conditions set by the regulatory authorities;
- › Mitigation measures proposed in the environmental impact assessment study;
- › Other MPA commitments.

Environmental monitoring will be adjusted in accordance with the phases of the project and with the anticipated environmental issues.

During the pre-construction phase, the MPA will ensure the integration of all the mitigation measures specified in the Environmental Impact Assessment in the plans, estimates, tendering documents and other contract documents, as well as of the conditions set out in the various authorizations and permits granted, where applicable. Environmental clauses will be integrated in the construction specifications. In addition, the key construction staff already assigned to the project (engineers and site managers, etc.) will be made aware of the main environmental concerns and environmental protection measures identified.

Monitoring activities conducted during the construction phase will aim to ensure that all environmental protection provisions will be carried out according to the frequency and terms determined based on the evolution of the works and environmental constraints encountered. A monthly monitoring report will be produced to document field observations and work progress. The MPA will keep the relevant authorities informed of work progress and the main events that have occurred throughout the construction phase.

Upon completion of the construction works, the MPA will ensure work areas are rehabilitated without delay, in accordance with the measures stated in the present study, as well as with the authorizations and environmental specifications.

The MPA will carry out regular inspections once in the terminal is in operation, in compliance with its environmental management plan.

In the event of closure, a decommissioning plan will be submitted to the authorities for approval, based on the regulations in force at the time of such decommissioning. The MPA will be responsible for the environmental monitoring of the decommissioning process and will ensure that appropriate mitigation measures are applied when required.

7.2 Compensation Program

Various compensation plans will be implemented to offset residual impacts of the Contrecoeur Maritime Terminal Expansion Project. These plans address fish habitat, aquatic grassbeds and Copper Redhorse habitat, as well as wetlands.

To offset the loss of fish habitat, the MPA intends to capitalize on its reserve habitat project. This project began in 2008 and aimed at creating and improving wildlife habitats on five different islands under the MPA management, located in the northwestern part of the archipelago of the Boucherville Islands.

With respect to the potential losses of Copper Redhorse habitat (aquatic grassland) generated by the construction or the operation of the new terminal in Contrecoeur, compensation will consist in the creation or restoration of the Copper Redhorse habitat in the region. A partnership has been established with the des Seigneuries Priority Intervention Zone (ZIP) to identify potential intervention sites and possible projects to achieve compensation in the Contrecoeur area. The MPA intends to identify and implement the offset project, with DFO's approval, prior to dredging.

Under the federal policy on wetland conservation, a compensation plan for residual losses of wetland will be identified and implemented. This compensation plan is not yet identified at this stage of the project.

7.3 Environmental and Social Monitoring Program

The environmental and social monitoring program will target the most valued components of the environment for which a residual impact is anticipated. Table 7.1 presents the components most likely to be monitored if necessary. It should be noted that the Aboriginal Peoples want to be kept informed of the results of these monitoring activities, and eventually participate in them.

Table 7.1 Components to be Subject to Environmental and Social Monitoring

Component	Construction	Operation	Environmental Monitoring
Air quality and climate	X	X	> Monitoring of dust (PM ₁ , PM _{2.5} , PM ₁₀ , PM _T).
Noise environment	X	X	> Monitoring of noise at the nearest receivers.
Water quality	X	X	> Monitoring of TSS during dredging activities; > Monitoring of runoff water discharge during operation.
Hydrosedimentary conditions		X	> Monitoring of hydrosedimentary conditions (velocity and direction of currents, sediments, erosion) in the shoreline downstream of the new wharf.
Terrestrial vegetation and wetlands		X	> Monitoring the spread of invasive alien species; > Monitoring of the rehabilitation process and drainage conditions in wetlands adjacent to the new terminal; > Monitoring of protected or restored wetlands to compensate for residual project losses.
Aquatic grassbeds and habitat of the Copper Redhorse		X	> Monitoring of their surface area and condition in relation to maintenance dredging activities and the presence of the new wharf and approach area.
Wildlife species		X	> Monitoring of wildlife populations on the MPA territory.
Stakeholders and local benefits	X	X	> Monitoring of complaints, economic benefits and jobs; > Creation of a technical committee during the construction that will eventually become a good neighboring committee during the operation phase of the terminal.
Economic benefits for Aboriginal Peoples	X	X	> Monitoring economic benefits and jobs for Aboriginal communities.



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